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CONSTRUCTION REPORT ON SPS-5 PROJECT 340500 NEW JERSEY DEPARTMENT OF TRANSPORTATION I-195 WEST BOUND

From East of Old York Road (Exit 8 to Allentown and Robbinsville) to East of Imlaystown-Hightstown Road (Exit 11)

Report Prepared By:
North Atlantic Region Contractor
Under Contract No. DTFH 61-92-C00007

Report Prepared For:
Department of Transportation
Federal Highway Administration
LTPP Division
Turner Fairbanks Resource Center
6300 Georgetown Pike
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December 1994

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December 13, 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: Construction Report; SPS-5 Project 340500, I-195 WB, Allentown, New Jersey, August 1992

Dear Mr. Symons:

Forwarded enclosed are two copies of the Construction Report for the SPS-5 project 340500, I-195 WB at Allentown, NJ, August 1992.

The report is prepared in accordance with the Guidelines, which envisages it's inclusion as part of an overall report on the SPS-5 Experiment. It thus covers only those features which are different from the model outlined in the Experiment 5 Guidelines. Details of materials and test results are obtainable from the NIMS database. Some laboratory testing by the FHWA-LTPP Contractor is still ongoing.

Performance monitoring data is available in either RIMS or NIMS.

Yours Sincerely,

for William A. Phang
Program Manager
Pavement Management Systems Limited

WAP/tf

enclosure

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15. Supplementary Notes

The NJ DOT Bureau of Materials staff and the Resident Engineers staff were particularly helpful in the collection of material samples and in the taking of levels and paving data.

16. Abstract

The NJ DOT SPS-5 project is a part of the rehabilitation of I-195 West Bound from East of Old York Road (Exit 8 to Allentown and Robbinsville), about 3 miles to Exit 11, the Imlaystown Hightstown Road. The project consists of 8 test sections with overlays of virgin asphalt concrete and 30/70 recycled asphalt mixes, laid in two thicknesses of 2 and 5 inches, over the existing asphalt pavement treated to minimum or intensive surface preparation (milling and replacement). In addition, there were two supplemental test sections and a control section of the existing pavement. One supplemental section was of the design used for the rest of the contract; the other was of an open graded rubberized friction course.

Construction was carried out in July and August 1992 by Trap Rock Industries, Inc, Kingston, NJ. The milling sub-contractor was Schifano, NJ. Heavy traffic (27,040 vehicles per day) hampered truck deliveries and frequent mix changes required timely communication between plant and job-site.

Materials sampling and testing plans for pre-construction, during and post-construction are included in the report.

17. Key Words	18. Distribution Statement
SPS-5, Asphalt Concrete Overlays, Recycled Mixes, Intensive Surface Preparation, Mill and Replace, Rubberized Open Graded Friction Course.	

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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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NEW JERSEY DEPARTMENT OF TRANSPORTATION
WITH SUPPLEMENTAL SECTIONS
I-195 WBL Allentown
Summer of 1992

INTRODUCTION

The I-195 NJ DOT SPS-5 Project 340500 is the rehabilitation of an asphalt concrete pavement which is in fair condition. The project lies in a Wet-Freeze environmental area. In addition to the 8 test sections of the main experiment which incorporates intensive and minimum surface preparations (but no minimum surface preparations were needed or done) 2 thicknesses of overlay (2" and 5") and overlays with virgin or 30/70 recycled asphalt mixes, there is a control section and 2 supplemental test sections. The control test section (i.e. a section of existing pavement) has no surface preparation or overlay but will have the normal maintenance as, and when required. It's performance will be monitored along with the other test sections. Both of the supplemental test sections require intensive surface preparation. One has the normal NJ overlay design and the other a rubberized open-graded friction course.

The project is in the West bound lane from East of Old York Road (Exit 8 to Allentown and Robbinsville) station 533+30 to just East of Imlaystown-Hightstown Road (Exit 11) station 690+00, a distance of about 3 miles, see Figure 1, (chainage is in opposite direction to traffic). It is a 4 lane divided highway with 2 lanes in each direction.

The West bound roadway consists of 2-12' asphalt surfaced lanes with a 3' inside shoulder and a 12' outside shoulder. The existing pavement structure and the inside shoulder consisted of 9" of asphaltic concrete (3" bituminous surface course and 6" of stabilized bituminous base course) on 5" of pit run unbound granular base and 5" of pit run unbound granular subbase on a predominantly silty sand subgrade. The outside shoulder consisted of 2" of stabilized bituminous base course on 12" of pit run gravel base on 5" of a pit run gravel subbase on the silty sand subgrade. Both the pit run gravel base and the pit run gravel subbase appeared to have been sweetened to meet the gradation requirements with the blending of the stone either at the pit or on the road. Subdrains were already in place in the cut between stations 569+00 - 586+00. Additional parallel subdrains were installed under this contract to improve the subgrade drainage.

The highway carries 27,040 vehicles per day (2 directions) with 3.75% heavy trucks. There is an estimation of 1,854,490 18 kip ESAL applications for the design lane over the 20 year design period. The asphalt surfacing exhibited wheel track rutting and longitudinal meandering cracking mainly in the wheel paths. The foreground in Photo 1 illustrates typical cracking distresses.

The LTPP test sections are all located between stations 533+30 and 656+50 and there are no intersecting roadways. There are however 2 underpass structures, the Dog Hill Road at 592+80 - 594+85 and the abandoned railroad at 608+25 - 609+60. Station 656+50 - 690+00 (the East end of the project) is outside the experiment test sections and it involved the rehabilitation of the existing West bound lane as well as the West bound off and on ramps of Exit 11, the Imlaystown-Hightstown Road.

The project is located in an outwash geological formation. The terrain is relatively flat to gently rolling with slight grades, 3 large curvatures and only shallow cuts and fills.

The contract was awarded to Trap Rock Industries, Inc. Laurel Avenue, Kingston, NJ 08528. Mr. Bill Grandinetti was the Superintendent, Mr. Sam Cooper, the Foreman, Mr. Wayne Byard, Head of Quality Control, and Mr. Mike Jopko, was the Materials Technician. Mr. Stephen J. Trapani was in charge of the testing laboratory for Trap Rock Industries at Kingston. Milling for the intensive surface preparation was done by Schifano, NJ. A pre-construction conference was held at the Regional District Office in Freehold on June 2, 1992, with all those involved with the project, Contractor and State staff, to ensure that all of the requirements could be met on schedule.

Ms. Eileen Connolly from the NJ Bureau of Materials and the LTPP Coordinator, coordinated the project task related to the LTPP activities. Mr. Frank Palise, the Regional Materials Engineer, from Region 3, arranged for the sampling of the materials for the Materials Reference Library, for the nuclear density/moisture tests, for the 5 point level measurements and for the plant and road inspections. Ms. Connolly provided the skid data and Mr. Palise the rolling straight edge testing data. The mix designs were done at the Regional Laboratory at Freehold. Mr. Paul Hoffman was the Resident Engineer, Mr. Jim P'simer was the Plant Inspector at the Kingston plant and Mr. John Giambelluca at the Florence Plant.

The Trap Rock Industries asphalt plant located at their quarry in Kingston, NJ produced all of the mixes for the project except the rubberized open graded mix (as shown in Photo 1). It is a portable automated recycling drum mixing plant made by Standard Havens and has a capacity of 350 tons/hr (317.5Mg/hr). This asphalt plant has only 1 storage bin so it is necessary to clear the storage bin, the drum and the conveyers at each change of mix. The haul distance from the plant to the job sites is 32 miles (51.5km).

The rubberized open graded surface course mix was produced at the STA-SEAL Plant (owned by Trap Rock Industries) at Florence, NJ located 18 miles (29km) from the job. The AC from the storage tank was metered and blended with finely ground rubber through the "Ultrafine" Metering and Blending Unit made by Rouse Rubber Industries, Vicksburg, Mississippi who also produced the rubber additive.

Paving equipment included the Barber Greene BG-760 Paver, 2 Cat BC 534 10-ton (9.1Mg) double drum vibratory rollers and a small Sakai 2 1/2 ton (2.3Mg) vibratory roller used to compact the sloped wedge of the 3" (76mm) base course pavement. Equipment for the milling operation included a CMI PR800 FL with a 12'6" (3.8m) cutting head and a CMI PR500 FL with a 6' (1.8m) cutting head. The milling equipment was supplied and operated by the subcontractor, Schifano, NJ who also supplied the water tank, front end loader to pick up the loose material and 2 powerful steel broom and vacuum pump trucks.

The contract included 2 test pits for pre-construction sampling, TP1 and TP2. These 2 test pits were made on July 13 and 14. The contractor supplied traffic control, sawing and excavating equipment and manpower. New Jersey DOT took all the samples to the Bureau of Materials at Trenton and carried out the nuclear density and moisture measurements.

PROJECT DETAILS

Layout Plan

Beginning at the East end of the project and situated in the West bound lane, the test sections are laid out so that the 5" (127mm) overlays are mainly located at the East end of the project. The 2" (51mm) overlays are mainly in the center of the project. The intensive surface preparation test sections requiring 2" (51mm) of milling and replacement, except for the rubberized test section which required only 1" (25mm) of milling, are spread out throughout the project as shown in the lower portion of Figure 2.

The mixes are either virgin or recycled mixes as required by the SPS-5 experiment. The beginning and ending stations of each surface preparation treatment, mix changes and overlay thicknesses are also shown in the lower part of Figure 2 and Table 1. The beginning and ending stations for each test section as well as the transition lengths between each test section is shown in the upper part of Figure 2. It should be noted that the transition lengths are not uniform and that 2 transition lengths are less than the desired 200' (61m) i.e. 90' (27m) and 150' (46m). Tapers of at least 100' (30.5m) and 150' (46m) were specified for a 2" (51mm) and 3" (76mm) difference in levels respectively between overlays of different thicknesses.

Layout by Contractor

Thirty inch stakes were placed by the contractor at 50' (15.3m) intervals throughout the full length of the project. They were placed in the median strip 6' (1.8m) from the inside shoulder pavement edge or 18' (5.5m) from the center line of the West bound lane. The stakes showed the station, offset distance and had at the top a yellow ribbon so that they could be readily spotted. They provided a valuable reference for the collection of the SHRP construction data.

Layout by Construction Staff

The Resident Engineer prepared special signs for each test section with white lettering on a blue background. As an example, the sign stated "SHRP TEST SECTION 3-with an arrow", see Photo 2. These signs were placed at the beginning and at the end of each test section with the arrows pointing in the direction of the test section. The signs were placed near the fence line and proved to be very useful in easily locating the test sections.

The survey party placed red top hubs at 50' (15m) intervals and at 12'6" (3.8m) offsets from the outside pavement shoulder joint at each test section. They were used for quick and easy reference to obtain the 5 point elevation measurements of each construction layer for the completion of Construction Data Sheet 10.

The Resident Engineer also prepared a table showing pavement treatments. This table showed the surface preparation, depth, width, and type of mix required for the pavement throughout the full length of the project (Table 2). Information from this table was painted on the pavement in bold numbers and was used as a guide during the paving operation. The contractor also used the table to produce another table estimating the quantities of each mix type (Table 3). This was important since mix changes were made on several occasions during the working day and some of the transition zones were very short. Table 2 and 3 were used together by the Contractor to coordinate and control the paving and plant operations so that the correct mix would be laid at the specified location.

Materials Sampling and Testing

Locations for the field materials sampling for pre-construction and post-construction purposes for each of the test sections are shown on the line diagram in the center of Figure 2 and in Table 2. The upper line shows pre-construction sampling locations of 4" (102mm) O.D., 6" (152mm) O.D., 12" (305mm) O.D. cores and test pits designated C, A, BA and TP respectively. The lower line diagram shows post-construction C type locations for obtaining 4" (102mm) O.D. "as constructed" overlay test specimens.

The pre-construction and post-construction samples were taken for the necessary tests by the Bureau of Materials staff and tested in their laboratories in Trenton, NJ. This laboratory is designated as laboratory No. 3421. The tests carried out there are listed in Tables 4 and 5 for pre-construction and post-construction samples respectively. Samples for resilient modulus testing and appropriate related tests were shipped to the FHWA-LTPP Contractor Laboratory, Law Engineering, Atlanta, GA. Laboratory. Tracking tables for these samples are Tables 6 through 9.

Sampling of the materials for the Materials Reference Library were taken by Mr. Wayne Byard and Mr. Mike Jopko and shipped by Consolidated Freightway C.O.D. to the:

Materials Reference Library
SHRP-Asphalt Research Program
The University of Texas at Austin
1416 Neils Thompson Drive
Suite 113
Austin, Texas 78759

A list of samples submitted to the Materials Reference Library is shown in Table 10.

CONSTRUCTION

Dates of intensive surface preparation (milling), layout of test section treatments, mixes and paving dates are shown in Table 11 and Table 12 respectively.

Surface Preparation

Only intensive surface preparation was carried out on this project as no patching was necessary in the "minimal maintenance" sections. This included the milling of 2" (51mm) of the original pavement and inside shoulder and of the outside shoulder on test sections 340506, 340507, 340508, 340509, and 340559. Only 1" (25mm) of milling was carried out on the pavement and shoulder of the rubberized test section 340560. The 2" (51mm) replacement layer was either a virgin or RAP asphalt base course mix to correspond to the overlay mixes shown in Figure 2.

The outside shoulder for the area from station 558+00 - 565+75 (which included test section 340559 was milled to a depth of 2" (51mm) because of poor pavement and shoulder performance. The original outside shoulder consists of 2" (51mm) of bituminous stabilized base course over a pit run gravel base. The milling exposed a number of gravel areas (perhaps 25% of the surface area), as is illustrated in Photo 3.

Milling started on the passing lane at the East end of the project. Two milling machines were used in tandem. The first machine, a CMI PR800 FL milled to it's full width of 12'6" (3.8m). The second machine was a CMI PR500 FL which was capable of milling to a width of 7'2" (2.2m), but was only used to mill the remaining inside shoulder width of 2'6". Only the larger milling machine was used on the SHRP driving lane and outside shoulder. The passing lane was milled with the replacement layer placed in 1 day on July 20 and the driving lane and outside shoulder in 2 days on July 21 and 22. Traffic was maintained in the lane adjacent to construction.

The milling of the driving (LTPP) lane extended 6" (0.02m) into the outside shoulder. Therefore the outside lane milled depths of the pavement could not be measured. The milling machine also cut into the replacement layer of the passing lane from 2-4" (51-102mm). The milled pavement had a fine macro texture whereas the milled shoulder due to the larger aggregate of the bituminous stabilized base course, had a coarse macro texture.

The cutting head was set to produce a cross-slope of 1 1/2" on the pavement and 4% on the shoulder. These are the designed cross-slopes of the finished pavement surface. The cross-slopes were checked with a straight edge and level at regular intervals.

A typical full width milling sequence is shown in Figure 3.

A water tank was on hand to supply the milling machine with water on the move. A front end loader followed the milling machine and scraped the loose milled material into a pile which was then picked up and returned to the contractors plant at Kingston a distance of about 32 miles (51.5km). The truck then returned with the replacement hot mix material. The replacement overlay followed closely, usually within 1000' (0.3km) of the milling machine so that none of the milled surface, except for the tie-ins, was exposed to traffic.

Two powerful steel broom and vacuum pump trucks were used to suck up the fine material prior to the application of a 40% diluted CSS-IH emulsion tack coat at the rate of 0.05 gals/sq.yd.(0.26ℓ/m^2). This tack coat was also applied to the vertical side of a previous overlay with a single nozzle on the tank truck.

The nominal lift replacement thickness was 3" (76mm).

Plant, Materials and Production

a) Virgin and RAP Mixes

All of the aggregate, except the sand, was obtained from their own (Trap Rock Industries), Kingston quarry. The sand was obtained from the Clayton Sand Company source at Jackson, NJ. The AC-20 asphalt cement for the virgin mixes was obtained from CITGO (Paulsboro). The AC-10 asphalt cement for the RAP mix was also obtained from CITGO for the replacement and base course layers. It was later noted that the AC-10 did not meet viscosity requirements at 275° F (135° C). The source of AC-10 was then changed to ELF (Pettys IS), for the surface course. Hence it was necessary to obtain 2 lots of sample for the Materials Reference Library in Austin, Texas. There was no evidence of any lay down problems with the AC-10 RAP mixes.

The asphalt plant had only 1 storage bin, so it was necessary to clear the storage bin, the drum dryer, and the conveyors at each change of mix, with calculated quantities being used in plant control, (see Table 3). The type of mixes required were marked on the pavement, (see Table 2), and these location limits were observed very carefully. A change in mix caused a 1/2 hour delay at the plant. The haul distance from the plant to the site was around 32 miles, which resulted in a normal haul time of 1 hour. However, the unloading time was often much greater because of lane changes and delays due to traffic flows, trucks waiting to unload. The batching to unloading times for the various test sections are shown in Construction Data Summary Replacement and Base Course Layers, Table 9, and Construction Data Summary Surface Course Layer, Table 10, as well as the paving time for each test section. The haul trucks had to use the East bound lane to get to an interchange in order to reach the paver. This lane was often clogged by traffic bound for the Shore Points, or the Great Adventure Playground.

The Kingston plant started to load trucks around 8:00 am with the aim of reaching the paver around 9:00 am, which was the time when traffic could be shifted to 1 lane and construction work could proceed. Each truck contained about 20 tons (18.1Mg) of hot mix. For a 12' (3.7m) wide placement 2" (51mm) deep, one load would supply about 100' (30.5m) of pavement.

b) Rubberized OGFC Mix (For Supplemental Section 340560)

The rubberized open graded surface course mix was produced at the STA-SEAL (Trap Rock Industries) Barber Greene 3 ton (2721kg) batch plant at Florence, NJ, located 18 miles from the site. All of the aggregates except the #2 (1/4") (6mm) stone, were obtained from the Kingston quarry. The #2 stone was obtained from the Trap Rock Industries quarry at Pennington, NJ. The ultrafine metering/blending equipment was connected directly to the AC storage tank. The process used for the rubber additive is shown in Figure 4. The specifications required that air quality testing be conducted during the production of the mix by the contractor and then approved by the New Jersey DOT of Environmental Protection and Energy.

The rubber metering/blending equipment arrived at the Florence Plant after it had been struck by lightning. The electrical system had been destroyed and had to be repaired. It was originally planned to lay the rubber mix on August 12, but was postponed until Monday, August 17, since repairs were not complete. An inspector from the Department of the Environment was not available before August 17. Rain further delayed the rubber mix placement until August 19.

When the plant started up at 8:00 am on August 19, it was discovered that the pump in the metering/blending unit had been installed incorrectly. This had to be corrected, which took about 2 hours. In the meantime, the AC had cooled in the pipes, restricting the size of the openings. Therefore, the production was slow at the beginning, but it improved as the pipe opening enlarged with use.

Mix Designs and Asphalt Plant Reports

The job mix formula of all the mixes and the daily asphalt plant inspection reports are summarized in 5 parts of Table 15. They are as follows:

Table 15A	Bituminous Stabilized Base Course I-2 (BCV) Virgin Replacement and Base Course Layers
Table 15B	Bituminous Stabilized Base Course I-2R 30% RAP (BCR) Recycled Replacement and Base Course Layers
Table 15C	Virgin Bituminous Concrete Surface Course I-4 (SCV)
Table 15D	Recycled Bituminous Concrete Surface Course I-4R 30% RAP (SCR)
Table 15E	NJ Bituminous Stabilized Base Course I-2 and Rubberized OGFC

Base Course Overlay Paving

Base course paving started on the passing lane test section 340507, station 654+00 with the virgin mix on Monday, July 27, and proceeded Westward through the next 2 RAP test sections 340503 and 340508, ending up at 630+00 the same day. As traffic could only be directed to 1 lane between the hours of 9:00 am to 4:00 pm, paving could not start before 9:00 am.

The base course mix was laid to a nominal thickness of 4" (102mm) and the paving screed was set to produce a cross-slope 1 1/2% on the pavement and 4% on the 3' (0.9m) inside shoulder. The passing lane and shoulder was laid to a width of 16' (4.9m) (normally would have been 15') (4.6m) to provide extra protection during the placement of the driving lane. A sloped plate attached to the screed produced a wedge having a face slope of 6:1 (see Photo 4). State safety regulations do not permit more than a 2" (51mm) drop between traveling lanes so until the driving lane could be laid (1 day) the 2 lane traffic was diverted to the driving lane and shoulder from 4:00 pm to 9:00 am.

Two identical 10 ton (9.1Mg) CAT BC534 double-drum vibratory rollers fitted with nuclear density on-the-run equipment were used on all of the paving layers (see Photo 5). The sloped face could not be compacted with the double drum vibratory rollers, so a small 2 1/2 ton (2.3Mg) vibratory roller SAKAI was used to compact the sloped face. The rolling pattern applicable to all of the pavement layers is shown in Figure 5.

On Tuesday, July 28, the base course was laid on the driving lane of test sections 340507, 340503, and 340508 to a width of 11' (3.4m) and on the shoulder of 340507 to a width of 12' (3.7m). An emulsion tack coat is always applied on a paved surface and at the vertical joints. The center line joint was not preheated with an infrared heater and there was no edge sloping at the shoulder joint.

It was noted that the vibratory rollers overlapped the adjoining and previously laid pavement by about 1' (0.3m) and that fracturing of the aggregate had occurred at both the center line and shoulder joints, leaving a white streak of about 6-8" (0.15-0.20m) at the center, (see Photo 6), and about 2-4" (0.05-0.10m) at the shoulder. There was no noticeable difference in aggregate fracture between the virgin and RAP mixes.

On Wednesday, July 29, paving of the outside shoulders on test sections 340503 and 340508 was completed and the aggregate fracture at the pavement shoulder edge was similar to 340507. The paver was then moved to test section 340504 to complete the last test section requiring an asphalt base course layer. The driving lane and shoulder were paved on this date.

On test section 340504 stations 558+00 - 551+00, the driving lane was laid first to a width of 12' (3.7m). The center longitudinal joint was sloped 6:1 into the passing lane. The pavement edge at the outside shoulder joint was not sloped. The driving lane pavement was still hot when the shoulder paving was done. There was no evidence of aggregate fracturing at the pavement shoulder joint. It was noted that there was a sheen on the driving lane surface from -1+00 to 0+00 (558+00 - 557+00) which might be considered flushing.

The binder course layer on the passing lane was placed on Thursday, July 30 to a width of 15' (4.6m). The whitish streak of the aggregate fracturing was apparent at the center longitudinal joint as in the previously laid base course layers. This aggregate fracture appears in the pavement layer being laid and compacted and not in the previously laid layer.

The layout of test section treatments, mixes and paving dates and construction data on base course layers are shown in Table 12 and Table 13 respectively.

Surface Course Paving Overlay

The surface course paving in all of the test section lanes (passing, driving, and shoulder) was placed in 5 days on August 12, 13, 19, 20, and 21. No paving work was carried out between August 3, and August 12 because of rain. The surface course outside the SHRP test sections from station 690+00 - 656+50 was laid using a State Mix Design with 10% RAP on August 3.

The change in asphalt mixes for all surface courses, like the base course and replacement layers, were made at pre-determined locations within the transition zones as shown in Table 1. A typical pavement cross-section showing the mixes and the layers (test section 340507 in this case) is shown in Figure 6. All the surface course mixes (except the rubber mix) were laid to a nominal thickness of 2 and 1/2" (64mm). A tack coat was applied to the longitudinal joint interface and the pavement surface at the rate of 0.05 gals./sq.yd. ($0.26\ell/m^2$). Silt, collected during rain storms was broomed from the shoulder. One paver ski was used for the placement of the passing lane and 2 skis for the placement of the driving lane.

The paver screed and its extensions were adjusted as required to produce a pavement cross-slope of 1 and 1/2% and an inside and outside shoulder cross-slope of 4%.

A slope plate attached to the paver screed was used to produce a face slope of 3:1 at the longitudinal joints on test sections 340507, 340503, 340508, 340502, and 340510. At the test sections in which the slope plate was not used, the pavement edges were more or less vertical. The infrared heater was used at the longitudinal joints of those test sections that were laid with a slope plate.

All of the surface course paving of the test sections started with the passing lane (and inside shoulder) which was followed with the driving lane and then the outside shoulder. The contractor completed the paving of 2 or 3 test sections each day except for the first day which was August 12. Only the passing lane was completed on this date on test sections 340507, 340503, and 340508. The driving lane and the shoulder were paved on August 13.

It usually took 1 to 1 and 1/2 hours to square up the joint each morning after the traffic was diverted to a single lane. The first few loads of the asphalt mix were therefore unloaded 1 and 1/2 - 2 hours after batching at the start of each day. The mix changes within the paving lane usually took 1/2 hour.

The change from paving the passing lane to the driving lane usually took about 2 hours. During this waiting period, the asphalt haul trucks tend to bunch up so that when the paver is ready, the asphalt mix can be laid very quickly. A short delay sometimes occurred thereafter when the trucks bunch up at the plant.

An isolated long delay in discharging 2 hot mix trucks occurred on August 20 on test sections 340509 and 340506 when changing the paving from the passing lane to the driving lane. The transition zone 90' (27m) and an extra load of RAP mix on the passing lane of 340509 was held until test section virgin mix 340506 passing lane was completed so that it could be used on the 340509 driving lane. The time to unload after batching was 3 hours and 54 minutes. Likewise, the extra virgin load on 340506 from the passing lane was held up for the driving lane 3 hours and 20 minutes.

There was another long delay due to a change of mix and a change of lane. When the rubber mix placement on the passing lane 340510 was nearing completion, trucks having no further need to return to the Florence Plant were sent to the Kingston plant for the RAP mix for the driving lane for test section 340502. There was a considerable delay in completing the rubber mix due partly to the wider inside shoulder at a turn around resulting in a waiting period of 4 hours and 11 minutes for 4 trucks, and 2 hours and 31 minutes for 1 truck before unloading. The laydown temperature of the driving lane for 340502 averaged 256°F (124°C), of (230-370°F), (110-188°C). The laydown temperatures for all of the other mixes in the driving lane varied from 264-290°F (129-143°C). The laydown temperature for the rubber mix was 296°F. The detailed information on surface course paving is shown in Table 14.

Compaction equipment was the same as it was for the bituminous base course consisting of 2 identical 10 ton (9.1Mg) CAT BC534 double drum vibratory rollers. The breakdown roller with vibrations came right up to the paver. The final roller stayed back about 1000' (0.3km). The breakdown roller overlapped the longitudinal joint by about 12" (0.3m). Fracturing of the aggregate was noted sometimes in the previously laid pavement and sometimes in the pavement that was currently being placed and compacted. The fracturing showed up as a whitish streak 2-4" (0.05-0.10m) in width more or less continuous at the center line. The whitish streak was evident to a lesser extent at the shoulder joint but it was not continuous. The extent of the fracturing seemed to depend on the temperature of the adjacent mix that has been laid the same day.

There is no difference in appearance between the RAP and virgin mixes or in the compaction characteristics.

The same 2 10 ton (9.1Mg) double rollers used in all of the other test sections were used for the rubber mix but without vibration. The breakdown roller came right up to the paver. There was some stone pick-up which dropped and then was rolled back into the pavement. This problem was partially corrected by adding detergent to the roller water tanks.

The rubber mix had a uniform small stony texture and was sticky. At unloading temperatures, the mix had a tendency to flow so the slope of the truck box had to be watched to avoid dropping the whole load into the paver. The mix also had a tendency to stick to the truck bed. After unloading, the trucks would move ahead and attempt to jar loose any remaining material stuck to the box in front of the paver. The infrared heater was used at the longitudinal joints and there was some aggregate fracturing in the pavement being laid as well as a slight amount at the shoulder joint.

Section 340559 is a supplemental test section with the NJ DOT overlay design. The NJ DOT specifications allow the contractor to use a virgin mix or 1 with up to 10% RAP for the surface course (for the base course mix 20% RAP is permitted). The virgin mix option was used, so there was no need for a mix change in any of the lanes or shoulder since sections 340504 and 340505 required virgin mixes.

Quality Control and Data Collection

Five point rod and level elevation measurements were taken at 50' (15m) intervals on each layer of each test section by the NJ DOT Survey Party under the direction of Mr. Syl Festa. Table 16 provides a Summary of Rehabilitation Treatments and Layer Thicknesses. Actual overlay thicknesses were obtained from the 5 point elevation measurements. Layer thicknesses of the original pavement were obtained from field sampling bore holes, test pit logs and construction drawings.

Nuclear density measurements were taken on the base course and surface course layers of the driving lane the same day the pavement was laid soon after the rolling was completed and while the pavement was still hot. Three nuclear density measurements selected at random were made on each layer of each test section. Each measurement represented 4 readings each taken after a rotation of 90°F.

New Jersey does not use the nuclear density measurements for compaction control purposes. Instead they use an air void acceptance plan. On this SHRP SPS-5 project, each test section was considered as a lot for purposes of air void acceptance. The air void acceptance is based on the average of air voids taken in each lot. As cores could not be taken within the SHRP test section, they were taken outside the test section. Traffic control for the coring was provided by the Contractor. The air void requirement is 2-8%.

The nuclear density and air voids for the base course layer is shown in Table 13 and for the surface course in Table 14. The Contractor did his own quality control verification with the nuclear density unit and with cores.

On September 1, 1992, about 2 weeks after the driving lane had been under traffic, nuclear density and cores were taken on either side of each test section. The maximum specific gravity's and air voids obtained are shown in Table 14.

New Jersey DOT does not have profilograph requirements for pavement smoothness in their specifications. They do, however, have a surface acceptance plan which uses a 10-foot rolling straight edge that automatically marks, in colored dye, the length of surface variations which exceeds a tolerance of 1/8" in 10 feet (3.2mm in 3m). The rolling straight edge test was made on September 2 from station 690+00 - 541+50. It was found that 21' (6.4m) out of 4850' (1.5km) had a 1/8" (3.2mm) or greater deviation in a 10 foot (3m) length.

There is no construction data sheet for skid data. However, skid numbers were obtained for each test section.

BRIEF SUMMARY OF OVERLAY CONSTRUCTION

All of the changes in mixes were made within the transition areas. The biggest problems were the delays caused by changing of the mixes in a particular lane, and by the lane changes which took 1 1/2 - 2 hours. It is not expected that these delays lowered the temperature of the hot mix sufficiently to cause any performance problems. While nuclear density measurements were taken of each layer of each test section, the results generally showed low densities in the surface course, which may be partially attributed to the nuclear density gauge's inability to measure thin lifts. These readings are not representative of the compaction achieved. Coring and nuclear density tests taken about 2 weeks after construction at locations 50' (15m) before and 50' (15m) after each test section showed generally higher densities and lower air voids, than measured by the nuclear gauge.

The greatest feature noted at the center longitudinal joint and the shoulder joint was the whitish streak caused by fracturing of the aggregate 4-8" (0.10-0.20m) in width at the center line and about 2" (0.05m) at the shoulder joint. On the 3" (76mm) binder courses, the aggregate fracture appeared in the lane being paved. On the 2" (51mm) surface course, most of the fracture appeared on the lane previously paved, and was caused by the overlap of the vibratory roller. The infrared heater was not used on the base course, but it was used on most of the surface courses in the test sections.

There did not seem to be any difference in the pavement texture between the RAP or virgin mixes for either the base or surface courses. While the break down roller came right up to the paver, the final roller stayed back as much as 1000' (0.3km) depending upon the laydown temperature.

The rubber mix was laid without difficulty. It was, however, quite sticky and materials left in the truck had to be jarred loose.

ACKNOWLEDGMENTS

Ms. Eileen Connolly, of the New Jersey Department of Transportation, Bureau of Materials, was the SHRP Coordinator for this project. She worked closely with the Regional Materials Office and the Project Construction Staff and along with her Assistant, Mr. Art Egon, provided the assistance necessary to meet the SHRP requirements. Special thanks are due to the Resident Engineer, Mr. Paul Hofmann, who provided office space, office equipment, and who gladly and generously gave all of the construction data required for the project. He also made his staff available when required. They were:

Mr. Mike Haluska	- Office Supervisor
Mr. Charlie Bassano	- Inspector
Mr. Rick Kraemer	- Inspector
Mr. Frank Dougherty	- Inspector

Mr. Frank Palise, the Regional Materials Engineer, provided valuable assistance by assigning his staff to arrange for the sampling of the materials, to carry out nuclear density measurements, and to undertake the plant inspections. This work by the following people was greatly appreciated:

Mr. Glen Gibbs	- Area Supervisor, QC
Mr. Sal Noto	- Field Supervisor, QC
Mr. Joe Manley	- Senior QC Engineer
Mr. Ray Sellnow	- Materials Inspector
Ms. Donna Pryor	- Materials Inspector
Mr. Jim P'simer	- Plant Inspector, Kingston
Mr. John Giambelluca	- Plant Inspector, Florence

The 5 point elevations taken at 50' (15m) intervals on each layer of the test sections by Mr. Syl Festa and his associates is also greatly appreciated. Often this work, like that by Mr. Ray Sellnow, for the nuclear density measurements, was carried out after the normal working hours.

Special thanks must be given to Trap Rock Industries, the Superintendent, Mr. Bill Grandinetti, and Foreman, Mr. Sam Cooper, who recognized the need for the special detailed attention this project required, and for the great support provided to it's completion. Special mention must be made of Mr. Wayne Byard, Head of Quality Control and Mr. Mike Jopko, Materials Technician. They took all of the samples (74-5 gallon (19 ℓ) pails and 6-55 gallon (208 ℓ) drums), stored and shipped them to the Materials Reference Library at the University of Texas at Austin. Mr. Stephen J. Trapani was in charge of the Trap Rock Industries Laboratory in Kingston.

shrp

FWHA–LTPP SPS 5 NEW JERSEY LOCATION PLAN
REHABILITATION OF A/C PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED

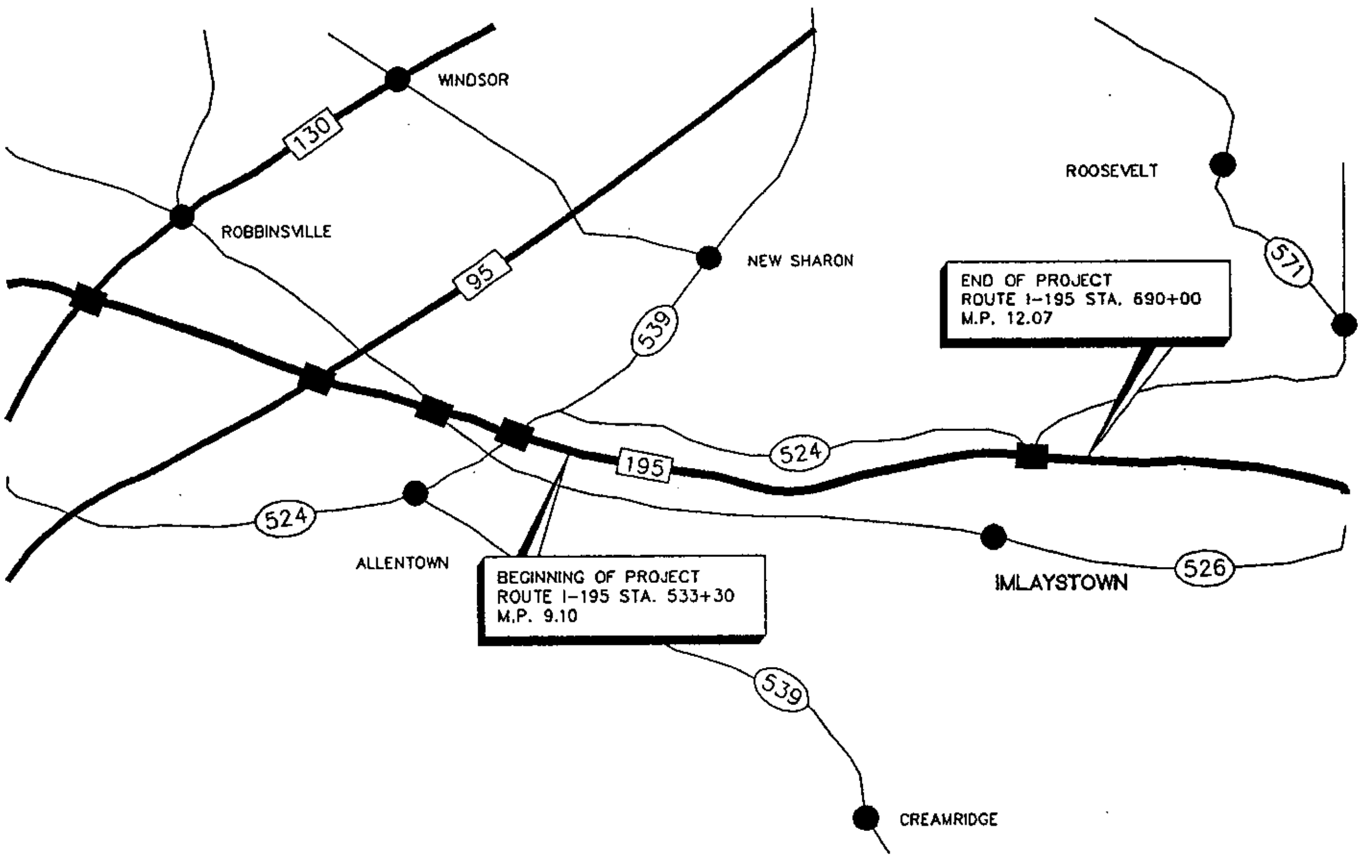


FIGURE 1 – LOCATION OF NJDOT I-195 SPS-5 PROJECT

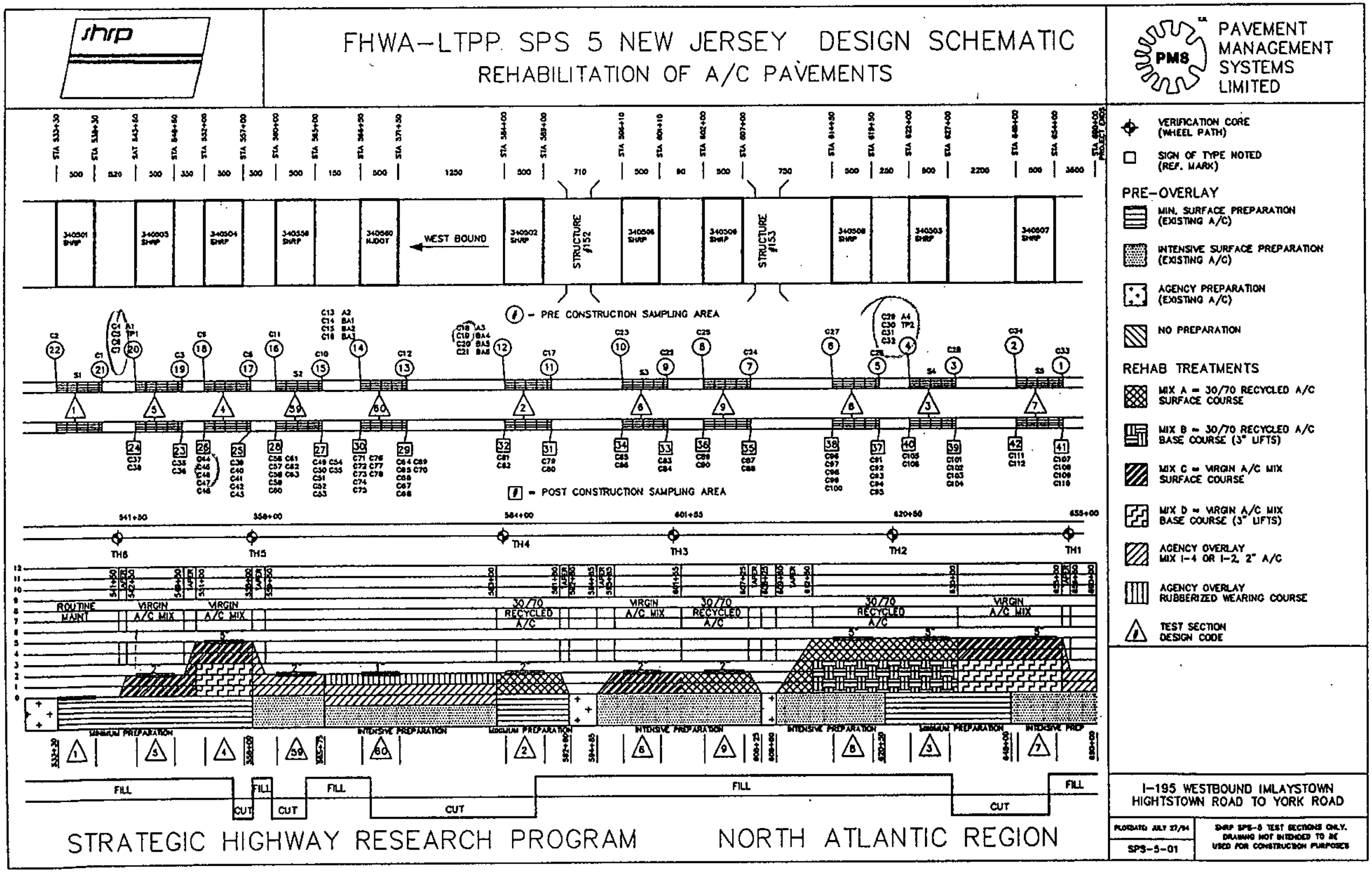
I-195 WESTBOUND IMLAYSTOWN
HIGHTSTOWN ROAD TO YORK ROAD

PLOTDATE SEPT 23/94

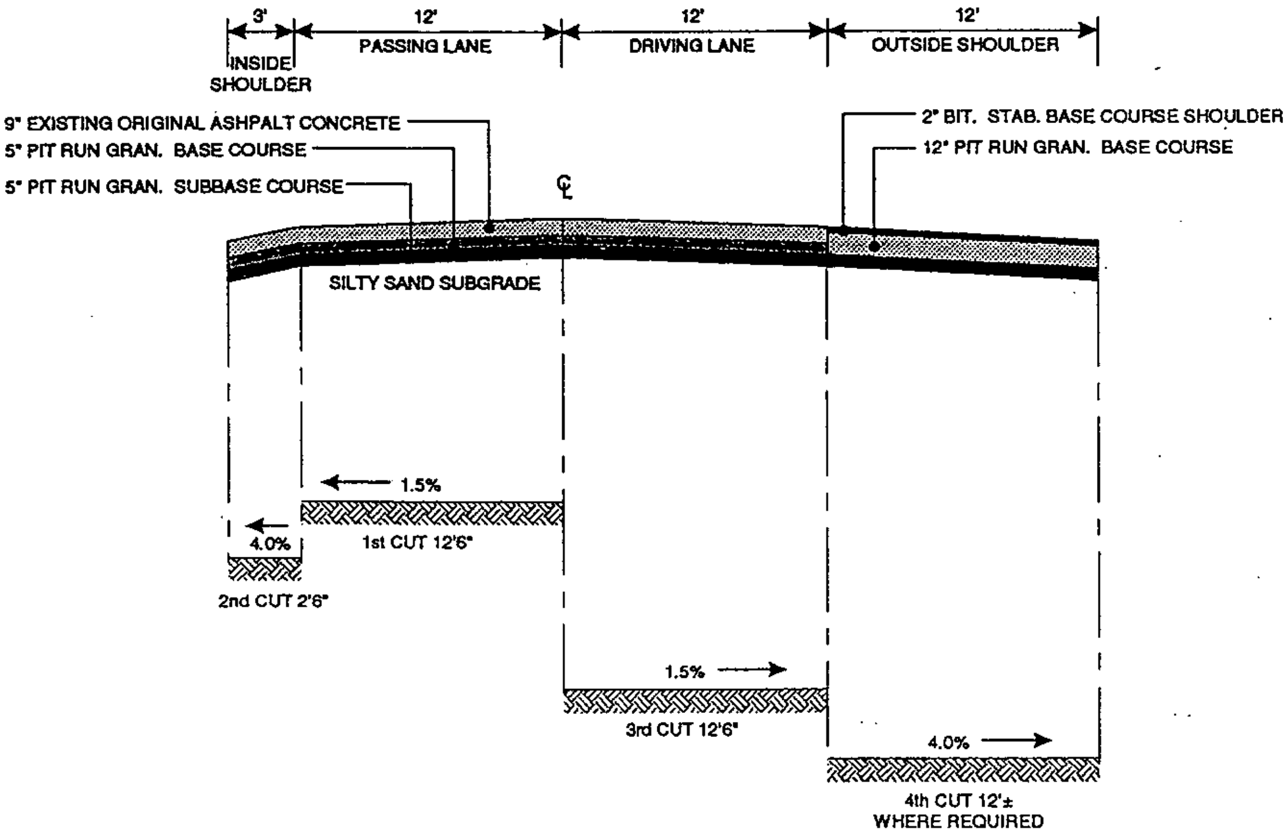
SPS-5-23

SHRP SPS-5 TEST SECTIONS ONLY.
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

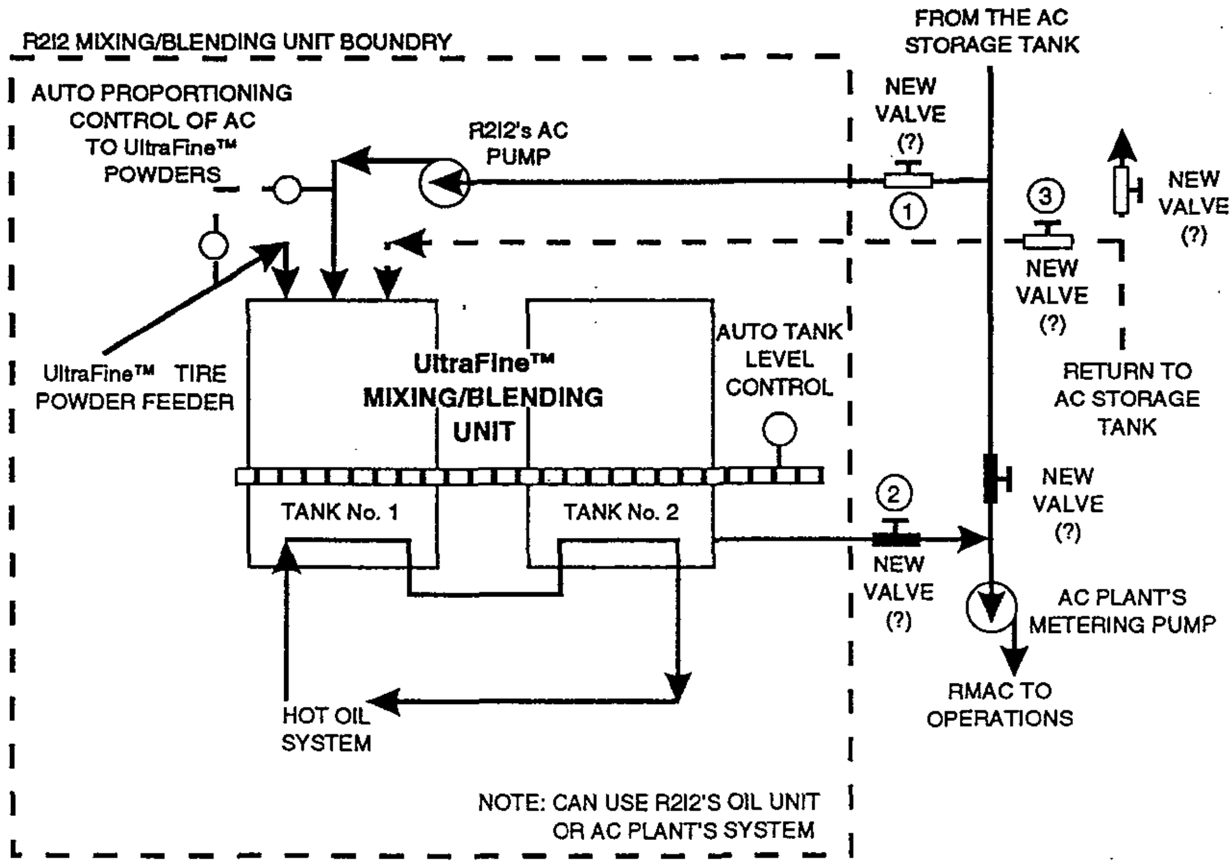
FIGURE 2



FHWA-LTPP SPS 5 NEW JERSEY DESIGN SCHEMATIC
REHABILITATION OF A/C PAVEMENTS
PAVEMENT MANAGEMENT SYSTEMS LIMITED
WEST BOUND
STRUCTURE #152
STRUCTURE #153
PRE CONSTRUCTION SAMPLING AREA
POST CONSTRUCTION SAMPLING AREA
VERIFICATION CORE (WHEEL PATH)
SIGN OF TYPE NOTED (REF. MARK)
PRE-OVERLAY
MIN. SURFACE PREPARATION (EXISTING A/C)
INTENSIVE SURFACE PREPARATION (EXISTING A/C)
AGENCY PREPARATION (EXISTING A/C)
NO PREPARATION
REHAB TREATMENTS
MIX A = 30/70 RECYCLED A/C SURFACE COURSE
MIX B = 30/70 RECYCLED A/C BASE COURSE (3" LIFTS)
MIX C = VIRGIN A/C MIX SURFACE COURSE
MIX D = VIRGIN A/C MIX BASE COURSE (3" LIFTS)
AGENCY OVERLAY MIX I-4 OR I-2, 2" A/C
AGENCY OVERLAY RUBBERIZED WEARING COURSE
TEST SECTION DESIGN CODE
ROUTINE MAINT
VIRGIN A/C MIX
30/70 RECYCLED A/C
MINIMUM PREPARATION
INTENSIVE PREPARATION
FILL
CUT
I-195 WESTBOUND IMLAYSTOWN HIGHTSTOWN ROAD TO YORK ROAD
SPS-5-01
STRATEGIC HIGHWAY RESEARCH PROGRAM
NORTH ATLANTIC REGION



TYPICAL FULL WIDTH MILLING SEQUENCE
NJ DOT I-195 SPS-5 ALLENTOWN



MAJOR INTERCONNECTS:

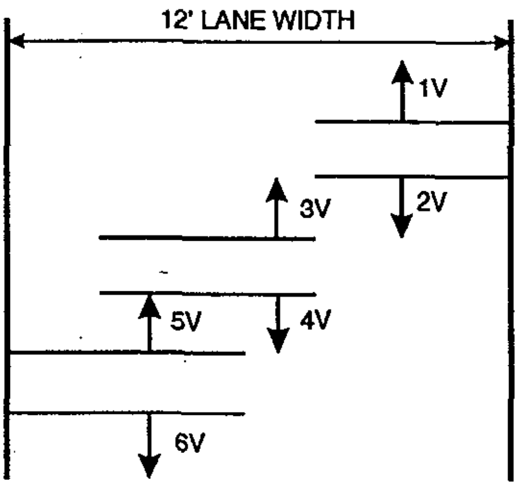
(1) AC FEED FROM PLANT'S AC STORAGE TANK

(2) RMAC TO ASPHALT PLANT'S OPERATIONS

(3) RETURN LINE TO UltraFine™ BLENDING UNIT

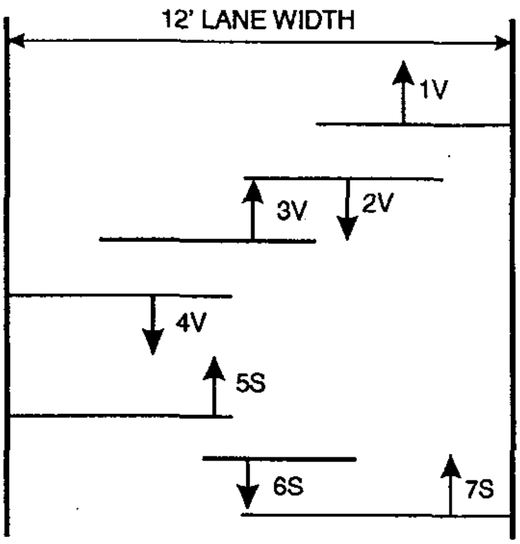
NOTE:
NEW VALVE (?) - AC PLANT MAY ALREADY HAVE THESE VALVES IN LINE

SUGGESTED INTERCONNECT FOR BATCH, DRUM OR CONTINUOUS PLANTS USING THE UltraFine™ METERING/BLENDING UNIT



BREAKDOWN ROLLING PATTERN

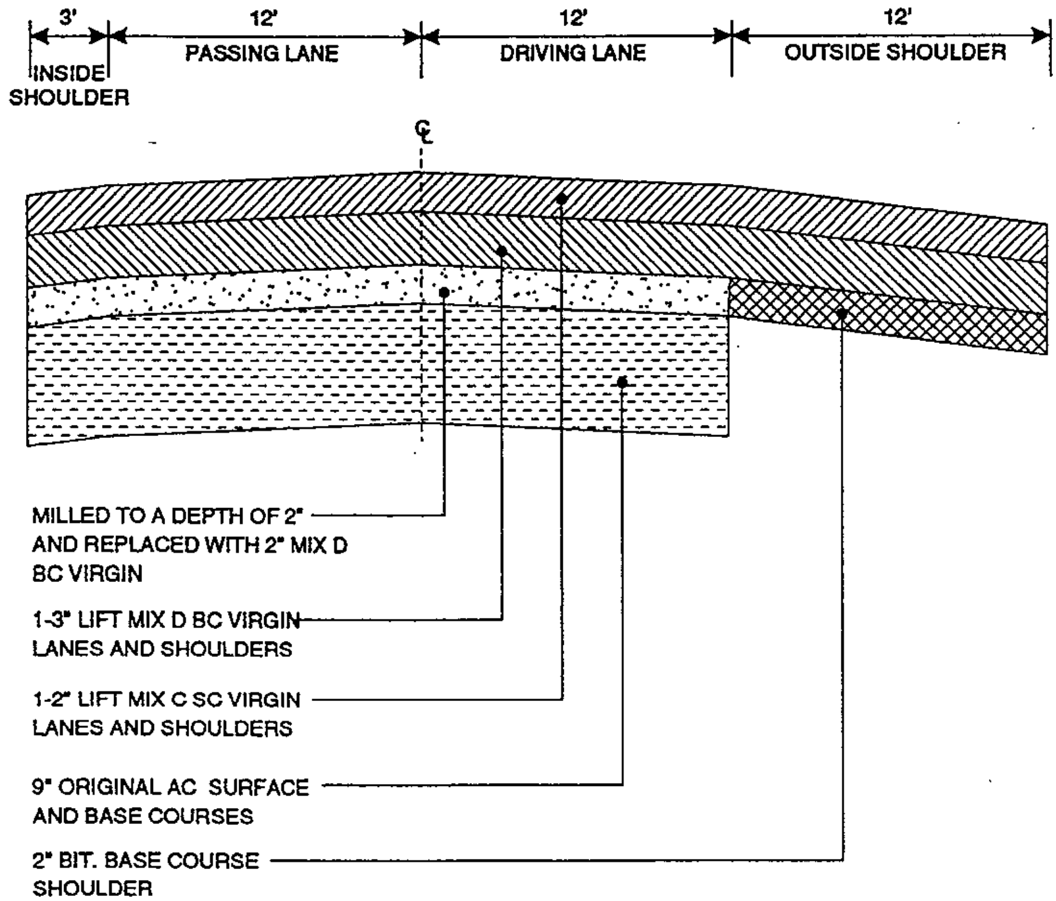
- HIGH AMPLITUDE
- 6 PASSES WITH VIBRATIONS (V), THEN ADDITIONAL PASSES WITHOUT VIBRATION DEPENDING UPON TIME AVAILABLE



FINAL ROLLING PATTERN

- LOW AMPLITUDE
- 4 PASSES WITH VIBRATION (V), THEN
- 3 PASSES WITHOUT VIBRATION (S)

COMPACTION ROLLING PATTERNS
NJ DOT I-195 SPS-5 ALLENTOWN



SECTION 340507, 5" VIRGIN AC OVERLAY, INTENSIVE PREPARATION

TABLE 1
SPS-5 Layout, NJ I-195 WB, Imlaystown - Hightstown Rd. to York Rd.

sheet 1/3

Station #	SHRP I.D.	Section Length	Pavement Preparation	Overlay Thickness	Overlay Material	Sample Area	Pre-Construction Samples	Post-Construction Samples
532+30		100'	Routine Maintenance			22	C2	
533+30 538+30	340501	500'		0	—		S1	
541+50 542+50		520'	Minimum Preparation	100' Taper 0" to 2"	Virgin AC	21 20/24	C1 A1 C4, C5, C6, C7	C37, C38
543+50 548+50	340505	500'		2" (2.1")				
549+50 551+00		350'		150' Taper 2" to 5" Ends	Virgin AC	19/23 18/26	C3 C9	C35, C36 C44, C45, C46, C47, C48
552+00 557+00	340504	500'		5" (4.6")				
558+00 559+50		350'	Minimum Prep. NJ Preparation	150' Taper 5" to 2" Ends	NJ Mix	17/25 16/28	C8 C11	C39, C40, C41, C42, C43 C56, C57, C58, C59, C60, C61 C62, C63
560+00 565+00	340559	500'		2" (1.9")			S2	
565+75		150'			NJ Mix Rub. Wrg. course	15/27 14/30	C10 A2, BA1, BA2, BA3 C13, C14, C15, C16	C49, C50, C51, C52, C53, C54, C55 C71, C72, C73, C74, C75, C76 C77, C78
566+50 571+50	340560	500'		2" (1.2")				
583+00		1150'	NJ Preparation		Rubberize wearing course	13/29	C12	C64, C65, C66, C67, C68 C69, C70

NOTE: Sample Areas are listed as Pre-construction/Post-construction, e.g. 13/29
( ) Avg. actual thickness

TABLE 1 (Cont.)
SPS-5 Layout, NJ I-195 WB

sheet 2/3

Station #	SHRP I.D.	Section Length	Pavement Preparation	Overlay Thickness	Overlay Material	Sample Area	Pre-Construction Samples	Post-Construction Samples
583+00		1150'	NJ Preparation	2"	Rub. Wrg. course		A3, BA4, BA5, BA6	
			Minimum		Recycled AC	12/32	C18, C19, C20, C21	C81, C82
584+00			Preparation	2"				
	340502	500'						
589+00				(1.7")				
						11/31	C17	C79, C80
592+50				100'	Recycled AC			
		650'	Bridge &	taper				
			Approaches	0				
594+20				100'				
			Intensive	taper		10/34	C23	C85, C86
596+10			Preparation					
	340506	500'		2"	Virgin AC	S	S3	
601+10				(1.9")				
601+55						9/33	C22	C83, C84
		140'						
					Recycled AC	8/36	C25	C89, C90
602+50								
	340509	500'		2"	Recycled AC			
607+00				(1.6")				
608+25			Intensive	100'		7/35	C24	C87, C88
			Bridge &	taper				
609+60			Approaches	0				
		750'	Intensive	Taper	Recycled AC			
				2" to 5"				
612+60				Ends				
				5"		6/38	C27	C96, C97, C98, C99, C100
614+50								
	340508	500'	Intensive	5"	Recycled AC			
619+50				(4.9")				
620+50			Intensive			5/37	C26	C91, C92, C93, C94, C95
		250'						
							A4	
			Minimum			4/40	C29, C30, C31, C32	C105, C106
622+00								
	340503	500'		5"	Recycled AC		S4	
627+00				(4.5")				
630+00					Recycled AC	3/39	C28	C101, C102, C103, C104

TABLE 1 (Cont.)
SPS-5 Layout, NJ I-195 WB

sheet 3/3

Station #	SHRP I.D.	Section Length	Pavement Preparation	Overlay Thickness	Overlay Material	Sample Area	Pre-Construction Samples	Post-Construction Samples
630+00			Mimimum	5"	Recycled AC			
				5"	Virgin AC			
648+00			Mimimum					
			Intensive			2/42	C34	C111, C112
649+00								
	340507	500'		5"	Virgin AC		S5	
654+00				(4.9")				
655+00			Intensive	Taper		1/41	C33	C107, C108, C109, C110
			NJ Preparation	5" to 2"	NJ Mix			
656+50								
				2"	NJ Mix			

TABLE 2
NJ SPS-5 I-195 PAVEMENT TREATMENT AND MIX LOCATIONS

sheet 1/3

TEST SECTION I.D.	STATION NO.	SURFACE PREPARATION DEPTH & WIDTH	BASE COURSE THICKNESS, WIDTH & TYPE OF MIX	SURFACE COURSE THICKNESS, WIDTH & TYPE OF MIX
	690 to 689+0	2" Mill F/W	No Base	2" & Var I-4 NJ (50*) F/W
	689 to 677+0	2" Mill F/W	2" Base (52) F/W	2" I-4 NJ (50) F/W
	677+0 to 676+0	2" Mill F/W	No Base	2" & Var I-4 NJ (50) F/W
	676+0 to 674+0	2" Mill F/W	No Base	2" I-4 NJ (50) F/W
	674 to 673+0	2" Mill F/W	No Base	2" & Var I-4 NJ (50) F/W
	673+0 to 656+50	2" Mill F/W	2" Base (52) F/W	2" I-4 NJ (50) F/W
	656+50 to 655+50	2" Mill F/W	2" Base (52) F/W	2" & Var I-4 NJ (50) F/W
	655+50 to 655+0	2" Mill 27'	2" & Var I-2 Vir (45) 27'	2" I-4 Vir (48) F/W
340507	655+0 to 648+0	2" Mill 27'	2" I-2 Vir (45) 27' 3" I-2 Vir (45) F/W	2" I-4 Vir (48) F/W
	648+0 to 630+0	No Mill	3" I-2 Vir (45) F/W	2" I-4 Vir (48) F/W
340503	630+0 to 620+50	No Mill	3" I-2 Rap (46) F/W	2" I-4 Rap (47) F/W
340508	620+50 to 612+50	2" Mill 27'	2" I-2 Rap (46) 27' 3" I-2 Rap (46) F/W	2" I-4 Rap (47) F/W
	612+50 to 611+0	2" Mill F/W	2" I-2 Rap (46) F/W 3"-0" I-2 Rap (46) F/W	2" & Var I-4 Rap (47) F/W
	611+0 to 609+60	2" Mill F/W	No Base	Var 2" I-4 Rap (47) F/W

( ) Pay Item No.

TABLE 2 (Cont.)
NJ SPS-5 I-195 PAVEMENT TREATMENT AND MIX LOCATIONS

sheet 2/3

TEST SECTION I.D.	STATION NO.	SURFACE PREPARATION DEPTH & WIDTH	BASE COURSE THICKNESS, WIDTH & TYPE OF MIX	SURFACE COURSE THICKNESS, WIDTH & TYPE OF MIX
	609+60 to 608+25	Gap		
	608+25 to 607+25	2" Mill F/W	No Base	2"-4" I-4 Rap (47) F/W
340509	607+25 to 601+55	2" Mill 27'	2" I-2 Rap (46) 27'	2" I-4 Rap (47) F/W
340506	601+55 to 595+85	2" Mill 27'	2" I-2 Vir (45) 27'	2" I-4 Vir (48) F/W
	595+85 to 594+85	2" Mill F/W	No Base	4"-2" I-4 Vir (48) F/W
	594+85 to 592+80	Gap		
	592+80 to 591+80	2" Mill	No Base	2"-4" I-4 Rap (47) F/W
340502	591+80 to 583+0	No Mill	No Base	2" I-4 Rap (47) F/W
340560	583+0 to 565+75	1" Mill F/W	2" I-2 (52) F/W	1" Rubber (49) F/W
340559	565+75 to 559+50	2" Mill F/W	2" I-2 (52) F/W	2" I-4 (50) F/W
	559+50 to 558+50	2" Mill F/W	2" I-2 (52) F/W	2"-4" I-4 (50) F/W
	558+50 to 558-0	No Mill	2"-3" I-2 (45) F/W	2" I-4 Vir (48) F/W
340504	558+0 to 551+0	No Mill	3" I-2 (45) F/W	2" I-4 Vir (48) F/W
	551+0 to 550+50	No Mill	3"-2" I-2 (45) F/W	2" I-4 Vir (48) F/W
	550+50 to 549+50	No Mill	No Base	4"-2" I-4 Vir (48) F/W

TABLE 2 (Cont.)
NJ SPS-5 I-195 PAVEMENT TREATMENT AND MIX LOCATIONS

sheet 3/3

TEST SECTION I.D.	STATION NO.	SURFACE PREPARATION DEPTH & WIDTH	BASE COURSE THICKNESS, WIDTH & TYPE OF MIX	SURFACE COURSE THICKNESS, WIDTH & TYPE OF MIX
340805	549+50 to 542+50	No Mill	No Base	2" I-4 Vir (48) F/W
	542+50 to 54+50	2" Mill	No Base	4"-2" I-4 Vir (48) F/W

* TYPE OF MIX ACCORDING TO PAY ITEMS:

45 Virgin Bit Stab Base Course I-2V
46 Recycled Bit Stab Base Course I-2R 30% Rap
47 Recycled Bit Concrete Surface Course I-4R 30% Rap
48 Virgin Bit Concrete Surface Course I-4V
49 Rubberized Open Graded Mix
50 Bit Concrete Surface Course I-4 State Mix (V or 10% Rap)
52 Bit Stab Base Course I-2 State Mix (V or 10% or 20% Rap)

TABLE 3
EXAMPLE CONTRACTOR PAVING OPERATIONS CONTROL CHART
NJ SPS-5 I-195 - QUANTITY ESTIMATES OF MIX TYPES

Mill and Replace - Inside Shoulder and Left Lane

sheet 1/3

Sta. No. To	Sta. No.	Test Section I.D. / Transition	Length	Width	Sq. Yds.	Mix Type / Pay Item	Thickness Ins. / Tons/Sq Yd/Ins	Quantity Replacement 1-2	Quantity 1-4
690+00	689+00	D	Mill 2" 100' at F/W	15'	167			0	
689+00	677+00		Mill 2" 1200' at F/W	15'	2000	Virgin (45)	2" 0.0608	244T	
677+0	676+0	D	Mill 2" 100' at F/W	15'				0	
676+0	674+0		Mill 2" 300' at F/W	15'				0	
674+0	673+0	D	100' at F/W	15'				0	
673+0	656+50		Mill 2" 1650' at F/W	15'	2750	Virgin (45)	2" 0.0608	335T	
656+50	655+50	F	Mill 2" 100' at F/W	15'	167	Virgin (45)	2" 0.0608	21T	
655+50	655+0	340507 F	Mill 2" 50' at F/W	15'	84	Virgin (45)	2" 0.0608	11T	
655+0	645+0	340507	Mill 2" 700' at 27'	15'		Virgin (45)	2" 0.0608	71T	
Inlet 648+0	630+0		No Mill 1800'	15'				0	
Inlet 630+0	620+0	340503	No Mill 950'					0	

TABLE 3 (Cont.)
EXAMPLE CONTRACTOR PAVING OPERATIONS CONTROL CHART
NJ SPS-5 I-195 - QUANTITY ESTIMATES OF MIX TYPES

Mill and Replace - Inside Shoulder and Left Lane

sheet 2/3

Sta. No. To	Sta. No.	Test Section I.D. / Transition	Length	Width	Sq. Yds.	Mix Type / Pay Item	Thickness Ins. / Tons/Sq Yd/Ins	Quantity Replacement 1-2	Quantity 1-4
620+50	612+50	340508	Mill 2" 800' at 27'	15'	1334	Rap (46)	2" 0.05915	158T	
612+50	611+0	C	Mill 2" 150' at F/W	15'		Rap (46)	2" 0.05915	15T	
611+0	609+60	C	Mill 2" 140' at F/W	15'				0	
609+60	608+25	Bridge							
608+25	607+25	D	Mill 2" 100' at F/W					0	
607+25	601+55	340509	Mill 2" 570' at 27'	15'	950	Rap (46)	2" 0.05915	113T	
601+55	595+85	340506	Mill 2" 570' at 27'	15'	950	Rap (45)	2" 0.0608	116T	
595+85	594+85	D	Mill 2" 100' at F/W					0	
594+85	592+80	Bridge	205						
592+80	591+80	A	Mill 2" 100' at F/W					0	
591+80	583+0	340502	No Mill 880					0	

September 22, 1994

TABLE 3 (Cont.)
EXAMPLE CONTRACTOR PAVING OPERATIONS CONTROL CHART
NJ SPS-5 I-195 - QUANTITY ESTIMATES OF MIX TYPES

Mill and Replace - Inside Shoulder and Left Lane

sheet 3/3

Sta. No.	To Sta. No.	Transition / Test Section I.D.	Length	Width	Sq. Yds.	Pay Item / Mix Type	Tons/Sq Yd/Ins / Thickness Ins.	Quantity: Replacement 1-2	Quantity: 1-4
583+0	565+75	1" Mill / 340560	Mill 1" 1720' at F/W	15'	2367	(52) / NJ	0.05915 / 2"	340T	
565+75	559+50	2" Mill / 340559	Mill 2" 625' at F/W	15'	1042	(52) / NJ	0.05915 / 2"	124T	
559+50	558+50	E	Mill 2" 100' at F/W	15'	167	(52) / NJ	0.05915 / 2"	20T	
558+50	558+0	E	Zero Mill 50'					0	
558+0	551+0	340504	Zero Mill 700'					0	
551+0	550+50	B	Zero Mill 50'						
550+50	549+50	B / 340505	Zero Mill 100'						
549+50	542+50	340505	Zero Mill 700'						
542+50	541+50	A	Mill 2" 100' F/W					**Total** 1568T	

Item 45= 798T
Item 46= 286T
Item 52= 484T

TABLE 4
NJ SPS-5 I-195 LABORATORY TESTING PLANS (Pre-Construction)

sheet 1/2

Material Type and Properties	SHRP Test Designation	SHRP Protocol	# of Tests Per Layer	Materials Source/ Sample Type Designation
Pre-Construction				
I. ASPHALT CONCRETE				
A. ASPHALTIC CONCRETE:				
Core Examination/Thickness	AC01	P01	32	All C type cores
Bulk Specific Gravity	AC02	P02	12	[C4, 5, 6], [C13, 14, 15], [C18, 19, 20], [C29, 30, 31]
Maximum Specific Gravity	AC03	P03	4	[TP1]. [BA1-3], [BA4-6], [TP2]
Asphalt Content (Extraction)	AC04	P04	4	[TP1], [BA1-3], [BA4-6], [TP2]
Creep Compliance	AC06	P06	1	C3, C12, C17
Resilient Modulus	AC07	P07	9	[C4, 5, 6], [C13, 14, 15], [C18, 19, 20]
Tensile Strength	AC07	P07	3	C7, C16, C21
Field Moisture Damage	AC08	P08	4	A1, A2, A3, A4
B. EXTRACTED AGGREGATE:				
Type and Classification:				
Coarse Aggregate	AG03	P13	4	[TP1], [BA1-3], [BA4-6], [TP2]
Fine Aggregate	AG03	P13	4	[TP1], [BA1-3], [BA4-6], [TP2]
Gradation and Aggregate	AG04	P14	4	[TP1], [BA1-3], [BA4-6], [TP2]
NAA Test for Fine Aggregate Particle Shape	AG05	P14A (note 2)	4	[TP1], [BA1-3], [BA4-6], [TP2]
C. ASPHALT CEMENT:				
Abson Recovery	AE01	P21	4	[TP1], [BA1-3], [BA4-6], [TP2]
Penetration at 77 and 115F	AE02	P22	4	[TP1], [BA1-3], [BA4-6], [TP2]
Specific Gravity (60F)	AE03	P23	4	[TP1], [BA1-3], [BA4-6], [TP2]
Viscosity at 77F	AE04	P24	4	[TP1], [BA1-3], [BA4-6], [TP2]
Viscosity at 140F, 275F	AE05	P25	4	[TP1], [BA1-3], [BA4-6], [TP2]

NOTES:

1. Creep compliance will be performed when suitable procedures are developed - cores will be stored.
2. National Aggregate Association will perform tests at no cost to State.
3. Cores within brackets are from the same sampling area.

TABLE 4 (Cont.)
NJ SPS-5 I-195 LABORATORY TESTING PLANS (Pre-Construction) Cont.

sheet 2/2

Material Type and Properties	SHRP Test Designation	SHRP Protocol	# of Tests Per Layer	Materials Source/ Sample Type Designation
II. BOUND (TREATED)				
BASE AND SUBBASE				
Type and Classification of Material and Treatment	TB01	P31		
Pozzolanic/Cementitious:				
Compressive Strength	TB02	P32		
Asphalt treated:				
Dynamic Modulus (77F)	TB03	P33		
HMAC:				
Resilient Modulus	AC07	P07		
III. UNBOUND GRANULAR				
BASE AND SUBBASE				
Particle Size Analysis	UG01	P41	4	[TP1], [BA1-3], [BA4-6], [TP2]
Sieve Analysis	UG02	P41	4	[TP1], [BA1-3], [BA4-6], [TP2]
Atterberg Limits	UG04	P43	4	[TP1], [BA1-3], [BA4-6], [TP2]
Moisture-Density Relations	UG05	P44	4	[TP1], [BA1-3], [BA4-6], [TP2]
Resilient Modulus	UG07	P46	4	[TP1], [BA1-3], [BA4-6], [TP2]
Classification	UG08	P47	4	[TP1], [BA1-3], [BA4-6], [TP2]
Permeability	UG09	P48	4	[TP1], [BA1-3], [BA4-6], [TP2]
Natural Moisture Content	UG10	P49	4	[TP1], [BA1-3], [BA4-6], [TP2]
IV. SUBGRADE				
Sieve Analysis	SS01	P51	4	[TP1], [BA1-3], [BA4-6], [TP2]
Hydrometer to 0.001mm	SS02	P42	4	[TP1], [BA1-3], [BA4-6], [TP2]
Atterberg Limits	SS03	P43	4	[TP1], [BA1-3], [BA4-6], [TP2]
Classification	SS04	P52	4	[TP1], [BA1-3], [BA4-6], [TP2]
Moisture-Density Relations	SS05	P55	4	[TP1], [BA1-3], [BA4-6], [TP2]
Resilient Modulus	SS07	P46	4	A1, A2, A3, A4
Unit Weight	SS08	P56	4	[TP1], [BA1-3], [BA4-6], [TP2]
Natural Moisture Content	SS09	P49	4	[TP1], [BA1-3], [BA4-6], [TP2]
Depth to Rigid Layer			5	S1, S2, S3, S4, S5

TABLE 5
NJ SPS-5 LABORATORY TESTING PLANS (Post-Construction)

Material Type and Properties	SHRP Test Designation	SHRP Protocol	# of Tests per layer	Materials Source/ Sample Type Designation
A. ASPHALTIC CONCRETE:				
Core Examination/Thickness	AC01	P01		All cores
Bulk Specific Gravity	AC02	P02		All cores
Maximum Specific Gravity	Ac03	P03	12	BV1, BV2, BV3, BR1, BR2, BR3, BNJ1, BNJ2, BNJ3, BSM1, BSM2, BSM3
Asphalt Content (Extraction)	AC04	P04	12	BV1, BV2, BV3, BR1, BR2, BR3, BNJ1, BNJ2, BNJ3, BSM1, BSM2, BSM3
Moisture Susceptibility	AC05	P05	12	BV1, BV2, BV3, BR1, BR2, BR3, BNJ1, BNJ2, BNJ3, BSM1, BSM2, BSM3
Creep Compliance	AC06	P06	4	[C43, C48, C111], [C95, C100, C105], [C53, C58, C63], [C68, C73, C78]
Resilient Modulus	AC07	P07	12	[C39, 40, 41], [C44, 45, 46], [C107, 108, 109]; [C91, 92, 93], [C96, 97, 98], [C101, 102, 103] [C49, 50, 51], [C54, 55, 56] [C59, C60, C61]; [C64, C65, C66], [C69, C70, C71], [C74, C75, C76]
Tensile Strength	AC07	P07	12	[C42, 47, 110],.[C94, 99, 104], [C52, 57, 62], [C67, 72, 77]
B. EXTRACTED AGGREGATE				
Bulk Specific Gravity:				
Coarse Aggregate	AG01	P11	12	BV1, BV2, BV3, BR1, BR2, BR3, BNJ1, BNJ2, BNJ3, BSM1, BSM2, BSM3
Fine Aggregate	AG02	P12	12	BV1, BV2, BV3, BR1, BR2, BR3, BNJ1, BNJ2, BNJ3, BSM1, BSM2, BSM3
Type and Classification:				
Coarse Aggregate	AG03	P13	12	BV1, BV2, BV3, BR1, BR2, BR3, BNJ1, BNJ2, BNJ3, BSM1, BSM2, BSM3
Fine Aggregate	AG03	P13	12	BV1, BV2, BV3, BR1, BR2, BR3, BNJ1, BNJ2, BNJ3, BSM1, BSM2, BSM3
Gradation to Aggregate	AG04	P14	12	BV1, BV2, BV3, BR1, BR2, BR3, BNJ1, BNJ2, BNJ3, BSM1, BSM2, BSM3
NAA Test for Fine Aggregate Particle Shape	AG05	P14A (note 2)	12	BV1, BV2, BV3, BR1, BR2,BR3, BNJ1, BNJ2, BNJ3, BSM1, BSM2, BSM3
C. ASPHALT CEMENT:				
Abson Recovery	AE01	P21	4	[BV1, BV2, BV3] [BR1, BR2, BR3] [BNJ1, BNJ2, BNJ3], [BSM1, BSM2, BSM3]
Pentration at 77F and 115F	AE02	P22	4	[BV1, BV2, BV3] [BR1, BR2, BR3] [BNJ1, BNJ2, BNJ3], [BSM1, BSM2, BSM3]
Specific Gravity (60F)	AE03	P23	4	[BV1, BV2, BV3] [BR1, BR2, BR3] [BNJ1, BNJ2, BNJ3], [BSM1, BSM2, BSM3]
Viscosity at 77F	AE04	P24	4	[BV1, BV2, BV3] [BR1, BR2, BR3] [BNJ1, BNJ2, BNJ3], [BSM1, BSM2, BSM3]
Viscosity at 140F, 275F	AE05	P25	4	[BV1, BV2, BV3] [BR1, BR2, BR3] [BNJ1, BNJ2, BNJ3], [BSM1, BSM2, BSM3]

NOTES:

1. Creep compliance will be performed when suitable procedures are developed - cores will be stored.
2. National Aggregate Association will perform tests at no cost to State.
3. BV, BR - Bulk samples of Virgin and Recycled Mixes taken during construction.
4. BNJ - Bulk sample during construction of standard (New Jersey Mix).
5. BSM - Bulk samples during construction of Split Mastic Asphalt (SMA).

TABLE 6
SPS-5 NJ DOT, I-195 WB, IMLAYSTOWN - FHWA-LTPP CONTRACTOR LABORATORY
Tracking Table for Laboratory Tests on Subgrade Material

TEST SECTION I.D.	SAMPLE LOCATION	MONITOR STATION	OFFSET FT.	SAMPLE NO.	LAB. TEST NO.	SAMPLE DESCRIPTION	LABORATORY HANDLING & TESTING SEQUENCE					
							FIRST	SECOND	THIRD	FOURTH	FIFTH	SIXTH
340502	BA4	5+60	3'	BS01	2	2 Bag bulk sample	SS01/P51	SS02/P42	SS03/P43	SS04/P52	SS05/P55	SS07/P46
340502	BA6	5+70	3'	BS02	2	3 Bag bulk sample						
340560	BA1	5+60	3'	BS03	2	2 Bag bulk sample	SS01/P51	SS02/P42	SS03/P43	SS04/P52	SS05/P55	SS07/P46
340560	BA3	5+70	3'	BS04	2	3 Bag bulk sample						
340502	BA4	5+60	3'	MS01	2	Moisture jar sample	SS09/P49					
	BA6	5+70	3'	MS02	2	Moisture jar sample	SS09/P49					
340560	BA1	5+60	3'	MS03	2	Moisture jar sample	SS09/P49					
	BA3	5+70	3'	MS04	2	Moisture jar sample	SS09/P49					
340505	TP1	5+66	3'	BS55	2	4 Bag bulk sample	SS01/P51	SS02/P42	SS03/P43	SS04/P52	SS05/P55	SS07/P46
340503	TP2	5+80	3'	BS56	2	4 Bag bulk sample	SS01/P51	SS02/P42	SS03/P43	SS04/P52	SS05/P55	SS07/P46

NOTE:

1. A combined sample of BS01 and BS02 is tested
   A combined sample of BS03 and BS04 is tested

2. Include a copy of tracking tables in the shipment of samples to:-
   Law Engineering Inc.
   396 Plasters Avenue, NE
   Atlanta, Georgia 30324
   c/o Rick Boudreau (404) 817-0242

TABLE 7
SPS-5 NJ DOT, I-195 WB, IMLAYSTOWN - FHWA-LTPP CONTRACTOR LABORATORY
Tracking Table for Laboratory Tests on Granular Base

TEST SECTION I.D.	SAMPLE LOCATION	MONITOR STATION	OFFSET FT.	SAMPLE NO.	LAB. TEST NO.	SAMPLE DESCRIPTION	LABORATORY HANDLING & TESTING SEQUENCE					
							FIRST	SECOND	THIRD	FOURTH	FIFTH	SIXTH
340502	BA5	5+65	6'	BG02	2	1 Bag bulk sample	UG01/P41	UG02/P41	UG04/P43	UG02/P47	UG05/P44	UG07/P46
	BA6	5+70	3'	BG03	2	1 Bag bulk sample						
340560	BA1	5+60	3'	BG04	2	1 Bag bulk sample	UG01/P41	UG02/P41	UG04/P43	UG02/P47	UG05/P44	UG07/P46
	BA2	5+65	6'	BG05	2	1 Bag bulk sample						
	BA3	5+70	3'	BG06	2	1 Bag bulk sample						
340502	BA4	5+60	3'	MG01	2	Moisture jar sample	UG10/P49					
	BA5	5+65	6'	MG02	2	Moisture jar sample	UG10/P49					
	BA6	5+70	3'	MG03	2	Moisture jar sample	UG10/P49					
340560	BA1	5+60	3'	MG04	2	Moisture jar sample	UG10/P49					
	BA2	5+65	6'	MG05	2	Moisture jar sample	UG10/P49					
	BA3	5+70	3'	MG06	2	Moisture jar sample	UG10/P49					
340505	TP1	5+66		BG55	2	4 Bag bulk sample	UG01/P41	UG02/P41	UG04/P43	UG02/P47	UG05/P44	UG07/P46
340503	TP2	5+80		BG56	2	4 Bag bulk sample	UG01/P41	UG02/P41	UG04/P43	UG02/P47	UG05/P44	UG07/P46

NOTE:
A combined sample of BG02 and BG03 is tested
A combined sample of BG04, BG05, and BG06 is tested

Include a copy of this tracking table
in the shipment of samples to:
Law Engineering, Inc. Atlanta, GA

TABLE 8
SPS-5 NJ DOT, I-195 WB, IMLAYSTOWN - FHWA-LTPP CONTRACTOR LABORATORY
Tracking Table for Laboratory Tests on Asphalt Concrete Surfacing (Existing Pavement)

TEST SECTION I.D.	SAMPLE LOCATION	MONITOR STATION	OFFSET FT.	SAMPLE NO.	LAB. TEST NO.	SAMPLE DESCRIPTION	LABORATORY HANDLING & TESTING SEQUENCE					
							FIRST	SECOND	THIRD	FOURTH	FIFTH	SIXTH
340503	C29	5+70	2'	CA29	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C30	5+70	3.5'	CA30	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C31	5+70	5'	CA31	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C32	5+71.5	5'	CA32	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
340502	C18	5+50	2'	CA18	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C19	5+50	3.5'	CA19	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C20	5+50	5'	CA20	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C21	5+51.5	5'	CA21	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
340560	C13	5+50	2'	CA13	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C14	5+50	3.5'	CA14	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C15	5+50	5'	CA15	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C16	5+51.5	5'	CA16	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
340505	C4	5+50	5'	CA04	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C5	5+50	2'	CA05	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C6	5+51.5	5'	CA06	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C7	5+51.5	2'	CA07	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
340560	BA1	5+60	3'	CA161	2	12" O.D. Core	AC01/P01	AC03/P03	AG04/P14	AG03/P13	AG05/P14A	
	BA2	5+65	6.0'	CA162	2	12" O.D. Core	AC01/P01					
	BA3	5+70	3'	CA163	2	12" O.D. Core	AC01/P01					
340502	BA4	5+60	3'	CA164	2	12" O.D. Core	AC01/P01	AC03/P03	AG04/P14	AG03/P13	AG05/P14A	
	BA5	5+65	6'	CA165	2	12" O.D. Core	AC01/P01					
	BA6	5+70	3'	CA166	2	12" O.D. Core	AC01/P01					
340505	C3	0-50	3'	CA03	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC06/P06			
340560	C12	0-50	3'	CA12	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC06/P06			
340502	C17	0-53	3'	CA17	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC06/P06			

TABLE 9
SPS-5 NJ DOT, I-195 WB, IMLAYSTOWN - FHWA-LTPP CONTRACTOR LABORATORY
Tracking Table for Laboratory Tests on Asphalt Concrete (Post-Construction Sampling)

sheet 1/2

TEST SECTION I.D.	SAMPLE LOCATION	MONITOR STATION	OFFSET FT.	SAMPLE NO.	LAB. TEST NO.	SAMPLE DESCRIPTION	LABORATORY HANDLING & TESTING SEQUENCE					
							FIRST	SECOND	THIRD	FOURTH	FIFTH	SIXTH
340507	C107	0-50	6'	CA107	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C108	0-50	3'	CA108	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C109	0-48.5	6'	CA109	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C110	0-48.5	3'	CA110	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
340504	C39	0-50	5'	CA39	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C40	0-50	3.5'	CA40	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C41	0-50	2'	CA41	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C42	0-48.5	5'	CA42	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C43	0-48.5	3.5'	CA43	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC06/P06			
340503	C101	0-50	6'	CA101	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C102	0-50	3'	CA102	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C103	0-48.5	6'	CA103	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C104	0-48.5	3'	CA104	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
340508	C91	0-50	5'	CA91	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C92	0-50	3.5'	CA92	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C93	0-50	2'	CA93	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C94	0-48.5	5'	CA94	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C95	0-48.5	3.5'	CA95	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC06/P06			
	C96	5+48.5	5'	CA96	2	4.2" O.D. Core (spare)	AC01/P01	AC02/P02				
	C97	5+48.5	3.5'	CA97	2	4.2" O.D. Core (spare)	AC01/P01	AC02/P02				
	C98	5+50	5'	CA98	2	4.2" O.D. Core (spare)	AC01/P01	AC02/P02				
	C99	5+50	3.5'	CA99	2	4.2" O.D. Core (spare)	AC01/P01	AC02/P02				
340504	C44	5+48.5	5'	CA44	2	4.2" O.D. Core (spare)	AC01/P01	AC02/P02				
	C45	5+48.5	3.5'	CA45	2	4.2" O.D. Core (spare)	AC01/P01	AC02/P02				
	C46	5+50	5'	CA46	2	4.2" O.D. Core (spare)	AC01/P01	AC02/P02				
	C47	5+50	3.5'	CA47	2	4.2" O.D. Core (spare)	AC01/P01	AC02/P02				

TABLE 9 (Cont.)
SPS-5 NJ DOT, I-195 WB, IMLAYSTOWN - FHWA-LTPP CONTRACTOR LABORATORY
Tracking Table for Laboratory Tests on Asphalt Concrete (Post-Construction Sampling)

sheet 2/2

TEST SECTION I.D.	SAMPLE LOCATION	MONITOR STA.	OFFSET FT.	SAMPLE NO.	LAB. TEST NO.	SAMPLE DESCRIPTION	LABORATORY HANDLING & TESTING SEQUENCE					
							FIRST	SECOND	THIRD	FOURTH	FIFTH	SIXTH
340559	C49	0-50	5'	CA49	1	4.2" O.D. Core	AC01/P01	AC02/P02	CA07/P07	AC07/P07 (ITS)		
	C50	0-50	3.5'	CA50	1	4.2" O.D. Core	AC01/P01	AC02/P02	CA07/P07	AC07/P07 (ITS)		
	C51	0-50	2'	CA51	1	4.2" O.D. Core	AC01/P01	AC02/P02	CA07/P07	AC07/P07 (ITS)		
	C52	0-48.5	5'	CA52	1	4.2" O.D. Core	AC01/P01	AC02/P02	CA07/P07	AC07/P07 (ITS)		
	C56	5+47	5'	CA56	2	4.2" O.D. Core	AC01/P01	AC02/P02	CA07/P07	AC07/P07 (ITS)		
	C57	5+47	3.5'	CA57	2	4.2" O.D. Core	AC01/P01	AC02/P02	CA07/P07	AC07/P07 (ITS)		
	C58	5+48.5	5'	CA58	2	4.2" O.D. Core	AC01/P01	AC02/P02	CA07/P07	AC07/P07 (ITS)		
	C59	5+48.5	3.5'	CA59	2	4.2" O.D. Core	AC01/P01	AC02/P02	CA07/P07	AC07/P07 (ITS)		
	C60	5+48.5	2'	CA60	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC06/P06			
340560	C64	0-50	5'	CA64	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C65	0-50	3.5'	CA65	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C66	0-50	2'	CA66	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C67	0-48.5	5'	CA67	1	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C71	5+47	5'	CA71	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C72	5+47	3.5'	CA72	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C73	5+48.5	5'	CA73	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C74	5+48.5	3.5'	CA74	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)		
	C75	5+48.5	2'	CA75	2	4.2" O.D. Core	AC01/P01	AC02/P02	AC06/P06			
	C76	5+50	5'	CA76	2	4.2" O.D. Core (spare)	AC01/P01	AC02/P02				
	C77	5+50	3.5'	CA77	2	4.2" O.D. Core (spare)	AC01/P01	AC02/P02				
	C78	5+50	2'	CA78	2	4.2" O.D. Core (spare)	AC01/P01	AC02/P02				
340559	C61	5+50	5'	CA61	2	4.2" O.D. Core (spare)	AC01/P01	AC02/P02				
	C62	5+50	3.5'	CA62	2	4.2" O.D. Core (spare)	AC01/P01	AC02/P02				
	C63	5+50	2'	CA63	2	4.2" O.D. Core (spare)	AC01/P01	AC02/P02				

TABLE 10
NJ SPS-5 I-195 LIST OF SAMPLES SENT TO MATERIALS REFERENCE LIBRARY - TEXAS

MIX			MATERIAL	SAMPLE SIZE	REMARKS
SCR	I-4R	Mix A	RAP only	2-55 gal. drums	Kingston Plant
BCR	I-2R	Mix B	RAP only	2-55 gal. drums	
SCV	I-4	Mix C	coarse & fine Agg. combined	2-55 gal. drums	
BCV	I-2	Mix D	coarse & fine Agg. combined	3-5 gal. pails	3/4", 3/8" stone
BCV	I-2	Mix D	coarse & fine Agg. combined	3-5 gal. pails	extra samples
BCR	I-2R	Mix B	coarse & fine Agg. combined	3-5 gal. pails	without RAP
Rubberized O.G.F.C.			coarse & fine Agg. combined 3/8" Screenings - Kingston 1/4" Pennington	2-55 gal. drums	Florence Plant

Total Aggregate Samples: 6-55 Gallon Drums, 9-5 Gallon Pails

UNCOMPACTED PAVING MIXTURES

SCR	I-4R	Mix A	HMAC	3-5 gal. pails	30% RAP AC10
BCR	I-2R	Mix B	HMAC	3-5 gal. pails	30% RAP AC10
SCV	I-4	Mix C	HMAC	3-5 gal. pails	AC20
BCV	I-2	Mix D	HMAC	3-5 gal. pails	AC20
State SC	I-4	Agency	HMAC	3-5 gal. pails	10% RAP AC20
State BC	I-2	Agency	HMAC	3-5 gal. pails	20% RAP AC20
Rubberized O.G.F.C.			HMAC	3-5 gal. pails	AC20 with rubber additives

Total HMAC Samples: 21-5 Gallon Pails

AC AND ADDITIVES

BCR	I-2R	Mix B	AC10	11-5 gal. pails	CITGO
SCR	State SC		AC10	11-5 gal. pails	ELF
SCV	BCV	State BC	AC20	11-5 gal. pails	CITGO
Rubberized O.G.F.C.			AC20	11-5 gal. pails	CITGO AC rubber additive
O.G.F.C.			Ground Rubber	1 small package	If more required can be purchased from Rouse

Total AC Samples: 44-5 Gallon Pails, 1-Package Ground Rubber

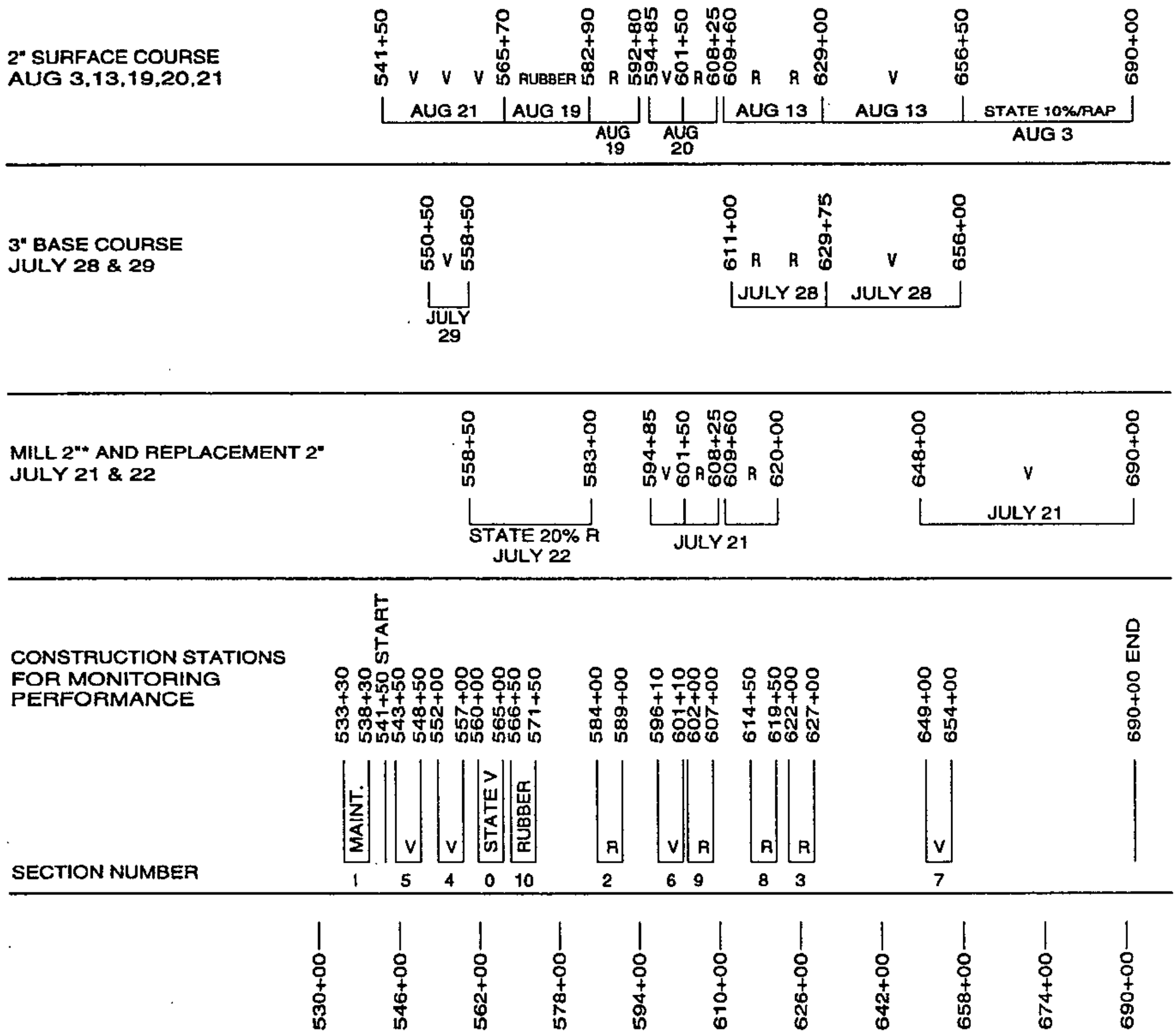
TOTAL SAMPLES SUBMITTED: 6-55 GALLON DRUMS 74-5 GALLON PAILS

TABLE 11
NJ SPS-5 I-195 INTENSIVE SURFACE PREPARATION AND PAVING DATES
Passing and Driving Lanes and Outside Shoulder

Section	Material (overlay)	Type of Treatment	Milled (Lane)			Replacement			Base Course			Surface Course		
			Pass	Drive	Shoulder	Pass	Drive	Shoulder	Pass	Drive	Shoulder	Pass	Drive	Shoulder
340507	5" V	Intensive	July 20	July 21		July 20	July 21		July 27	July 28	July 28	August 12	August 13	August 13
340503	5" R	Minimum							July 27	July 28	July 29	August 12	August 13	August 13
340508	5" R	Intensive	July 20	July 21		July 20	July 21		July 27	July 28	July 29	August 12	August 13	August 13
340509	2" R	Intensive	July 20	July 21		July 20	July 21					August 20	August 20	August 20
340506	2" V	Intensive	July 20	July 21		July 20	July 21					August 20	August 20	August 20
340502	2" R	Minimum										August 19	August 19	August 19
340560	1" O.G.F.C.	Intensive	July 20	July 22	July 22	July 20	July 22	July 22				August 19	August 19	August 19
340559	2" State	Intensive	July 20	July 22	July 22	July 20	July 22	July 22				August 21	August 21	August 21
340504	5" V	Minimum							July 30	July 29	July 29	August 21	August 21	August 21
340505	2" V	Minimum										August 21	August 21	August 21
340501	Maint.	Normal												

Weather Notes and Paving Temperatures:

July 20: warm, cloudy, some sun
July 21: sunny, hot 82-92 degrees
July 22: warm, cloudy, some sun, 82 degrees
July 27: cloudy, some sun, 82-88 degrees
July 28: sunny, hot, 76-80 degrees
July 29: sunny, hot, 80 degrees
July 30: hot, sunny, humid, 80 degrees
Aug. 12: sunny, warm 72-83 degrees
Aug. 13 cloudy, threat of rain, 80 degrees
Aug. 19: sunny, warm, 80-88 degrees
Aug. 20: sunny, warm, 75-80 degrees
Aug. 21: hot, sunny, 72-83 degrees



NOTES:

1. BASE COURSE - SHRP BCR 30% RAP
   STATE BC 20% RAP
2. SURFACE COURSE - SHRP SCR 30% RAP
   STATE SC V or 10% RAP
3. SHRP V = STATE V
4. V - VIRGIN
5. R - RECYCLED ASPHALT PAVEMENT
6. * - MILL 1" 340510

LAYOUT OF TEST SECTION TREATMENTS, MIXES AND PAVING DATES
NJ DOT I-195 SPS-5 ALLENTOWN

TABLE 13
NJ SPS-5 I-195 (ALLENTOWN) CONSTRUCTION DATA SUMMARY
REPLACEMENT LAYER (DRIVING LANE) AND BASE COURSE LAYER PASSING AND DRIVING LANE

Section	Lane	Type of Mix	Const. Date	Avg. Travel Load & Unload	Paving Time/Section			HM Temp. (F)		Air Temp.	Nom. Thick.	Pav. Width	Density & Voids	
					At 0+00	At 5+00	Time	Plant	Laydown				Density	Voids
340507	Replace	BCV	July 21	62 Min.	10:38 AM	11:06 AM	28 Min.	310	288	82	3.0	12.5	160.7	3.6
	Pass	BCV	July 27	93 Min.	10:00 AM	10:40 AM	40 Min.	302	296	88	4.0	16.0		
	Drive	BCV	July 28	92 Min.	9:24 AM	9:43 AM	19 Min.	303	284	76	3.8	11.0	159.0	5.2
340503	Pass	BCR	July 27	62 Min.	2:15 PM	2:55 PM	40 Min.	280	266	82	4.0	16.0		
	Drive	BCR	July 28	67 Min.	12:05 PM	12:26 PM	19 Min.	300	287		3.5	11.0	155.4	7.3
340508	Replace	BCR	July 21		1:27 PM	1:52 PM	25 Min.	295	263	90	3.0	12.5	159.0	4.6
	Pass	BCR	July 27	66 Min.	3:08 PM	3:43 PM	40 Min.	288	273	85	4.0	15.5		
	Drive	BCR	July 28	59 Min.	12:31 PM	1:14 PM	43 Min.	283	277	80	4.0	11.0	156.5	6.7
340509	Replace	BCR	July 21		2:45 PM	3:00 PM	15 Min.	295	282	92	3.0	12.5	158.3	5.0
340506	Replace	BCV	July 21		3:22 PM	3:48 PM	26 Min.	310	287	92	3.0	12.5	154.4	7.3
340560	Replace	BC State	July 22		11:09 AM	11:44 AM	35 Min.	285	281	82	3.0	12.0	161.7	2.9
340559	Replace	BC State	July 22		11:50 AM	12:20 PM	30 Min.	300	288	82	3.0	12.0	161.1	3.3
340504	Pass	BCV	July 30	80 Min.	9:28 AM	9:46 AM	18 Min.	290	281	80	3.7	15.5		
	Drive	BCV	July 29	57 Min.	12:14 PM	12:41 PM	27 Min.		292	80	4.0	12.0	159.0	5.2

TABLE 14
NJ SPS-5 I-195 (ALLENTOWN) CONSTRUCTION DATA SUMMARY
CONSTRUCTION DATA SUMMARY - SURFACE COURSES
(PASSING AND DRIVING LANES)

Section	Lane	Type of Mix	Const. Date	Avg. Travel Load & Unload	Paving Time/Section			HM Temp. (F)		Air Temp. (F)	Nom. Thick. ins.	Pav Width ft.	Density (#/cu. ft.)	Voids %	Surf. Prof.	Voids % Driving Lane Post Const. Sept. 1992		
					At 0+00	At 5+00	Time	Plant	Laydown							Max Density	Density	Voids
340507	Pass	SCV	Aug. 12	127 Min.	10:13 AM	10:30 AM	17 Min.	305	294	72	2.5	15.0			*			
	Drive	SCV	Aug. 13	96 Min.	9:40 AM	9:55 AM	15 Min.	310	281	80	2.5	12.0	154.8	7.67		164.9	153.9	6.67
																	155.7	5.58
340503	Pass	SCR	Aug. 12	66 Min.	1:20 PM	1:35 PM	15 Min.	293	263	83	2.5	15.0						
	Drive	SCR	Aug. 13	68 Min.	12:24 PM	12:40 PM	16 Min.	295	265	80	2.5	12.0	152.6	9.03		164.5	152.2	7.48
																	155.6	5.41
340508	Pass	SCR	Aug. 12	60 Min.	1:44 PM	2:08 PM	24 Min.	290	273	83	2.5	15.0						
	Drive	SCR	Aug. 13	70 Min.	12:46 PM	1:12 PM	26 Min.	290	264	78	2.5	12.0	152.6	9.03		164.5	155.0	5.78
																	153.9	6.44
340502	Pass	SCR	Aug. 19	79 Min.	10:00 AM	10:38 AM	38 Min.	300	258	75	2.4	15.0						
	Drive	SCR	Aug. 19	4 Hrs. 11 Min.	3:34 PM	3:50 PM	16 Min.	290	256 (230-270)	83	2.5	12.0	150.7	10.2		165.2	152.1	7.93
																	151.9	8.05
340560	Pass	Rubber	Aug. 19	49 Min.	12:55 PM	1:28 PM	33 Min.	325	281	88	1.5	12+6						
	Drive	Rubber	Aug. 19	80 Min.	4:37 PM	4:50 PM	13 Min.	325	296	80	1.5	12.0	122.4	27.2		165.0	135.4	17.9
																	135.9	17.6
340509	Pass	SCR	Aug. 20	80 Min.	10:11 AM	10:28 AM	17 Min.	295	282	75	2.5	15.5						
	Drive	SCR	Aug. 20	56-1st Load	1:20 PM	1:34 PM	14 Min.	295	272	80	2.5	12.0	154.4	8.18		165.2	156.6	5.21
				3 Hrs. 54 Min.													154.8	6.30
340506	Pass	SCV	Aug. 20	74 Min.	11:07 AM	11:24 AM	17 Min.		295	75	2.5	15.5						
	Drive	SCV	Aug. 20	3 Hrs. 20 Min.	1:40 PM	2:12 PM	32 Min.		278	80	2.5	12.0	153.8	8.3		164.0	157.5	3.96
																	156.3	4.70
340559	Pass	SCV	Aug. 21	109 Min.	9:48 AM	10:04 AM	16 Min.	310	302	72	2.5	15.5						
	Drive	SCV	Aug. 21	134 Min.	12:47 PM	1:03 PM	16 Min.	310	297	80	2.5	12.0	153.0	8.76		166.0	156.7	5.60
																	156.7	5.60
340504	Pass	SCV	Aug. 21	102 Min.	10:10 AM	10:24 AM	14 Min.	310	282	72	2.5	15.5						
	Drive	SCV	Aug. 21	84 Min.	1:09 PM	1:22 PM	13 Min.	310	275	83	2.5	12.0	153.4	8.30		166.0	152.6	8.07
																	156.0	6.02
340505	Pass	SCV	Aug. 21	60 Min.	10:40 AM	10:58 AM	18 Min.	310	284	72	2.5	15.5						
	Drive	SCV	Aug. 21	113 Min.	1:27 PM	1:37 PM	10 Min.	310	290	83	2.5	12.0	154.0	8.31		166.0	155.5	6.33
																	157.5	5.12

* New Jersey DOT use 10' Rolling Straightedge

TABLE 15A
NJ SPS-5 I-195 (ALLENTOWN) MIX DESIGNS AND ASPHALT PLANT REPORTS
BITUMINOUS STABILIZED BASE COURSE - I-2V (BCV)
VIRGIN REPLACEMENT AND BASE COURSE LAYERS
(Total Percent Passing Each Sieve)

SIEVE SIZE	MIX TYPE - REPLACEMENT AND BASE COURSES - BCV							
	JMF	SPECIFICATION AVERAGE OF 5 SAMPLES		PLANT REPORTS				
				REPLACE I-2V	BASE COURSE I-2V			
				TS 7, 6 JULY 21 #2	TS 7 JULY 27 #5	TS 7 JULY 28 #6	TS 4 JULY 29 #7	
2	100	100		100	100	100	100	100
1 1/2	100	90	100	100	100	100	100	100
1	100	80	100	98.8	98.3	100	100	100
3/4								
1/2	74	50	85	79.7	76.5	76.1	70.4	75.9
3/8								
#4	50	25	60	55.5	50.7	52.2	44.6	44.7
#8	40	35.5	44.5	45.9	42.0	43.3	36.2	36.6
#16								
#30								
#50	16	8	30	16.7	16.8	15.7	14.3	14.3
#100								
#200	5.3	3.9	6.7	6.5	7.5	5.5	5.4	5.5
% AC in RAP								
% AC								
Total AC	4.5	4.05	4.95	4.94	4.55	4.52	3.78	4.17
Type AC	AC 20			AC 20	AC 20	AC 20	AC 20	
Source AC				Citgo Paulsboro	Citgo Paulsboro	Citgo Paulsboro	Citgo Paulsboro	
Marshall Design								
Stability	>2900			3420	3810	2700	3400	2600
Flow-0.01 in.	13.0			10	10	12	11	14
Air voids %	3.4			3.3	2.7	5.0	4.1	7.2
VMA %	15.1							
VFA %	77.0							
Max SP.GR.	2.690			2.670	2.681	2.655	2.688	2.688
Bulk SP. GR.				2.582	2.609	2.554	2.577	2.494
lbs./sq. yd./in.	121.6							

Same mix was used full width

TABLE 15B
NJ SPS-5 I-195 (ALLENTOWN) MIX DESIGNS AND ASPHALT PLANT REPORTS
BITUMINOUS STABILIZED BASE COURSE - I-2R 30% RAP (BCR)
RECYCLED REPLACEMENT AND BASE COURSE LAYERS
(Total Percent Passing Each Sieve)

SIEVE SIZE	MIX TYPE - REPLACEMENT AND BASE COURSES - BCR 30% JMF I-2R 30%	SPECIFICATION AVERAGE OF 5 SAMPLES		PLANT REPORTS REPLACE I-2R TS* 8,9 JULY 21 #2	BASE COURSE I-2R TS 3,8 JULY 27 #5	BASE COURSE I-2R TS 3,8 JULY 28 #6	BASE COURSE I-2R TS 3,8 JULY 29 #7
2	100	100		100	100	100	100
1 1/2	100	90	100	100	100	100	100
1	100	80	100	100	100	100	100
3/4							
1/2	75	50	85	77.3	84.9	70.9	74.2
3/8							
#4	49	25	60	50.4	54.9	47.7	48.9
#8	40.5	36.0	45.0	40.9	45.4	39.3	40.3
#16							
#30							
#50	16	8	30	16.7	19.2	17.5	16.8
#100							
#200	6.6	5.2	8.0	6.7	7.7	7.1	7.3
% AC in RAP	1.5						
% AC	2.9						
Total AC	4.4			4.17	4.46	3.95	4.43
Type AC	AC 10			AC 10	AC 10	AC 10	AC 10
Source AC				Citgo Paulsboro	Citgo Paulsboro	Citgo Paulsboro	Citgo Paulsboro
Marshall Design							
Stability	3000.0			3340	3810	2960	
Flow-0.01 in.	12			9	10	11	
Air voids %	3.8			4.9	2.7	4.6	
VMA %	14.5						
VFA %	74.0						
Max SP.GR.	2.642			2.667	2.681	2.669	
Bulk SP. GR.				2.536	2.609	2.546	

* Same mix was used full width

TABLE 15C
NJ SPS-5 I-195 (ALLENTOWN) MIX DESIGNS AND ASPHALT PLANT REPORTS
VIRGIN BITUMINOUS CONCRETE SURFACE COURSE - I-4V (SCV)
(Total Percent Passing Each Sieve)

SIEVE SIZE	MIX TYPE - SURFACE COURSE - VIRGIN I-4V SCV							
	JMF I-4 V	SPECIFICATION AVERAGE OF 5 SAMPLES		PLANT REPORTS: TS 7 AUG. 12 #11	TS 7 AUG. 13 #12	TS 6 AUG. 20 #14	TS 4, 5 AUG. 21 #15	
2								
1 1/2								
1	100	100		100	100	100	100	100
3/4	99	98	100	99.2	97.6	97.5	99.0	98.7
1/2	90	88	98	94.0	90.8	90.3	89.7	91.2
3/8	83	65	88	88.5	83.2	84.8	82.5	84.4
#4	58	35	65	63.1	57.7	56.1	57.7	56.6
#8	44.0	40.0	48.0	46.8	45.5	43.4	43.9	44.5
#16	34	28	40	36.1	36.1	33.5	33.6	33.0
#30	26	12	30	28.6	38.7	26.1	26.2	26.0
#50	16	10	25	17.6	17.9	16.1	16.6	17.1
#100								
#200	5.4	4.0	6.8	6.2	6.6	5.5	6.5	6.2
% AC in RAP								
% AC								
Total AC	4.7	4.25	5.15	5.02	4.74	4.79	4.61	4.58
Type AC				AC 20	AC 20	AC 20	AC 20	
Source AC				Citgo Paulsboro	Citgo Paulsboro	Citgo Paulsboro	Citgo Paulsboro	
Marshall Design								
Stability	2400			3210	2450	2200	3210	2720
Flow-0.01 in.	12.0			9	10	12	11	12
Air voids %	3.5			4.0	4.1	5.4	3.2	3.4
VMA %	15.2							
VFA %	76.0							
Max SP.GR.	2.620			2.659	2.643	2.668	2.662	2.662
Bulk SP. GR.				2.553	2.535	2.524	2.576	2.570

* Same mix was used full width

TABLE 15D
NJ SPS-5 I-195 (ALLENTOWN) MIX DESIGNS AND ASPHALT PLANT REPORTS
RECYCLED BITUMINOUS CONCRETE SURFACE COURSE - I-4R 30% RAP (SCR)
(Total Percent Passing Each Sieve)

	MIX TYPE - SURFACE COURSE - I-4R (SCR) 30%						
		SPECIFICATION		PLANT REPORTS			
SIEVE SIZE	JMF SCR 30%	AVERAGE OF 5 SAMPLES		TS 3, 8 AUG. 12 #11	TS 3, 8 AUG. 3 #12		TS 2 AUG. 19 #13
2	100						
1 1/2							
1	100	100	100	100	100	100	100
3/4	99	98	100	100	99.3	100	98.6
1/2	91	88	98	92.4	92.6	93.6	89.6
3/8	84	65	88	84.1	86.3	84.1	80.4
#4	55	35	65	55.1	54.1	55.3	49.1
#8	43.0	39.0	41.0	41.6	43.0	44.1	37.2
#16	34	18	40	33.7	34.1	35.2	30.4
#30	26	12	30	27.4	26.2	27.3	24.8
#50	16	10	25	17.4	16.4	17.2	16.0
#100							
#200	6.7	5.3	8.1	6.8	6.6	6.9	5.5
% AC in RAP	1.5						
% AC	3.2						
Total AC	4.7	4.25	5.15	5.02	4.81	4.72	4.62
Type AC	AC 10			AC 10	AC 10		AC 10
Source AC				ELF Pettys IS	ELF Pettys IS		ELF Pettys IS
Marshall Design							
Stability	2700			3210	2500	2700	2400
Flow-0.01 in.	11.0			9	12	10	12
Air voids %	3.5			4.0	4.3	3.7	4.7
VMA %	15.3						
VFA %	76.0						
Max SP.GR.	2.637			2.659	2.636	2.636	2.661
Bulk SP. GR.				2.553	2.523	2.537	2.536

* Same mix was used full width

TABLE 15E
NJ SPS-5 I-195 (ALLENTOWN) MIX DESIGNS AND ASPHALT PLANT REPORTS
BITUMINOUS STABILIZED BASE COURSE I-2* AND RUBBERIZED O.G.F.C.
(Total Percent Passing Each Sieve)

	MIX TYPE - I-2 BASE COURSE					MIX TYPE - RUBBERIZED O.G.F.C.				
				PLANT REPORT					PLANT REPORT	
SIEVE SIZE	JMF I-2 20% RAP	SPECIFICATION AVERAGE OF 5 SAMPLES		TS 10, 55 (0) I-2 20% RAP JULY 22 # 3		JMF	SPECIFICATION AVERAGE OF 5 SAMPLES		TS 10 AUG. 19 1A	1B
2	100	100	100	100	100					
1 1/2	100	90	100	100	100					
3/4	100	80	100	100	100					
1/2	75	50	85	73.1	84.7	100	100	100	100	100
3/8						94	80	100	95.9	96.9
#4	49	25	60	45.3	55.8	39	30	50	42.0	44.1
#8	40.5	36.0	45.0	37.9	45.8	10.5	5	15	9.3	8.5
#16									4.7	4.5
#30									4.7	4.1
#50	16	8	30	16.3	18.5				4.3	4.0
#100										
#200	6.2	4.8	7.6	5.5	6.7	2.9	2	5	3.8	3.6
% AC in RAP	1.0									
% AC	3.5									
Total AC	4.5			4.37	5.00	6.6**	5.70	7.00	6.6	6.6
Type AC	AC 20					AC 20			AC 20	
Source AC						Citgo Paulsboro			Citgo Paulsboro	
Marshall Design										
Stability	2900			3790	3130					
Flow-0.01 in.	13.0			7	11					
Air voids %	3.5			4.0	3.5					
VMA %	15.1									
VFA %	77.0									
Max SP.GR.	2.690			2.669	2.661					
Bulk SP. GR.				2.563	2.567					
lbs./sq. yd./in.	121.6									

* NJ State Designation Contractor has the option to use Virgin, 10% or 20% RAP

** Includes 15% rubber by weight of AC

TABLE 16
NJ SPS-5 I-195 (ALLENTOWN)
SUMMARY OF REHABILITATION TREATMENTS AND LAYER THICKNESSES

SHRP ID	LAYER THICKNESS INS. A.C. OVERLAY 01	A.C. OVERLAY 04 BASE	A.C. OVERLAY 04 REPLACE	ORIGINAL AC 03	TOTAL AC	PIT RUN BASE & SUBBASE 05	REHABILITATION TREATMENT PATCHES OR LEVEL-UP	SURFACE PREP.	OVERLAY MIX DESIGNATION
340507	2.2	2.7	2.2	6.3 (8.4)	13.4"	10*	None	Milled	2" I-4V (SCV) 3" I-2V (BCV) 2" I-2V (BCV)
340503	1.9	2.6		8.7	13.2"	11.2	None	None	2" I-4R (SCR) 3" I-2R (BCR)
340508	1.7	3.2	2.2	6.8 (9.1)	13.9"	10*	None	Milled	2" I-4R (SCR) 3" I-2R (BCR) 2" I-2R (BCR)
340509	1.6		2.5	6.9 (9.4)	11.0"	10*	None	Milled	2" I-4R (SCR) 2" I-2R (BCV)
340506	1.9		2.1	6.5 (9.4)	10.5"	10*	None	Milled	2" I-4V (SCV) 2" I-2V (BCV)
340502	1.7			9.0	10.7"	10.0	None	None	2" I-4R (SCR)
340504	1.8	2.8		8.5	13.1"	10*	None	None	2" I-4V (SCV) 3" I-2V (BCV)
340505	2.1			9.2	11.3"	9.5	None	None	2" I-4V (SCV)
Supplemental									
340560	1.2		2.2	6.5 (8.4)	9.9"	10.4	None	Milled	1" O.G.F.C. 2" I-4 (used BCR 20% RAP)
340559	1.9		2.1	6.1 (8.6)	10.1"	10*	None	Milled	2" I-4 (used SCV) 2" BCR 20%
Control									
340501	0	0	0	9.2	9.2"	10*	None	Normal Maint.	

NOTES:

Overlay thicknesses obtained from 5 point levels.
( ) Original AC thickness prior to milling
I-4R S Bit. concrete surface course 30%RAP
I-4V S Bit. concrete surface course virgin
I-2R B Bit. stabilized base course 30% RAP
I-2V B Bit. stabilized base course virgin
O.G.F. Rubberized open graded friction course
I-4 Standard state bituminous concrete surface course - 10% RAP permitted
I-2 Standard state bituminous stabilized base course - 20% RAP permitted
* Base and subbase thickness obtained from contract documents

Photo 1
Standard Havens 350 Tons/Hr. (317.5 Mg/Hr.) Recycling Drum Mixer

Photo 2
Test Section 3 Sign. Cracking Distress of Existing Pavement Illustrated

Photo 3
Milling 2" (51mm) of Shoulder in 340559 Exposed the Granular Base

Photo 4
3" (76mm) Thick Base Course Mix Laid with Edge Beveled at 6:1

Photo 5

CAT BC534 Roller with Nuclear Density On-The-Run Equipment

Photo 6

Fractured Aggregate of Beveled Base Course During Compaction Shows a Whitish Streak at Center Line Joint