PAVEMENT MANAGEMENT SYSTEMS

File MD-SPS-9

MEMORANDUM

TO:	Monte Symons	**DATE:**	December 14, 1992
FROM:	Bill Phang Bill Phang.	**PROJECT:**	50450810
SUBJECT:	MD SPS-9 Draft Construction Report	**FILE:**	
		COPIES:	See Below

Forwarded enclosed for your comments and suggestions is a draft of the construction report for the SPS-9 project on I-70, Frederick, Maryland.

The report was prepared by Mr. Alex Rutka who was the PMSL construction inspector on the project.

This draft may serve as the "straw-man" you need during formulation of framework and guidelines for preparation of SPS construction report

Distribution To:

I J Pecnik
A Blazucki
Gonzala Rada
A.Rutka
A.Brigg

Comment in File 15009

415 LAWRENCE BELL DRIVE
UNIT #3
AMHERST, N Y 14221
TEL (716) 632-0804
FAX (716) 632-4808

FHWA–LTPP

SPS–9 PROJECT

I–70 WB, FREDERICK, MD

NORTH ATLANTIC REGION

CONSTRUCTION REPORT

Prepared By

ALEX RUTKA

PAVEMENT MANAGEMENT SYSTEMS

415 Lawrence Bell Drive, Unit 3
Amherst, New York 14221

December 1992

DRAFT

CONSTRUCTION REPORT
SPS-9, I-70 Frederick, Maryland

Prepared by Alex Rutka, PMSL

Introduction

This project in Frederick County is for milling and resurfacing on I-70 EBR and resurfacing I-70 WBR from 800' west of bridge #10107 to 3200 east of bridge #10188 a distance of approximately 4.2 miles (i.e., 0.2 miles west of MD 144 [Patrick Street] to approximately 0.6 miles east of Ijamesville Rd.). See Figure 1 map of Frederick, Maryland area.

The contract as advertised required the following pavement rehabilitation:

EBR — Milling the existing pavement a minimum 3/4" to a maximum of 1" and then paving with 1-1/2" bituminous surface course and 3/4" plant mixed seal (polymer modified)

WBR — Paving with 1-1/2" bituminous surface course and 3/4" plant mixed seal (polymer modified). About 1" of the pavement had already been milled prior to advertising.

The tenders closed on June 09, 1992. Genstar, Frederick, Maryland was the lowest bidder. The contract had not been awarded when Genstar made an alternate proposal of milling the existing EBR surface as planned and replacing the 1-1/2" surface course and 3/4" plant mixed seal with 2" of SMA. A meeting was held on June 15, 1992 to discuss the proposal to incorporate the SPS 9 test sections in the contract and to arrive at a cost by June 17 with a view to starting the work in July. A copy of the minutes is shown in Appendix A-1.

On June 17, 192, Dr. Haleem Tahir, MD DOT submitted nomination forms to Mr. Ivan Pecnik, SHRP Regional Office for the nomination of this project for the SPS 9 experiment. This nomination included test sections for the State Mixture, SHRP Mixture and SMA (Appendix A-2).

On June 22, Mr. Pecnik had written to Mr. Teng, FHWA-LTPP recommending that the proposal be accepted (Appendix A-3). On July 23, 1992, Mr. Teng advised Mr. A. Porter Barrows, MD, Division of Administration that the nomination of the SPS 9 pilot test site is approved (Appendix A-4). The FHWA-LTPP Regional office has been working with MD DOT SHRP Coordinator Al Blazucki implementing the activities of this project since its approval. The pre-construction borings were made on August 11 and 12, 1992 in all the test sections except for 242805. This is a GPS section and the borings were carried out under SHRP contract P-012 on April 20, 1989. The sampling plan for the pre-construction boring is shown in Figure 2. Approval was given by MD SHA to proceed with the project but the surface course paving with SMA and all of the SPS test sections was reduced to 1-3/4" from 2".

A pre-construction meeting was held at the Frederick District Office on September 14. Genstar was advised that there would be 50 working days for the project starting Monday, September 14. The Contractor was prepared to start milling the EBR on Monday September 21 and paving the WBR on September 21. However, as the Asphalt Institute gyratory compactor for the SHRP mixture was not available until September 30, the start up time for the paving was delayed until September 28, the actual starting time of the overlay operation. Milling of the EBR started on September 21 as planned.

I-70

The EBR (east bound roadway) and WBR (west bound roadway) are three (3) lanes wide except for about 1/2 mile at the west end of the project where the pavement is only 2 lanes wide. All of the SPS 9 test sections were located in the WBR driving lane. There are two exits on the WBR (none within the SPS 9 test sections) at exit 59 at sta.1357 and at Patrick Street MD 144 at sta. 1520 but there are no entrances. The EBR has an entrance at Patrick Street.

The annual average daily traffic (two directions) is 35,700, truck traffic 14.5% and the estimated 18k ESAL rate in the study lane (1000 ESAL/yr) is 567.0

The terrain is rolling but the average grade is 1.8% resulting in several deep cuts and high embankments. Some cuts consist of rock and are now stabilized with vegetation at about 1:1 slope.

The pavement lanes are 12' wide with 10' outside shoulders and 4'-10' inside shoulders. The pavement crossfall is 2% and the shoulder 6%. A typical pavement section for the WBR shown in the contract documents prior to changing to the 1-3/4" SMA mix design is shown in Figure 3.

The pavement structure consists of the silt subgrade, 6" of crushed stone subbase, 6" of CTB and 9" of AC. The WBR pavement had about 1" of an open graded surface mix but it was milled prior to the award of the contract. The EBR was milled under this contract. A typical section of the pavement structure profile is shown in Figure 4.

SPS 9

Specific Pavement Studies SPS 9 was established for the validation of SHRP Asphalt Specifications and Mix Designs and Innovations in Asphalt Pavements. It is expected that this study will provide a direct comparison in terms of pavement performance between superpave and existing highway agencies' specifications as well as a forum for evaluating Stone Matrix Asphalt (SMA) and other innovative materials and/or features.

This I-70 project followed the guidelines established for nomination and evaluation of SPS 9 projects. It is in the category of the rehabilitation of an existing flexible pavement by milling and replacing the asphalt surface. The milling had been carried out in 1991 prior to the award of the contract because of the rapid deterioration of the existing open-graded friction course. The SPS 9 portion of the WBR involved resurfacing only.

The asphalt resurfacing involved three (3) asphalt mixtures namely, SMA mixture, SHRP mixture (Superpave) and SHA mixture. Each mixture contained two (2) test sections. The test sections were 500' in length and were separated by transition zones varying from 450' to 1600'. Each test section was fully in cut or in fill. Due to the rolling nature of the terrain, the cuts were high and fills were deep. The SMA and SHRP test sections had one test section in cut and the other in fill. Both of the SHA test sections were located in cuts.

The layout of the test section is shown in Figure 5.

Pre-Construction Preparation

1. Milling

   Because the open-graded mix was ravelling out causing a hazard to traffic by flying stones, it was found necessary to remove the 1" open graded layer on the WBR for its full width during the fall of 1991.

   The WBR did not therefore require any surface preparation by Genstar.

   The milling that was done produced a micro surface texture which was smoothed out in places especially under the wheel paths (photo 1). In other places, the lack of surface texture, under the wheel paths indicated that the milling did not reach the previous surface course or reached its lightly as was noted by isolated dark streaks (photo 2). In any case, the milling operation left a good surface to receive the pavement (photo 3). There was not need for level up or patching. There was no delamination in the test sections.

   As a point of interest, the EBR, not involving the SPS 9 test section was milled by the subcontractor F.A. and F.C. Wagman, Inc. starting on September 21. The contract called for 3/4-1" of milling. When the milling operation started, it was noted that some of the surface course layer below the open graded mix had deteriorated and was being picked out by the milling machine (photo 4). SHA decided that a second milling cut of about 1-1/2" to 2" was needed to remove the deteriorating surface course layer and to reach a solid surface.

   In total 3" of H M was removed which was then replaced with 1-3/4" of SMA. The SMA on EBR contained a domestic fibre additive whereas the SMA mix on the WBR including the SPS 9 test sections contained the vestoplast additive.

2. Markings

   Test section numbers were marked on the pavement edge as well as marking at 100' intervals from 0 to 5. A hub and stake with a white flag was placed 20' from the outside shoulder (which was 60' RT of CL) and also in the median strip 60' LT of CL at the start of each test section. Construction chainages were painted on the outside shoulder at 100' intervals for the full length of the job.

3. Elevations

   Five point elevations were taken by the SHA survey crew at 50' intervals at all of the SHRP test sections except for SPS section 242805. There the elevations were taken every 1' across the pavement.

4. Sample Containers

   The bulk sample requirements for the SHRP Asphalt Research Program were determined by NARO/SHRP office in Buffalo and the SHRP Asphalt Research Program office at the University of Texas at Austin. The containers supplied by the Asphalt Research Program were labelled and shipped to Shawn Kennedy at the Genstar plant in Frederick, MD prior to the start of the contract.

Construction

General

There were work restrictions. The Special Provisions permitted the contractor to work between sunrise and sunset, however, single lane closures were not allowed on WBR from 3 PM to 7 PM. Two lane closures were allowed from 9 AM to 3 PM daily. The contractor had the option to utilize night time construction with supplemental lighting to facilitate quality workmanship and adequate inspection. Due to the limited daylight working hours the contractor had intended to start up his plant about 4 AM and to start paving about 6 AM. There were also paving restrictions on pavement and air temperatures. For the SMA mix both the pavement and air temperature had to be 50 degrees F and rising; for the SHRP and SHA mixes 40 degrees F and rising. During the first week of paving several night temperatures were around 40 degrees F and the paving operations could not start until around 9 AM.

To avoid transverse joints in any of the paving lanes, the contractor scheduled his work to start and finish the days operation at a structure or at a pre-determined tie-in spot. The haul trucks unloaded into a Materials Transfer Vehicle (MTV) (photo 5). This resulted in fewer paver stops and a re-mixing of the mix prior to laying the minimizing segregation and producing a more uniform pavement. The paving of the passing lane started at station 1353 (bridge) at 7:15 AM on September 28 with the hope of stopping at station 1427 (bridge). After laying about 1500' several flushing streaks were noted (photo 6). The operation was suspended until the source of the problem was identified. It was found that the aggregate gradation was not meeting the job mix formula. After the appropriate aggregate correction was made which took two hours (the wrong aggregate was used in one bin) paving operations switched to the inside shoulder. Not as much paving had been accomplished as anticipated on the first day thus throwing the paving plan out of schedule. While the contractor had originally intended to reach the driving lane and the 4 SPS 9 test sections between the bridges by Thursday October 01, 1992, he re-scheduled his operation so that 4 of the test sections were paved on Monday October 05. The remaining 2 sections between bridges stations 1427 and 1476 were paved on Tuesday, October 06.

A plan showing the dates of paving from starting on Monday September 28 and ending on October 07 is shown in Figure 6. All of the test sections were laid to the same nominal depth of 2-1/4" with the intent of compacting the mix to 1-3/4". An emulsion tack coat was used throughout.

Comments on Each Test Section

240905 Station 1372+50 to 1377+50 SMA Vestoplast

The contractor took the opportunity to pave the driving lane to within 500' of the beginning of this test section (1367) so that a good start could be obtained on Monday October 05. If there were any problems with the SMA, the SHRP mix or the mix change he wanted sufficient time to make the correction before having to open the lane to traffic.

The contractor was ready to start paving at 6 AM but could not get going until 9 AM because of the 50 degrees F temperature restriction. When the plant started up, it was discovered that the silo gates were plugged with hardening SMA mix and had to be cleaned out. This took 2 hours. The first load did not reach the paver until 11:10 AM and the SMA test section until 11:44 AM. The contractor was advised by SHA that a one lane closure would be permitted beyond 3 PM.

This section is in a high fill. It took 15 minuted to pave this section at a laydown temperature of 263 degrees F. The air temperature was 50 degrees F. The pavement was laid to a width of 12.0' with o/s -0.4'.

The compaction requirement for SMA mixes is 94% minimum. This compaction was achieved as determined by both the nuclear and the core methods. There were no laydown problems. Three steel-wheel tandem rollers were in use.

The breakdown roller moved right up to the paver and the intermediate and final rollers were close behind. Each roller made about 2 passes.

The SMA mix was stoney in appearance and uniform in texture (photo 7). The mix was sticky and should be laid at higher temperatures than normal hot mix to avoid hardening prior to compaction. There was generally no loss in mix temperature from the plant to the road. The loss in temperature occurred when it passed through the MTV and the paver.

LTPP - SPS Construction Data forms were filled out on all of the test sections. They were as follows:

Sheet 7 overlay placement operations

Sheet 8 overlay compaction data

Sheet 9 construction quality control measures

A summary of the Construction Data for all of the test sections is shown in Table 1.

240904 Station 1382+00 to 1387+00 SMA Vestoplast

This test section is in a deep cut. It was laid in 21 minutes between 12:10 PM and 12:31 PM at a laydown temperature of 277 degrees F to a width of 12'. It is on a slight curve and the o/s varied from 0-6". From 0+00 to 2+50 the o/s was 6" and from 2+50 to 5+00 it was 0" with an average of 3" (0.2'). This offset may affect the zero point of the 5 point elevation survey.

The mix was the same as in the previous section 240905.

On this test section the paving operators did not notice that the right hand side of the paver ran out of material (photo 8). Before the paver stopped, a gap on the outside 3' from station 1+50 to 1+60 had occurred. This gap was filled in by hand with materials from the paver and then compacted. It is not expected that this problem will affect the pavement performance but it should be watched from time to time. The average compaction was 95.5%. The detailed construction data is shown on sheets 7, 8 and 9 and summarized in Table 1.

240903 Station 1401+67 to 1406+65 SHRP Mix

This section is in a deep cut and was laid on October 05 following the completion of the 2 SMA sections. It took 1-1/2 hours at the plant to change over from the SMA mix to the SHRP mix. This 500' test section was laid in 16 minutes to a width of 12-1/2' with o/s -0.5' and to a nominal depth of 2-1/4". The mix temperature prior to unloading was 318 degrees and the laydown temperature was 274 degrees.

The mix was sandy in appearance and had a uniform texture throughout. The first pass of the breakdown roller came up to the paver, leaving pronounced roller marks then it held back (photo 9). The intermediate and final rollers held back about 500 and 1000 respectively. The average percent density as determined by the nuclear gauge was 99% with 2 readings at 100.6 and 100.9%. The in-place density requirements is 92-97%.

The completed asphalt pavement showed some isolated rich streaks which may have been caused by a high asphalt content (photo 10). Construction data sheets 7, 8 and 9 for this section are shown in Appendix A-5.

Table 1 shows the summary of construction data.

240902 Station 1411+67 to 1416+67 SHRP Mix

This section is located in a deep fill and was laid in 25 minutes to a width of 12.4', o/s -0.4', and to a nominal depth of 2-1/4". The mix temperature in the truck prior to unloading into the MTV was 308 degrees and the laydown temperature was 282 degrees. Paving was held up for awhile waiting for trucks.

The mix was the same as in the previous test section 240903 and the same laying characteristics were noted. The average nuclear density was 98.2 percent with 2 readings above 100%.

Some isolated rich streaks were also present in this section.

Construction data sheets 7, 8 and 9 were completed for this section. The summary of the Construction Data is shown in Table 1.

240901 Station 1439+00 to 1444+00 SHA Mix

This section is in cut and was laid in 27 minutes on October 06, 1992 to a width of 12.0', o/s 0 and to a nominal depth of 2-1/4". The average mix temperature in the trucks prior to unloading was 319 degrees and the laydown temperature was 288 degrees. The air temperature was 55 degrees. There was some delay in waiting for trucks.

The mix appeared somewhat similar to the SHRP mix but perhaps a little coarser (photo 11). It was uniform in texture throughout. The laying characteristics were the same. The breakdown roller came right up to the paver, leaving paver marks and then it held back (photo 12). Only 2 rollers were in use on this section because the finish roller had broken down. Because the mix was tender, the finish roller held back 500-1000 feet. The absence of the roller did not seem to affect the density. The average density was 97%.

The detailed Construction Data is contained in Construction Data sheets 7, 8 and 9 for this section. A summary of the Construction Data is shown in Table 1.

242805 Station 1460+00 to 1465+00 SHA Mix

This is a GPS section which will change experiments to a 6B because of the resurfacing program. It is now incorporated into the SPS 9 project.

This test section, like 240901 is located in cut.

It was the only test section where the paver did not stop and it was laid in 10 minutes. The pavement was laid to a width of 12.0', o/s o and to a nominal depth of 2-1/4". The truck unloading temperature was 304 degrees and laydown temperature was 282 degrees.

The laydown characteristics were the same as in section 240901. However, the finish roller was repaired and the 3 rollers were in use. The breakdown roller came right up to the paver but the intermediate and the finish rollers stayed back because of the tender nature of the mix (photo 12). The average density was 95.6%, somewhat lower than the density of 97.0% in the previous section where only 2 rollers were in use. The surface texture was uniform.

The detailed Construction Data is contained in Construction Data sheets 7, 8 and 9. A summary of the Construction Data is shown in Table 1.

Mix Designs

Three mix designs were required for this SPS 9 project:

1. SMA Vestoplast
2. SHRP (Superpave)
3. SHA SC - Virgin

The mix designs that were prepared by the contractor were approved by the MD Western Regional Laboratory headed up by Larry Michael. A brief comment on each of the mixes is as follows:

SMA

This mix was prepared by Genstar and approved by the Western Regional Materials Laboratory

SHRP (SUPERPAVE)

The design method used for this mix was developed through the SHRP Research Program and the design which required the use of gyratory compactor was carried out by the Asphalt Institute as arranged through the SHRP Asphalt Research Group (photo 13). The Contractor submitted a proposed job mix formula on October 04, 1992 which was approved by L.L. Michael, Regional Engineer, Western Regional Laboratory.

SHA SURFACE COURSE - VIRGIN

This mix was designed by the Western Regional Materials Laboratory.

The data on mix designs are shown in Appendix A-6.

Plant Materials and Production

The Genstar plant used in the production of the hot mix is located in Frederick on I-70 at the west end of this project. It is an ASTEC drum - mix plant with a rated capacity of 450 tons per hour. It has 6 storage bins which can feed into the conveyor system (photo 14). The asphalt binder is supplied by two 30,000 gallon storage tanks with insulating re-circulating asphalt lines. AC20, from CITGO, was used in all of the mixes.

For the SHA and SHRP mixes all of the aggregates except the sand was obtained from Genstar's Quarry at Frederick. The sand is known as the Davidville concrete sand. For the SMA mix Virginatrap rock and Texas Aglime were used in addition to the Genstar's aggregate. The Vestoplast was introduced into the drum through the recycle feeder and drum collar (photo 15).

While the plant has 3 silos, only one silo was in use. Care had to be taken when using the SMA mix, to clean out the equipment properly. On October 05 when the SMA test section was to start, it was noted that the mix had blocked the gates and had to be cleaned out thus causing a delay of 2 hours.

It was necessary to clean the storage bin, drum and the conveyor at each mix change. Since all of the SPS 9 test sections were completed in 1-1/2 days, only 1 mix change on October 05 taking 1-1/2 hours was needed within a working day.

The automatic weighing and ticketing equipment produced records of the production. Each trucker received a print out ticket showing amongst other things, loading time, type of mix and weight. When the truck arrives on the job, the inspector checks the ticket, ensures that the mix is appropriate, takes the mix temperature prior to unloading, time of unloading and the placement station. This information is added to the ticket, see Appendix A-7.

While the plant is located at the west end of the project, no cross-overs of the median were allowed. It was therefore necessary to use the EBR to exit 62 (Hwy 75 Libertytown Hattstown) a distance of 8 miles from the plant before coming back on the WBR. The distance to the first SPS 9 test section was 12 miles and the travelling time varied from 28 to 49 minutes (see Table 1).

Quality Control and Data Collection

Compaction

Three steel wheel tandem rollers were used in all of the 6 test sections except for test section 240901. Here the Dynapac roller had broken down and had to be repaired. The absence of one roller did not affect the compaction results. These 3 rollers were as follows:

1.	breakdown	Ingersol	10-12T	W74
2.	intermediate	Bomag	8-10T	W54
3.	finish	Dynapac	8-10T	W66

The density of the HMAC was determined by the core method although nuclear density readings were also taken at all core locations. The core locations were selected by the inspector outside the test sections and were taken as soon as the pavement cooled off sufficiently and prior to opening the lane to traffic. Each mix was considered as a lot for quality control purposes and each mix covered 2 test sections.

When all of the cores had been taken for the day, they were delivered to the SHA laboratory at the plant. The specific gravities of each core was obtained early next morning. The percent of maximum density was determined at which time it was decided whether the field compaction met the requirement of 92.0 to 97.0 for the SHRP and SHA mixes and a minimum of 94% for the SMA mix.

Form SHA 73-0-01 revised January 1992 HMA Field Compaction Report was used for the recording the core information and the laboratory core specific gravities for the determination of the % densities. Copies of the completed forms used for 3 mixes are shown in Appendix A-8.

All of the mixes met the SHA compaction requirements. This data was included with the data collected for pavement sampling and testing during construction and for the preparation of Tables 3-9.

Plant Control

Each morning, aggregate samples were taken from the conveyor chute to check the gradation. Any adjustments that were required to the feeder bins were made prior to the production of the HM. Bulk HMAC samples were taken from the trucks (2 samples at different times for each mix except for the SHA mix where only 1 sample was taken) and checked for aggregate gradation, % AC and maximum S.G. This information is used for the preparation of the Bituminous Concrete Plant Report. Copies of this report for all 3 mixes is shown in Appendix A-9. Table 2 combines the mix design and plant report information.

Layer Thickness Measurements

Five point elevations were taken at 50' intervals on all of the test sections which will be monitored before the overlay and after the surface course overlay. The nominal overall thickness was 2-1/4" and the final compacted thickness was expected to be 1-3/4". A typical construction construction Data Sheet 10 for layer thickness for test section 240905 is shown in Appendix A-10. These layer thickness measurements should be studied in relation to the performance. While the nominal thickness measurements were generally 2-1/4" prior to compaction it is noted that the 5 point elevations on some test sections are quite variable and one test section in particular, 240904 shows isolated thicknesses around 1". The cores at the ends of the test sections show an average thickness of 1-7/8" (1-3/4" to 2").

Profilograph

The paving profile was tested by the contractor using the California profilograph. Profiles were made 3' from and parallel to each edge of the pavement. Roadways to be resurfaced with a single lift construction that do not provide for wedge and/or levelling course are usually excluded. SHA considered that the milling should be considered similar to a wedge and level course but the contractor considered that as the milling was done prior to their contract it should be excluded. This point was brought up at the pre-construction meeting on September 14. In any case, the profilograph was used on all of the test sections with very good results except for test section 240904. One profile showed 7.0 and the other 17.5 with an average of 12.25. This high results is not evident on the pavement. The inspector considered that the profilograph could have been malfunctioning. The profilograph readings are shown in Table 1 and in construction Data Sheets 9.

During and Post Construction Sampling Field and Laboratory Testing

In addition to the sampling and testing carried out by SHA for quality control purposes, a sampling field and laboratory testing plan was developed and carried out for the SPS 9 test sections. The requirements for this plan is contained in a memorandum dated September 18, 1992 to Dr. Haleem Tahir from Dr. Bill Phang, Appendix A-11. The details of the sampling and testing plan are as follows:

Samples for the SHRP Mixes - Test sections 240903, 240904

Bulk samples were taken from the truck at the plant and taken to the Genstar quality control laboratory for the preparation of 6" diameter briquettes with the gyratory compactor. Sufficient briquettes were made for the mix design gyrations, and with gyrations to produce briquettes with 7+/- 1% air voids and with 10+/- 1% air voids to perform the required tests. The briquettes were prepared by Dave Ross of the Asphalt Institute who operated the gyratory compactor. Ron Cominsky (SHRP Contractor) and Chuck Hughes (SHRP Consultant) were present during the sampling of the HMAC and the preparation of the briquettes. All of the briquettes were taken away by Dave Ross.

Pavement Sampling and Testing During Construction

Figure 7 shows the during and post construction sampling and testing plan. Nuclear density tests were taken in the wheel path at 50' intervals at the test sections to be monitored (photo 16) as well as at the core locations outside the test sections just after compaction and before the cores were obtained. The cores located at 0-25 and 5+25 of the test sections with the appropriate offsets were obtained by the contractor during the normal quality control operation

These cores were designated for the various tests as shown in Appendix A-11; some for thickness, some for bulk specific gravity, some for resilient modulus, and some for indirect tensile strengths. During the coring operations, it was discovered that the core size used for quality control purposes did not meet the 4" outside diameter required for several of the SHRP tests. All of the cores taken by the Contractor, C45 - C72 (28 in all) were used for determining their specific gravity and percent maximum density. The cores to the required dimensions were obtained by the SHA coring crew as described under post-construction sampling and testing.

Two nuclear density measurements were taken at 180 degrees at each SHRP test location to produce an average nuclear density reading shown in Tables 3 to 8. These tables also include the densities obtained from the cores at the ends of each test section as well as those obtained for quality control purposes. The summary of all the density results obtained from all the nuclear tests and cores are summarized in Table 9.

While a lot of time can be spent in analyzing the density results, in general it can be concluded:

1. Nuclear density readings for the SMA mix were about 2% lower than the QC cores

2. Nuclear density readings for the SHRP mix were about 2% higher than the QC cores. The average nuclear density readings were 98.4% and the QC density from cores was 96.2%

3. Nuclear density readings for the SHA mix were about 1% higher than the QC cores

Post Construction Sampling and Testing

Figure 7 shows 2 locations from which a set of 22 4" OD cores is to be obtained at times 0, 3, 6, 9, 12, 18, 24, 48, 96 and 168 months. A typical coring layout for the SHA and SHRP mixes is shown in Figure 8. The areas involved with the set is 2'4" x 6'6". The first line of cores was taken at test section 240902 at 5+50 (1417 15). The next set is to be taken in 3 months and the set will be moved 20'. Each successive set will be moved 20' so that after 10 sets the plan will cover a distance of 200'.

For the SHA test section 240901, the set is located approaching the test section so the first line of coring was located at -2-50 (1436+50). The final line after 10 successive sets will be located at -0-50.

The set of cores at the 2 locations were taken by the SHA drilling crew under the supervision of Al Blazucki. The first set at test section 240902 was located at the end of the days paving operations on October 05. It was not possible to take the cores due to lane closure restrictions so they were taken the following morning on October 06. The pavement was therefore exposed to traffic from 6 PM on October 05 to 6 AM on October 06. The set with the SHA mix test section 240901 was laid and cored the same day, October 06.

As mentioned before, the contractors' cores located at the ends of the test section did not meet the diameter requirements. Therefore the SHA coring crew re-sampled all the core locations utilizing the core sample numbers on the testing plan but they were located at 0-24 and 5+26 in all of the test sections. These cores for test section 5, 4, 3 and 2 (core samples C45 to C64) were taken after overnight traffic from 6 PM to 6 AM on October 06. All the cores for test section 01 and 242805 (core samples C64 to C72) were taken on October 06, the same day the pavement was laid.

Directional traffic arrows were marked on each core prior to drilling. All of the core samples taken for the SHRP program were taken to the MD Brooklandville Laboratory by Al Blazucki. Some cores will be tested by the MD laboratory and other will be distributed to designated laboratories.

Sampling Materials

All the sampling of materials was done by the Contractor at the plant under the supervision of SHA inspectors. Bulk samples of aggregate, asphalt cement, additives, and uncompacted asphalt concrete mix were collected for quality purposes, for State testing and for the Asphalt Reference Library. Containers for the SHRP Reference Library were pre-labelled and sent to Shawn Kennedy, Genstar, Frederick, MD plant by the SHRP Materials Reference Library prior to the start of construction. The gyratory briquettes of SHRP mix were prepared and taken away by Dave Ross, Asphalt Institute.

The samples required and taken are shown in Table 10.

The samples for the reference library were shipped to:

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

Acknowledgments

Al Blazucki, MD DOT was the SHRP Coordinator for this project. He worked closely with the Regional Materials office and the Project Construction Staff to ensure that the SHRP requirements were met. His assistance was greatly appreciated.

Assistance for the construction of this project was gladly and generously given by all of the construction staff and project engineer, Steve Sites, who also provided office space, office equipment and construction data. He also made his staff available as and when required. There were:

Project Engineer	Steve Sites
Office Manager	Steve McClaire
Inspectors	Ross Clingan
	Donald Byrd
	Richard Holderby

Special thanks is due to Glen Kallmeyer and Bill Wells the State Materials Laboratory supervisors at the plant. The arranged for all the sampling with Shawn Kennedy and Tom Steger of the Genstar Quality Control Laboratory. Shawn arranged to store the samples and to ship them to the Materials Reference Library. Dave Brown from the Western Materials Laboratory provided valuable assistance in supplying information on mix the designs for the preparation of this report.

The 5 point elevations taken by Kevin Howell, MD Survey Chief is also greatly appreciated. He also marked out the test sections and painted chainages within the test section to make the data collection easier.

Special thanks must be given to Genstar and the Superintendent, Hank Serafini and Foreman, Frank Garvin who recognized the need for the special detailed attention this SPS 9 project required and the great support provided for its completion. The assistance and cooperation of this technical staff Angie Poe, Dawn Young and Patte Stroupe in carrying out the nuclear density measurements, coring and profilograph work was appreciated.

TABLES

APPENDICES

I-70 SMA/SPS Meeting

H. Tahir(SHA)	L. Michaels (SHA)	R. Cominsky (SHRP)
A. Gardner (MAPA)	Doug Rose (SHA)	Becky Smith (SHA)
C. Churilla (FHWA)	Don Dean (Genstar)	
S. Miller (SHA)	Ron Pope (Genstar)	

Contract F223- 501-777 (I-70 Resurfacing)

GENSTAR is low bid -> Contract not awarded yet.

- Milling surface at existing plant mix seal
- 1½" S.C. plus plant mix seed (¾")
- GENSTAR suggested substituting 2" with SMA
- Contractor is expected to provide at bid cost
- GENSTAR will provide estimate of four SMA.
- SPS-9 ->
    - (a) 1000' of SC mix (2"); designed by SHRP
    - (b) 1000' of SC state Marshall design. (2")
- 21,330 tons -> SMA 40-41 $/T; could reduce cost if go to 1½" on one side; most probably will use vestoplast.
- Total cost of Project - $741,000+
  GENSTAR to provide SHA with new total
- Cost estimate on 6/17/92
- Notice to proceed -> July 27, 1992. SHA wants to move date to early July.
- Contractor will ship aggregates/asphalt to TAI by July 6, 1992.
- Contractor foresees no problem with stockpiling SHRP MiDAS aggregates
- Contractor foresees no problem with compacting mat to 94% MTD.
- All test sections are on uniform pavement cross section.

1) Ship aggregates to TAI by July 6, 1992.

2) Mix design week of July 13 -> 10 working days.

3) Will have mix design ready by July 20, 1992.

4) Quantities same as identified for Indiana and Wisconsin SPS-9.

Each stockpile -- 200lbs.

Asphalt cement --3 gallons.

The Asphalt Institute
P.O. Box 14052
Lexington, KY 40512-4052
(Gerry Huber)
Phone: 606/288-4960
FAX: 606/288-4999

Dr. David Anderson
Professor of Engineering
Pennsylvania Transportation Institute
Pennsylvania State University
Research Office Bldg.
University Park, PA 16802
Phone: 814/863-1912
FAX: 814/237-6500

A - 2 June 17/92 correspondence from Dr. Tahir to Ivan Pecnik for the nomination of this I-70 Project for the SPS-9 experiment.

Maryland Department of Transportation
State Highway Administration

O. James Lighthizer
Secretary
Hal Kassoff
Administrator

DATE REC. JUN 17 1992
JOB #
FILE #

COPY

PLEASE REPLY TO:
OFFICE OF MATERIALS & RESEARCH
2323 WEST JOPPA ROAD
BROOKLANDVILLE, MARYLAND 21022

JUN 11 19[illegible]

Mr. Ivan J. Pecnik
415 Lawrence Bell Drive
Unit #3
Amherst, New York 14221

Dear Mr. ~~Pecnik~~: Ivan

Here are the completed forms for our nomination of a candidate project for the SPS-9 experiment. It is a resurfacing project on I-70, east of Frederick, MD, which currently has a GPS site, SHRP ID No. 242805.

If you need more information, please contact me.

Sincerely,

Hal Sem

A. Haleem Tahir
Deputy Chief Engineer
Materials and Research

AHT/sfh

Enclosure

cc: Mr. A. J. Blazucki
Mr. S. R. Miller, Jr.

My telephone number is (410) 321-3538
FAX (410) 321-2208
Teletypewriter for Impaired Hearing or Speech
383-7555 Baltimore Metro - 565-0451 D.C. Metro - 1-800-492-5062 Statewide Toll Free
707 North Calvert St., Baltimore, Maryland 21203-0717

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

STATE Maryland SHRP SECTION NO. _____

PROJECT LOCATION

ROUTE NUMBER I-70

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

PROJECT LOCATION Start Milepost 16.8 End Milepost 20.9
Start Milepost -- End Milepost --

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

PROJECT LOCATION DESCRIPTION I-70 Project is from approx. 0.2 mi. West of MD 144 (Patrick St.) to approx. 0.6 mi. East of Ijamsville Rd.

COUNTY Frederick
HIGHWAY AGENCY DISTRICT NUMBER 7

SHRP ASPHALT RESEARCH ENVIRONMENTAL ZONE

HIGH TEMPERATURE (Highest Average Monthly Maximum Daily Temperature)		LOW TEMPERATURE (Annual Lowest Temperature)		MOISTURE (Annual Precipitation)	
<80 °F	[ ]	<-30 °F	[ ]	<10 inches	[ ]
80 to 89 °F	[X]	-30 to -21 °F	[ ]	10 to 24 inches	[ ]
90 to 100 °F	[ ]	-20 to -10 °F	[ ]	25 to 40 inches	[X]
>100 °F	[ ]	>-10 °F	[X]	>40 inches	[ ]

SIGNIFICANT DATES

LATEST DATE OF APPROVAL NOTIFICATION FROM SHRP	ASAP
CONTRACT LETTING DATE	June, 1992
ESTIMATED CONSTRUCTION START DATE	July, 1992 July 20/92
ESTIMATED DATE TEST SECTIONS OPENED TO TRAFFIC	Sept., 1992
ESTIMATED CONSTRUCTION COMPLETION DATE	Sept., 1992

PROJECT DESCRIPTION

PROJECT TYPE [ ] New Route [ ] Removal and Reconstruction
[ ] Parallel Roadway [X] Resurfacing
[ ] Other _____

FACILITY [X] Divided [ ] Undivided NUMBER OF LANES (One Way) 3

DESIGN TRAFFIC DATA

ANNUAL AVERAGE DAILY TRAFFIC (TWO DIRECTIONS)	35,700
% HEAVY TRUCKS AND COMBINATIONS (OF AADT)	14.5
ESTIMATED 18K ESAL RATE IN STUDY LANE (1,000 ESAL/YR)	567.0
TOTAL DESIGN 18K ESAL APPLICATIONS IN DESIGN LANE	8,504,658
DESIGN PERIOD (Years)	15

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

STATE Maryland SHRP SECTION NO. _____

AGENCY'S PAVEMENT STRUCTURE DESIGN FOR SITE

LAYER[1] NO.	LAYER[2] DESCRIPTION CODE	MATERIAL TYPE[3] CLASS CODE	THICKNESS[4] (INCHES)	STRUCTURAL[5] COEFFICIENT
1	07	54	— — —	4.0
2	06	23	6.0	0.14
3	05	37	6.0	0.23
4	04	01	5.5	0.28
5	03	01	3.0	0.44
6	— —	— —	— — —	
7	— —	— —	— — —	
8	— —	— —	— — —	
9	— —	— —	— — —	

STRUCTURAL DESIGN METHOD [ ] 1972 AASHTO [ ] 1986 AASHTO [X] Modified AASHTO
Other _____

AASHTO DESIGN RELIABILITY FACTORS R% — S_o —

OUTSIDE SHOULDER TYPE

[ ] Turf [ ] Granular [X] Asphalt Concrete [ ] Surface Treatment
[ ] PCC [ ] Curb and Gutter Other _____

OUTSIDE SHOULDER WIDTH (Feet) 10

SUBSURFACE EDGE DRAINS [X] Yes [ ] No

NOTES

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

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

3. Refer to Tables 1 through 4 for material class codes.

4. If subgrade depth to a rigid layer is known, enter this depth for subgrade thickness, otherwise leave subgrade layer thickness blank.

5. Enter AASHTO structural layer coefficient value, as appropriately modified, used in pavement design or typical coefficient used by agency for this material. For the subgrade, enter either AASHTO soil support value or resilient modulus value (psi) used in design.

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

STATE Maryland SHRP SECTION NO. _____

TEST SECTION LAYOUT

TEST SECTIONS TO BE CONSTRUCTED: [X] STATE MIXTURE [X] SHRP MIXTURE [X] SMA

NUMBER OF TEST SECTIONS ENTIRELY ON: FILL _____ CUT X

SHORTEST TRANSITION BETWEEN CONSECUTIVE TEST SECTIONS (Feet) 200'

VERTICAL GRADE (Avg %) (+ upgrade; - downgrade) - 1.8

HORIZONTAL CURVATURE (Degrees) [ ] Tangent 1^{o} 30.0'

COMMENTS ON DEVIATIONS FROM DESIRED SITE LOCATION CRITERIA _____

OTHER SHRP TEST SECTIONS

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

DISTANCE TO NEAREST GPS TEST SECTION ON SAME ROUTE (Miles) 0.0

TEST SECTION NUMBER OF NEAREST GPS SECTION 242805

ARE OTHER SPS SECTIONS LOCATED ON SAME PROJECT? [ ] Yes [X] No

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

SUPPLEMENTAL TEST SECTIONS

IF SUPPLEMENTAL EXPERIMENTAL TEST SECTIONS ARE PROPOSED, COMPLETE THE FOLLOWING

TOTAL NUMBER OF SUPPLEMENTAL TEST SECTIONS —

FACTORS TO BE INVESTIGATED _____

Pavement Design Procedure-Modified AASHTO

The basic procedure used for agency flexible pavement design is a program developed by the University of Maryland for MD SHA, which incorporates life cycle costing to prioritize alternative designs.

The program, developed in 1984, is predicated on AASHTO serviceability concepts and most of the 1986 AASHTO Guide for Design of Pavement Structures parameters with few exceptions, namely:

1) It does not provide for drainage coefficient or reliability factor input flexibility, per se.

2) Soils support values are currently based in CBR testing.

A - 3 June 22/92 - correspondence from Ivan Pecnik to Mr. Paul Teng recommending acceptance of nomination.

STRATEGIC HIGHWAY RESEARCH PROGRAM

North Atlantic Region, 415 Lawrence Bell Dr., Unit 3, Amherst, NY 14221 Tel (716) 632-0804

IVAN J. PECNIK
Regional Engineer

MEMORANDUM

TO: Paul Teng
SHRP/FHWA

FROM: I.J. Pecnik, P.E.
SHRP Regional Engineer, NA

DATE: June 22, 1992

SUBJECT: SPS-9 Nomination - MD

c.c. A. Haleem Tahir, MD SHA/DOT, w/o attachment
C. Churilla, FHWA Region 3, w/o attachment
NARCO, original to file

We transmit herewith nomination forms (5 pages) for an SPS-9 experiment installation as proposed by the Maryland DOT-SHA.

They propose to install the sections as part of a resurfacing project recently bid on I-70 WB in Fredrick County, MP 16.8 to MP 20.9.

This office has reviewed the submission. It provides for the inclusion of 1, State mixture Design; 2, SHRP mixture design and 3, SMA. Specific details of the to be constructed sections have not yet been made available for review, but all preliminary indications point to an acceptable site location and layout.

A potential hang-up in scheduling revolves around the ability to execute the SHRP mix design within an appropriate time frame. It appears that this has been addressed with TAI and others and that the SHRP mix design can be accomplished within the project schedule time frame.

Given the above, this office recommends that this proposal be accepted for inclusion into the SPS-9 experiment. By copy of this memo, we are advising MD DOT-SHA of our recommendation.

You review and early reply is anticipated.

A - 4 July 23/92 correspondence Mr. Teng to Mr. Barrows advising that the SPS 9 Project is Approved.

U.S. Department of Transportation
Federal Highway Administration

6300 Georgetown Pike
McLean, Virginia 22101-2296

Subject: ACTION: Nomination of SPS-9 Pilot. Date: JUL 23 1992

From: Chief, Long-Term Pavement Performance Division Reply to Attn. of: HNR-40

To: Mr. A. Porter Barrows
Maryland Division Administrator
Baltimore, Maryland

The nomination of an SPS-9 Pilot test site by the Maryland Department of Transportation (DOT) on I-70 in Fredrick County, Maryland is approved.

Preliminary agreements and discussions concerning the nomination of this site were initiated prior to the transfer of the Strategic Highway Research Program (SHRP) Long-Term Pavement Performance Division (LTPP) responsibility to the Federal Highway Administration LTPP Division. In particular, the University of Texas's SHRP contract A-001 was increased by $25,000 to cover the asphalt mixture design and testing by the SHRP procedures.

It is our understanding that potential problems with this projects have been resolved and the test site will be constructed in late August or early September of this year.

Upon receiving a copy of this memorandum, Mr. Ivan Pecnik, LTPP Regional Engineer, will contact the MD DOT SHRP Coordinator to offer further assistance and coordination of activities related to this SPS-9 pilot.

Please formally notify the Maryland DOT of the acceptance of the test site.

Paul Teng

FHWA:HNR-40:MSymons:km:7/23/92:285-2730
I:\data\MSymons\wp\mdsp9f.APP
cc:
R&D Reading
Region 3, C. Churilla
HNG-40
Ivan Pecnik
MD SPS-9 work file
File 150.09
HNR-40 chron
HNR-1

October 1990

LTPP-SPS CONSTRUCTION DATA OVERLAY PLACEMENT OPERATIONS CONSTRUCTION DATA SHEET 7	* STATE CODE [24] * SPS PROJECT CODE [0904] * TEST SECTION NO. [03]

1. DATE SURFACE PREPARATION BEGAN (Month-Day-Year) [10-05-92]
2. DATE SURFACE PREPARATION COMPLETED [10-05-92]

3. SURFACE PREPARATION PRIOR TO PLACEMENT OF OVERLAY [4]
   None..... 1 Broomed..... 2 Broomed + Asphaltic Tack Coat.... 3
   Asphaltic Tack Coat (only).... 4

4. TACK COAT
   Layer Numbers [__ __] [05]
   Material Type None..... 1 SS-1.... 2 SS-1H.... 3 CRS-1.... 4 [__ 4]
   CRS-2.... 5 CMS-2.... 6 CMS-2H.. 7 CSS-1.... 8 CSS-1H... 9
   Other.... 10 (Specify) _____
5. TACK COAT DILUTION
   (Percent) [50]
   Mixing Rate Parts Diluent 50 TO Parts Asphalt 50
6. TACK COAT APPLICATION RATE (Gal/Sq. Yd.) [0.02]

7. ASPHALT CONCRETE PLANT AND HAUL

	Type	Name	Haul Distance (Mi)	Time (Min)	Layer Numbers
Plant 1	[2]	ASTEC	[__12]	[29]	[__] [__] [6]
Plant 2	[__]	_____	[__ __ __]	[__ __]	[__] [__] [__]
Plant 3	[__]	_____	[__ __ __]	[__ __]	[__] [__] [__]

   Plant Type: Batch..... 1 Drum Mix.... 2 Other...3 Specify _____

8. MANUFACTURER OF ASPHALT CONCRETE PAVER BARBER GREEN
9. MODEL DESIGNATION OF ASPHALT CONCRETE PAVER BG240
10. SINGLE PASS LAYDOWN WIDTH (Feet) [12.5]
11. AC BINDER COURSE LIFT
    Layer Number [__ __]
    Nominal First Lift Placement Thickness (Inches) [__.__]
    Nominal Second Lift Placement Thickness (Inches) [__.__]
12. AC SURFACE COURSE LIFT
    Layer Number [__ __]
    Nominal First Lift Placement Thickness (Inches) [__.__]
    Nominal Second Lift Placement Thickness (Inches) [__.__]
13. SURFACE FRICTION COURSE
    Layer Number [06]
    Nominal Placement Thickness (Inches) [2.5]
14. TEST SECTION STATION OF TRANSVERSE JOINTS (within test section)
    Binder Course [__ + __ __]
    Surface Course [__ + __ __]
    Surface Friction Course [__ + __ __]
15. LOCATION OF LONGITUDINAL SURFACE JOINT [1]
    Between lanes.. 1 Within lane.. 2 (specify offset from O/S feet) [__0.5] RT
16. SIGNIFICANT EVENTS DURING CONSTRUCTION(disruptions, rain, equip. problems, etc.)
    3/4" OPEN GRADED SURFACE MIX WAS MILLED OFF IN 1991 PRIOR TO THIS CONTRACT

PREPARER D. Rucka EMPLOYER NAZO/SHRP DATE oct 14/92

LTPP-SPS CONSTRUCTION DATA OVERLAY COMPACTION DATA CONSTRUCTION DATA SHEET 8	* STATE CODE [24] * SPS PROJECT CODE [09] * TEST SECTION NO. [03]

1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [10-05-92]
2. DATE PAVING OPERATIONS COMPLETED [10-05-92]
3. LAYER NUMBER [6]
4. MIXING TEMPERATURE (°F) [300.]
5. LAYDOWN TEMPERATURES (°F)
   - Mean..... 274.
   - Minimum..... 265.
   - Standard Deviation... ___.__
   - Number of Tests ..... 6.
   - Maximum..... 285.

ROLLER DATA

	Roller Code #	Roller Description	Gross Wt (Tons)	Tire Press. (psi)	Frequency (Vibr./Min)	Amplitude (Inches)	Speed (mph)
6	A	Steel-Whl Tandem	12.0				
7	B	Steel-Whl Tandem	10.0				
8	C	Steel-Whl Tandem	10.0				
9	D	Steel-Whl Tandem					
10	E	Pneumatic-Tired					
11	F	Pneumatic-Tired					
12	G	Pneumatic-Tired					
13	H	Pneumatic-Tired					
14	I	Single-Drum Vibr.					
15	J	Single-Drum Vibr.					
16	K	Single-Drum Vibr.					
17	L	Single-Drum Vibr.					
18	M	Double-Drum Vibr.					
19	N	Double-Drum Vibr.					
20	O	Double-Drum Vibr.					
21	P	Double-Drum Vibr.					
22	Q	Other					

	COMPACTION DATA	First Lift	Second Lift	Third Lift	Fourth Lift
	BREAKDOWN				
23	Roller Code (A-Q)	A			
24	Coverages	2.			
	INTERMEDIATE				
25	Roller Code (A-Q)	B			
26	Coverages	2.			
	FINAL				
27	Roller Code (A-Q)	C			
28	Coverages	2.			
29	Air Temperature (°F)	65.			
30	Compacted Thickness (In)				
31	Curing Period (Days)	0.1			

PREPARER A. Rucka EMPLOYER NARO/SHRP DATE Oct 14/92

A-5

October 1990

LTPP-SPS CONSTRUCTION DATA CONSTRUCTION QUALITY CONTROL MEASUREMENTS CONSTRUCTION DATA SHEET 9	* STATE CODE [24] * SPS PROJECT CODE [09] * TEST SECTION NO. [03]

1. NUCLEAR DENSITY MEASUREMENTS

LAYER TYPE	Rut Level-Up	Mill Replacement	Binder Course	Surface Course	Surface Frction Layer
Measurement Method (A, B, C)[1]				A	
Rod Depth (Inches)					
Number of Measurements				10	
Average (pcf)				152.8	
Maximum (pcf)				155.8	
Minimum (pcf)				150.7	
Standard Deviation (pcf)					
Layer Number				06	

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

2. MANUFACURER OF NUCLEAR DENSITY GAUGE: TROXLER

3. NUCLEAR DENSITY GAUGE MODEL NUMBER: 4640

4. NUCLEAR DENSITY GAUGE IDENTIFICATION NUMBER: 394

5. NUCLEAR GAUGE COUNT RATE FOR STANDARDIZATION: 1 minute

6. PROFILOGRAPH MEASUREMENTS

Profilograph Type California... 1 Rainhart... 2	1
Profile Index (Inches/Mile)	04
Interpretation Method Manual.. 1 Mechanical.. 2 Computer.. 3	3
Height of Blanking Band (Inches)	0.20
Cutoff Height (Inches)	0.30

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

PREPARER D. Rucka EMPLOYER NARO/SHRP DATE Oct 19/92

OCT 15 1992

GENSTAR

Genstar Stone Products Company
Executive Plaza IV
Hunt Valley, Maryland 21031-1091
Telephone (301) 527-4000
Fax (301) 527-4258

October 7, 1992

Mr. Larry Michael
Western Region Laboratory
528 E. Main Street
Hancock, Maryland 21750

Dear Mr. Michael:

Genstar wishes to submit the following mixes for use on State Contract #F-223-501-777.

Frederick SC-W-92-143-SC01-T
SHRP Mix SPS-9 Surface

If you need additional information please contact me at your convenience at 410-682-5971.

Sincerely,

Carl R. Blevins

Carl R. Blevins
Manager, Quality Control
Blacktop

CRB:ab

cc: R. Pope
H. Schult
J. Yingling/File
S. Kennedy

cc: WRL Regional File
WRL Field Office
Project Engineer, S. Sites
~~District Eng. Mgr.~~
SW Coordinator, P. Finnerty
Producer, Genstar - Dunn
Plant Inspector, Genstar - Dunn
Prime Contractor, Genstar
C. Smith

APPROVED AS NOTED
OCT 15 1992
for L. L. MICHAEL
REGIONAL ENGINEER
WESTERN REGIONAL LABORATORY

OMD Rec'd 10-19-92.

APPROVALS ARE FOR SOURCES OF SUPPLY ONLY AND DO NOT APPROVE OR IMPLY APPROVAL OF THE MATERIALS FROM THESE SOURCES.

Suppliers must be notified of appropriate (ITEM NUMBER) when ordering material for Maryland State Highway Administration Contracts.

GENSTAR

Genstar Stone Products Company
Executive Plaza IV
Hunt Valley, Maryland 21031-1091
Telephone (301) 527-4000
Fax (301) 527-4258

BITUMINOUS CONCRETE SPECIFICATION SC MIX

PRODUCED AT FREDERICK PLANT

Materials	Percent	Source
Frederick #7 Stone	30	Genstar Stone Products Co.,Frederick,MD
Frederick #8 Stone	25	Genstar Stone Products Co.,Frederick,MD
Frederick #10 Stone	35	Genstar Stone Products Co.,Frederick,MD
Davidsonville Concrete Sand	10	Genstar Stone Products Co.,Davidsonville,MD
AC-20 Asphalt Cement	5.1	Citgo Asphalt, Baltimore, MD

Proposed Gradation	Percent Passing
3/4"	100
1/2"	97
3/8"	86
#4	50
#8	33
#16	23
#30	15
#50	8
#100	6
#200	5.1

OK OES

Delivery Temperature 280 Degrees F — ~~No~~ Anti-Strip Needed 0.2
Mixing Temperature 305 Degrees F — Molding Temperature 290 Degrees F

Maximum Specific Gravity	2.501
Ratio of Dust to Binder Material	1.00
Compactive Effort	75 Blows
Percent - 200 Removed by Dust Collecting System	0%

The material will be produced at Frederick, Maryland in the Astec Drum Mix Plant #143.

Anti-Strip Additive ACRA-600L	Exxon Chemical Americas Pedricktown, New Jersey
AE-4 (RS-1) Asphalt Emulsion for Tack Coat	Koch Asphalt Company Baltimore, Maryland
Asphalt Release Agent KWIK RELEASE	Presto Chemical Company Roswell, Georgia

March 9, 1992

APPROVED AS NOTED

FKSC2

OCT 15 1992

L. L. MICHAEL
REGIONAL ENGINEER
WESTERN REGIONAL LABORATORY

Carl R. B Morris

GENSTAR STONE PRODUCTS COMPANY
W-92-143-SC01-T

SHA 75.0 - 39
12-1-73

#143

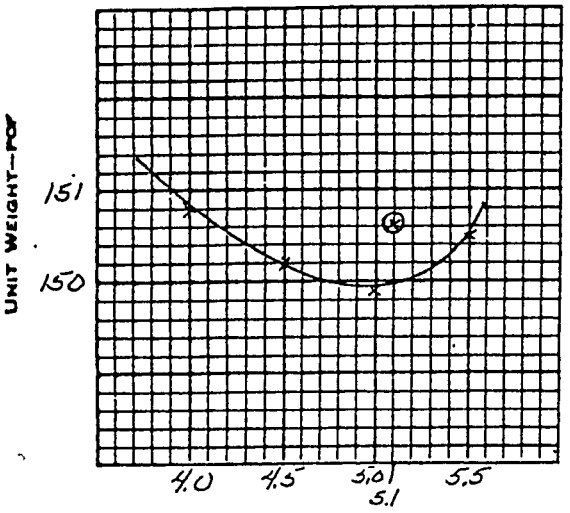
STATE HIGHWAY ADMINISTRATION
MATERIALS & RESEARCH
MARSHALL METHOD SUMMARY SHEET

_____ HOT BIN
_____ 50 BLOWS
✓ 75 / _____ 35 BLOWS

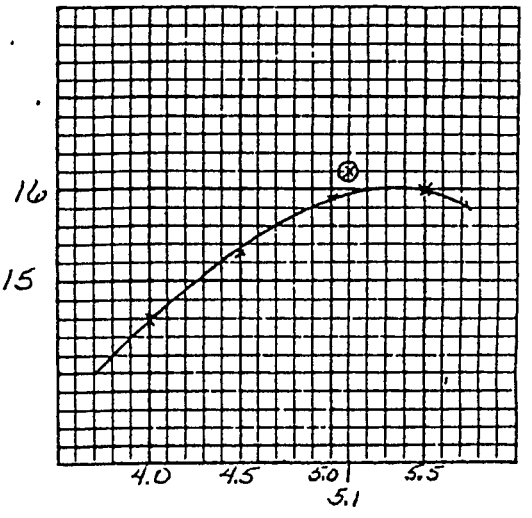
[redacted] 2A6SCY01T , X _____ Plant Orig
⊗ Lab

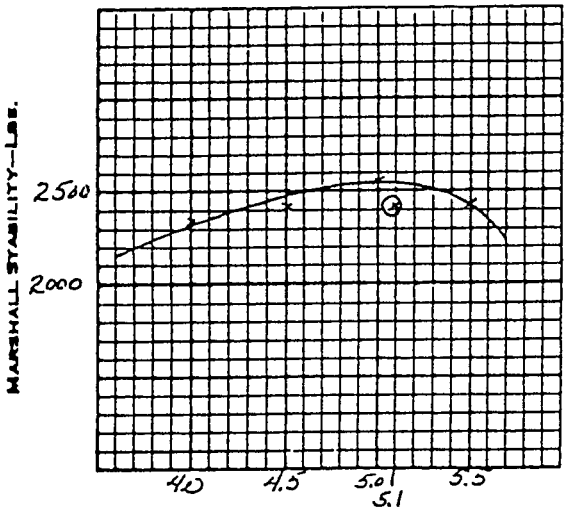
DATE RECEIVED: MAY 6 1992
F.A.P. F-249-501-777

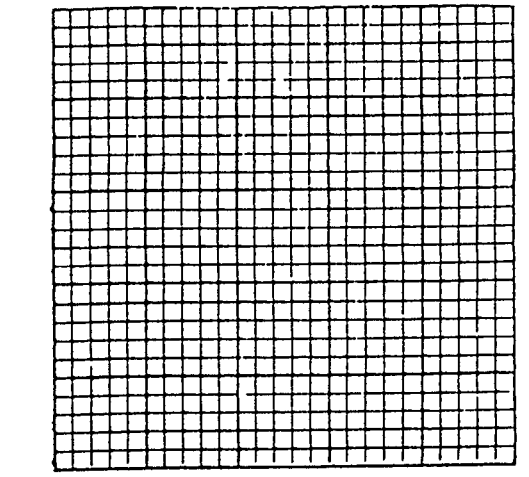
PROJECT [redacted] BAND & COURSE 'SC' Surface DATE 01-13-92



SIEVE SIZE	% PASSING		
	_____	_____	_____
2"	JMF	DRY	WRL
3/4" + 1/2"	100	100	100
1/2" 3/4"	97	97	98
3/8"	86	86	89
= 4	50	50	55
= 8	33	33	35
= 16	23	23	24
= 30	15	15	17
# 50	8	7	9
#100	6	5	6
#200	5.1	3.9	4.2
A C	5.1	_____	_____ %





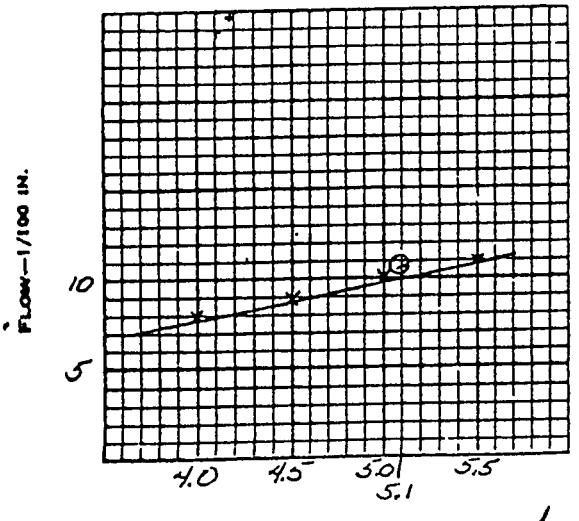


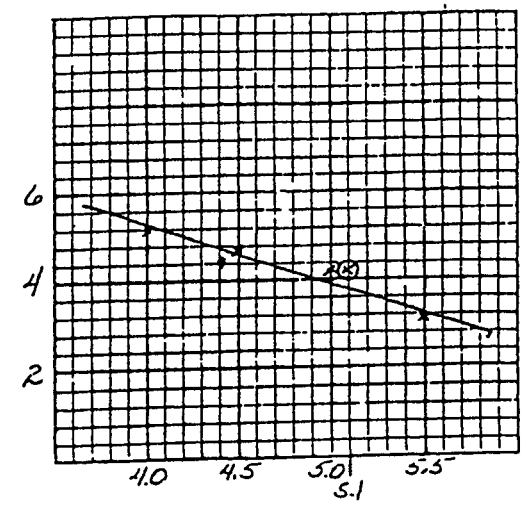
RECOMMENDATION

A.C. 5.1 %
BY C. Smith
DATE 2/20/92

RECOMMENDED FOR APPROVAL

A.C 5.1 %
BY Frank B. Bishop
DATE 3-9-92





Rec'd 10-14-92. [signature]

MARSHALL METHOD SUMMARY SHEET

#143

W92143SCV01T

PROJE[redacted] DATE TESTED 01-13-92

PRODUCER Genstar Stone Products, Inc. PLANT LOCATION Frederick, Md.

COURSE Surface BAND 'SC' CONTRACTOR

SPECIFIC GRAVITY OF AGG. A. C. SOURCE Chevron

SPECIFIC GRAVITY OF PLUS 1" MATERIAL PLUS 1" MATERIAL

AGGREGATE PROPORTIONING

#7's Genstar; Frederick, Md. 30 %

#8's Genstar; Frederick, Md. 25 %

#10's Genstar; Frederick, Md 35 %

SAND Davidsonville Concrete Sand; Davidsonville, Md 10 %

%

~~DATE HOT BIN SAMPLED:~~ ~~COMPARED TO:~~

REMARKS THIS MIX REQUIRES NO ADDITIVE.

Orig: F.B. Bishop P.D.B 1-14-92

cc: Genstar
Plant Insp. @ Genstar
C. Smith - WRL
P. Bittinger - WRL
R. Myers - WRL
WRL File
Field Office
Project Engr. - R. McGraw
Paul Brode - District 7

Mix Temperature	300°F
Max. Spec. Grav.	2.508
Dust to Binder Ratio	1.0
Wash Loss	5.1
Plant Approval	

Date Rec'd: In Lab. In Testing Unit

Date Put Under Test: Date Test Completed

Tested By:

Test Cost: Approved By: Recorded By:

OCT 15 1992

GENSTAR

Genstar Stone Products Company
Executive Plaza IV
Hunt Valley, Maryland 21031-1091
Telephone (301) 527-4000
Fax (301) 527-4258

October 7, 1992

Superpave.

Mr. Larry Michael
Western Region Laboratory
528 E. Main Street
Hancock, Maryland 21750

Dear Mr. Michael:

Genstar wishes to submit the following mixes for use on State Contract #F-223-501-777.

Frederick SC-W-92-143-SC01-T
SHRP Mix SPS-9 Surface

If you need additional information please contact me at your convenience at 410-682-5971.

Sincerely,

Carl R. Blevins

Carl R. Blevins
Manager, Quality Control
Blacktop

CRB:ab

cc: R. Pope
H. Schult
J. Yingling/File
S. Kennedy

cc: WRL Regional File
WRL Field Office
Project Engineer, S. Sites
~~District Engineer~~
SW Coordinator, P. Finnerty
Producer, Genstar - Quinn
Plant Inspector, Genstar - Quinn
Prime Contractor, Genstar
C Smith

APPROVED AS NOTED

OCT 15 1992

for L. L. MICHAEL
REGIONAL ENGINEER
WESTERN REGIONAL LABORATORY

OMD Rec'd 10-19-92
Steven C. McClain SHA

APPROVALS ARE FOR SOURCES OF SUPPLY ONLY AND DO NOT APPROVE OR IMPLY APPROVAL OF THE MATERIALS FROM THESE SOURCES.

"Suppliers must be notified of appropriate (ITEM NUMBER) when ordering material for Maryland State Highway Administration Contracts".

GENSTAR

Genstar Stone Products Company
Executive Plaza IV
Hunt Valley, Maryland 21031-1091
Telephone (301) 527-4000
Fax (301) 527-4258

BITUMINOUS CONCRETE SPECIFICATION SHRP MIX SPS-9 SURFACE

PRODUCED AT FREDERICK PLANT

Materials	Percent	Source
Frederick #7 Stone	20	Genstar Stone Products Co.,Frederick,MD
Frederick #8 Stone	29	Genstar Stone Products Co.,Frederick,MD
Frederick #10 Stone	41	Genstar Stone Products Co.,Frederick,MD
Davidsonville Concrete Sand	10	Genstar Stone Products Co.,Davidsonville,MD
AC-20 Asphalt Cement	5.4	Citgo Asphalt, Baltimore, MD

OK CES NOTE 5

Proposed Gradation	Percent Passing
3/4"	100
1/2"	98.2
3/8"	89.6
#4	56.7
#8	35.8
#16	25.4
#30	17.8
#50	10.7
#100	7.4
#200	6.1

OK CES

Delivery Temperature 280 Degrees F — No Anti-Strip Needed
Mixing Temperature 305 Degrees F — Molding Temperature 290 Degrees F

Maximum Specific Gravity 2.498
Ratio of Dust to Binder Material 1.13
Compactive Effort 75 Blows
Percent - 200 Removed by Dust Collecting System 0%

OK CES

The material will be produced at Frederick, Maryland in the Astec Drum Mix Plant #143.

NOTE 5

Anti-Strip Additive
ACRA-600L — Exxon Chemical Americas, Pedricktown, New Jersey

AE-4 (RS-1) Asphalt Emulsion for Tack Coat — Koch Asphalt Company, Baltimore, Maryland

Asphalt Release Agent
KWIK RELEASE — Presto Chemical Company, Roswell, Georgia

October 4, 1992

FKSHRP

APPROVED AS NOTED
OCT 15 1992
(FOR) L.L. MICHAEL
REGIONAL ENGINEER
WESTERN REGIONAL LABORATORY

Carl R. Blevins
GENSTAR STONE PRODUCTS COMPANY

[redacted]

[redacted] MIX DESIGN

Maryland: SPS-9 Surface
12.5 mm Nominal

SUMMARY OF DATA

Design

Air Voids	4.1%	Density	2388
Asphalt %	5.6%	Rice TSG	2.491
VMA	16.0%		
VFA	74.0%		

Properties at Design Gyrations

AC (%)	Weight kg/m3	Air Voids (%)	VMA (%)	VFA (%)	Theoretical S. G.	Effective AC (%)
4.7%	2371	6.1%	15.9%	62%	2.525	4.3%
5.2%	2381	5.0%	16.0%	69%	2.505	4.8%
5.7%	2376	4.4%	16.6%	73%	2.486	5.3%
6.2%	2402	2.7%	16.1%	83%	2.468	5.8%

AC (%)	Density 10 gyrations	Density 200 gyrations	Density 230 gyrations
4.7%	84.3%	93.9%	94.3%
5.2%	85.4%	95.0%	95.3%
5.7%	86.1%	95.6%	95.9%
6.2%	87.3%	97.3%	97.7%

Aggregate Blend BSG	2.686
Aggregate Effective SG	2.719
Asphalt Absorption	0.5%
Asphalt Specific Gravity	1.03

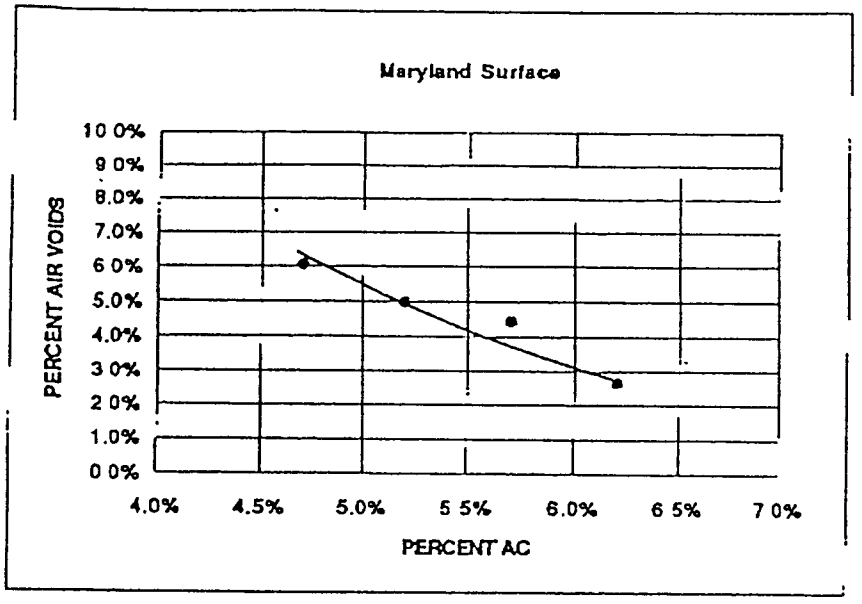
Aggregates

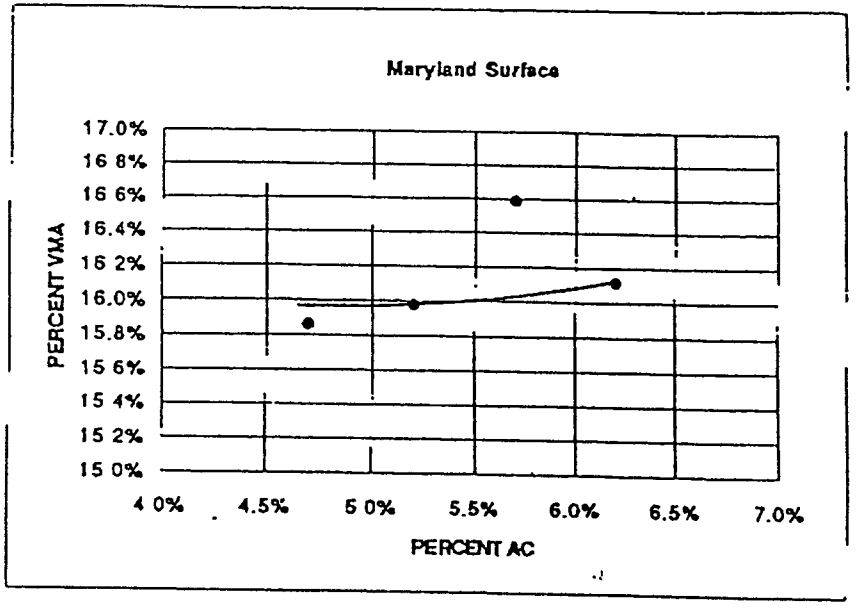
Percent	Aggregate	Bulk SG
20.0%	#7 Limestone	2.700
29.0%	#8 Limestone	2.700
41.0%	#10 Limestone	2.700
10.0%	Natural Sand	2.570

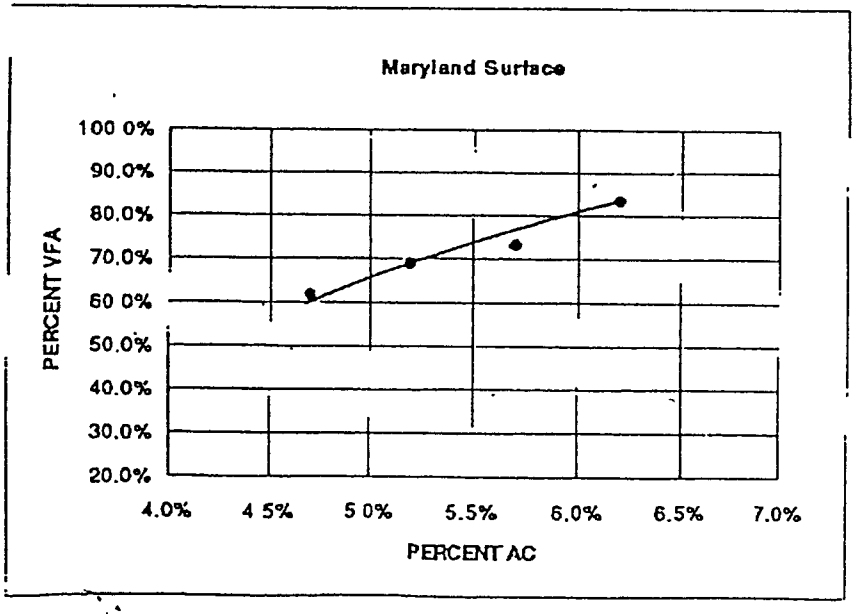
Asphalt AC 20

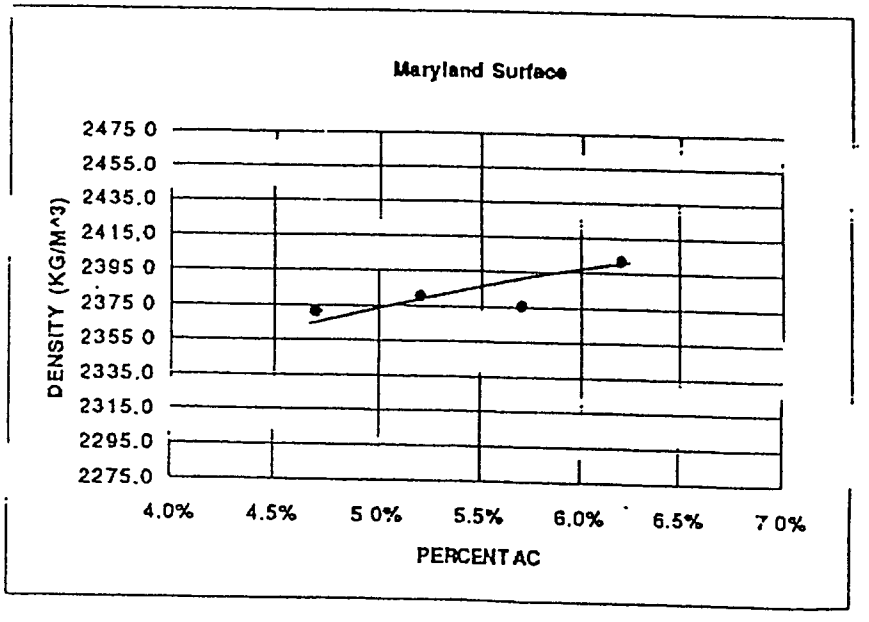
Rec'd 10-14-92
Alan E. McClain SHA

9/24/92


Maryland Surface
PERCENT AIR VOIDS
10 0%
9 0%
8.0%
7.0%
6 0%
5.0%
4.0%
3 0%
2 0%
1.0%
0 0%
4.0%
4.5%
5.0%
5 5%
6.0%
6 5%
7 0%
PERCENT AC


Maryland Surface
PERCENT VMA
17.0%
16 8%
16 6%
16.4%
16 2%
16.0%
15.8%
15 6%
15 4%
15 2%
15 0%
4 0%
4.5%
5 0%
5.5%
6.0%
6.5%
7.0%
PERCENT AC

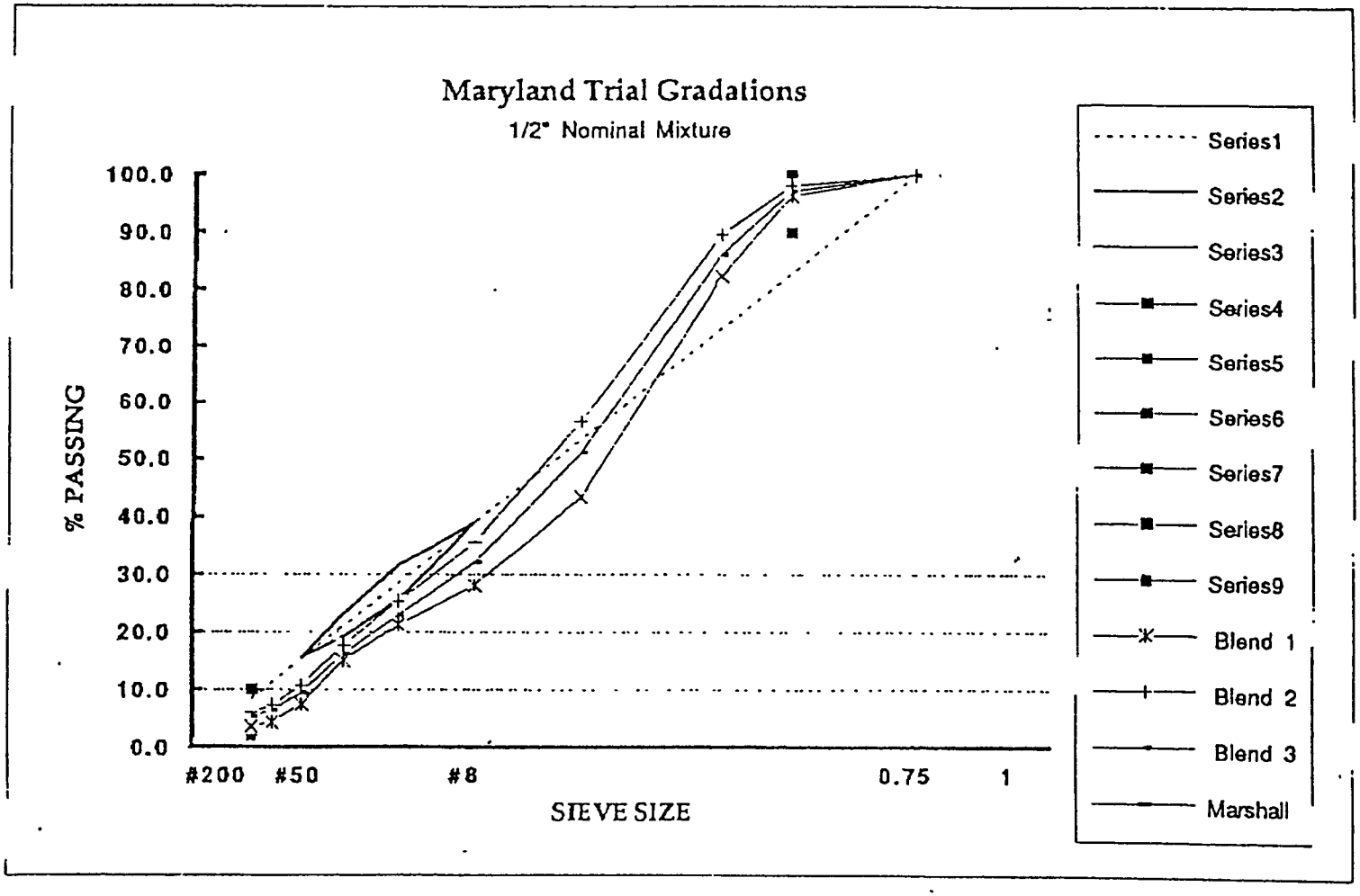

Maryland Surface
PERCENT VFA
100 0%
90.0%
80.0%
70.0%
60 0%
50.0%
40.0%
30.0%
20.0%
4.0%
4 5%
5 0%
5.5%
6.0%
6.5%
7.0%
PERCENT AC

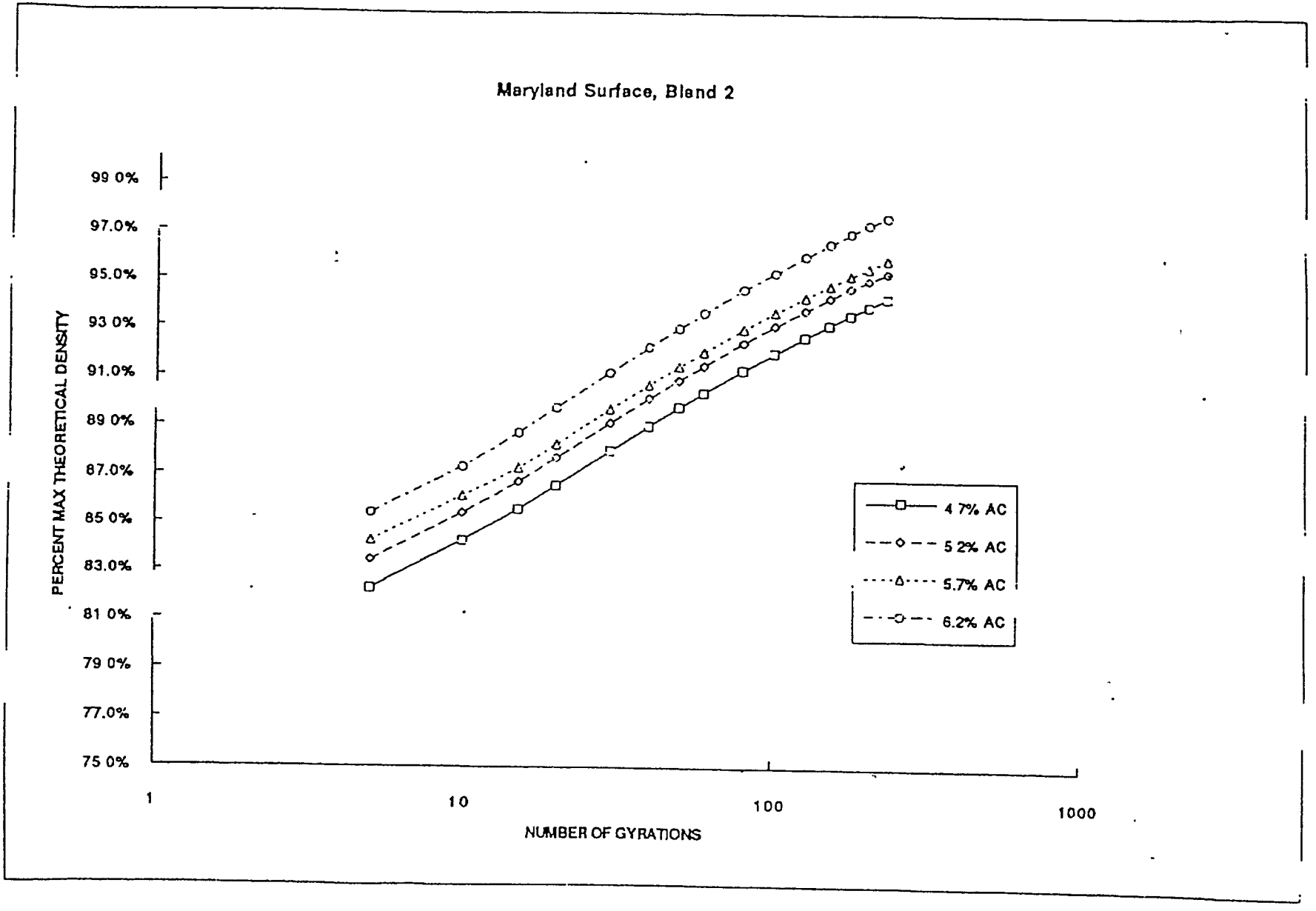

Maryland Surface
DENSITY (KG/M^3)
2475 0
2455.0
2435.0
2415.0
2395 0
2375 0
2355 0
2335.0
2315.0
2295.0
2275.0
4.0%
4.5%
5 0%
5.5%
6.0%
6.5%
7 0%
PERCENT AC

AGGREGATE BLENDING

	#7's	#8's	#10's	Sand							
Blend 1	40.0%	24.0%	21.0%	15.0%	0.0%	0.0%					
Blend 2	20.0%	29.0%	41.0%	10.0%	0.0%	0.0%					
Blend 3	30.0%	25.0%	35.0%	10.0%	0.0%	0.0%	Blend 1	Blend 2	Blend 3	Marshall	Max Dens
Marshall	0.0%	0.0%	0.0%	0 0%	0.0%	0.0%	Gradation	Gradation	Gradation	Gradation	Gradation
Sieve Size											
3/4 in	100.0	100.0	100.0	100.0	0.0	0.0	100.0	100.0	100 0	0.0	100 0
1/2 in	91.0	100.0	100.0	100.0	0.0	0.0	96.4	98.2	97.3	0.0	82.8
3/8 in	61.0	91.0	100.0	100 0	0.0	0.0	82.2	89.6	86.1	0.0	73.2
No. 4	10.0	21.0	95.0	97.0	0.0	0.0	43.5	56.7	51.2	0.0	53.6
No. 8	3.0	5.0	61.0	87.0	0.0	0.0	28.3	35.8	32.2	0.0	39.1
No.16	*2.0*	2.0	41.0	76.0	0.0	0.0	21.3	25.4	23.1	0.0	28.6
No.30	*2.0*	*2.0*	28.0	53.0	0.0	0.0	15.1	17.8	16.2	0.0	21.1
No.50	*1.0*	*1.0*	21.0	16.0	0.0	0.0	7.5	10.7	9.5	0.0	15.5
No.100	*1.0*	*1.0*	16.0	3.0	0.0	0.0	4.5	7.4	6.5	0.0	11.3
No.200	1.0	1.0	13.5	1.1	0 0	0.0	3.6	6.1	5 4	0.0	8.3

NOTE: Numbers in italics are estimated.


Maryland Trial Gradations
1/2" Nominal Mixture
% PASSING
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
#200
#50
#8
0.75
1
SIEVE SIZE
Series1
Series2
Series3
Series4
Series5
Series6
Series7
Series8
Series9
Blend 1
Blend 2
Blend 3
Marshall


Maryland Surface, Bland 2
PERCENT MAX THEORETICAL DENSITY
99 0%
97.0%
95.0%
93 0%
91.0%
89 0%
87.0%
85 0%
83.0%
81 0%
79 0%
77.0%
75 0%
1
10
100
1000
NUMBER OF GYRATIONS
4 7% AC
5 2% AC
5.7% AC
6.2% AC

Date Photocopied: OCT 2 1992

GENSTAR

Genstar Stone Products Company
Executive Plaza IV
Hunt Valley, Maryland 21031-1091
Telephone (301) 527-4000
Fax (301) 527-4258

SEP 22 11:57

cc: WRL Regional File
WRL Field Office
~~Project Engineer, J. Yates~~
~~District Engineer~~
SW Coordinator, P. Finnerty
Producer, Genstar - Drum
Plant Inspector, Genstar - Drum
Prime Contractor, Genstar
C. Smith
F. Bishop

F223-501-777

September 21, 1992

Mr. Larry Michael
Western Region Laboratory
528 E. Main St.
Hancock, MD 21750

Dear Mr. Michael:

We wish to submit for your approval the "SMA" Band Mix with Vestoplast-Polyolefin to be produced at our Frederick Plant.

It is my understanding that this is a joint-venture between Western Region Lab and Genstar.

Sincerely,

Carl R. Blevins

Carl R. Blevins
Manager, Quality Control
Blacktop

CRB:ab

cc: R. Pope
H. Schult
J. Yingling/File
S. Kennedy

SHABLT.LTR

APPROVED AS NOTED OCT 2 1992

Frank B. Bishop for
L. L. MICHAEL
REGIONAL ENGINEER
WESTERN REGION LABORATORY

(20) Rec'd 10-6-92 SHA

GENSTAR

Genstar Stone Products Company
Executive Plaza IV
Hunt Valley, Maryland 21031-1091
Telephone (301) 527-4000
Fax (301) 527-4258

BITUMINOUS CONCRETE SPECIFICATION "SMA" MIX

PRODUCED AT FREDERICK PLANT

Materials	Percent	Source
VA Trap Rock #68	47	Virginia Trap Rock, Leesburg, VA
Frederick #7 Stone	29	Genstar Stone Products Co.,Frederick,M
Frederick Birdeye	14	Genstar Stone Products Co.,Frederick,M
Texas Aglime	10	Genstar Stone Products Co., Texas, MD
AC-20 Asphalt Cement	6.0	Citgo Asphalt, Baltimore, MD

OK CES NOTE 5

Proposed Gradation	ASPHALT PERCENTAGES		Percent Passing
3/4"			100
1/2"			81
3/8"	Vestoplast @ 7 %	= 0.42	67
#4	Virgin AC-20	= 5.58	28
#8	Total AC in Mix	= 6.00	15
#16			12
#30			11.2
#50			10.9
#100			10.2
#200			9.4

OK CES

OK CES

Delivery Temperature 290 Degrees F — No Anti-Strip Needed
Mixing Temperature - 310°F
Molding Temperature 290 Degrees F
Maximum Specific Gravity — 2.570
Compactive Effort — 50 Blows
Percent - 200 Removed by Dust Collecting System — 0%

The material will be produced at Frederick, Maryland in the Astec Drum Mix Plant #143.

OK CES NOTE 5

Anti-Strip Additive ACRA-600L	Exxon Chemical Americas Pedricktown, New Jersey
AE-4 (RS-1) Asphalt Emulsion for Tack Coat	Koch Asphalt Company Baltimore, Maryland
Asphalt Release Agent KWIK RELEASE	Presto Chemical Company Roswell, Georgia

September 22, 1992

Carl R. Blevins
GENSTAR STONE PRODUCTS COMPANY

FKSMA.922

W92143 S.M.A.02T

MARSHALL METHOD SUMMARY SHEET

PROJECT _____ DATE TESTED 9-22-92

PRODUCER Genstar PLANT LOCATION Frederick

COURSE _____ BAND SMA Anti-Strip 0.2 %

MAX. SPEC. GRAV. 2.570 A. C. SOURCE Citgo

DUST TO BINDER RATIO _____ PLANT MIXING TEMP. _____ deg. F

AGGREGATE PROPORTIONING		Cold Feed ~~HOT BIN~~ PERCENTAGES	
Virginia Trap Rock #68	%	Bin #1	47 %
Frederick #7	%	Bin #2	29 %
Frederick Bird eye	%	Bin #3	14 %
Texas Aglime	%	Bin #4	10 %
_____	%	Ret. Fines	%

DATE DESIGN CHECK SAMPLED _____ COMPARED TO: _____

REMARKS: COST:

	DESIGN
	GRADING
_____	STRIP STUDY
	TOTAL

REG. ENG.
CH. PLANT INSP.
REG. FILE
DESIGN(Orig.)
PLANT INSP.
FIELD OFFICE
PRIME

STATE OF MARYLAND
STATE HIGHWAY ADMINISTRATION
MATERIALS & RESEARCH
MARSHALL METHOD SUMMARY SHEET

MIX DESIGN # _____

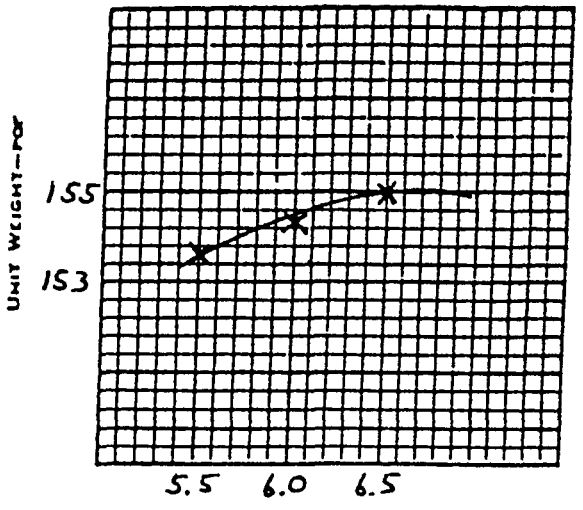
PLANT LAB

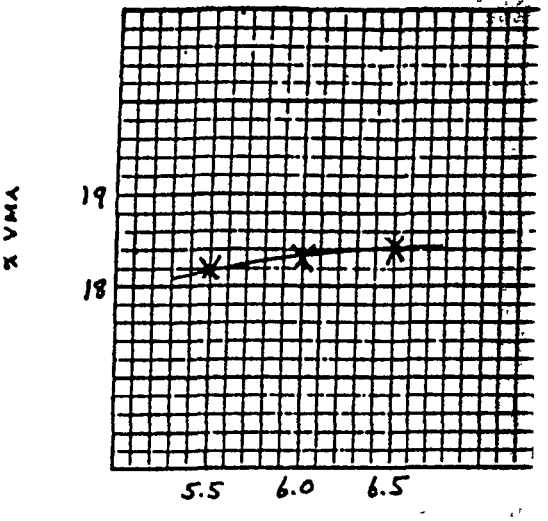
___ Original D
___ Design Chec
✓ 50 Blows
___ 75 Blows

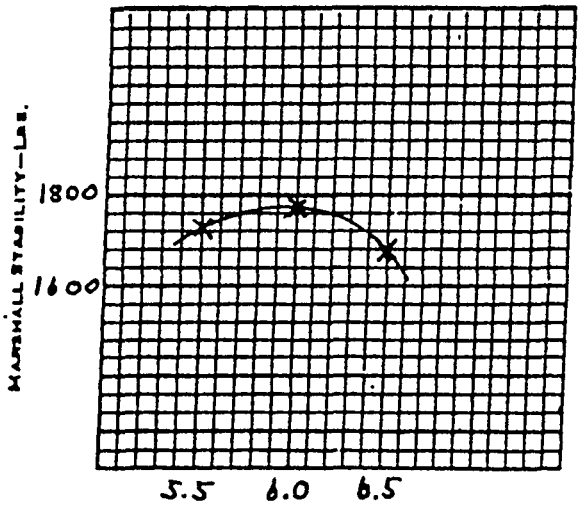
REPLACES # _____

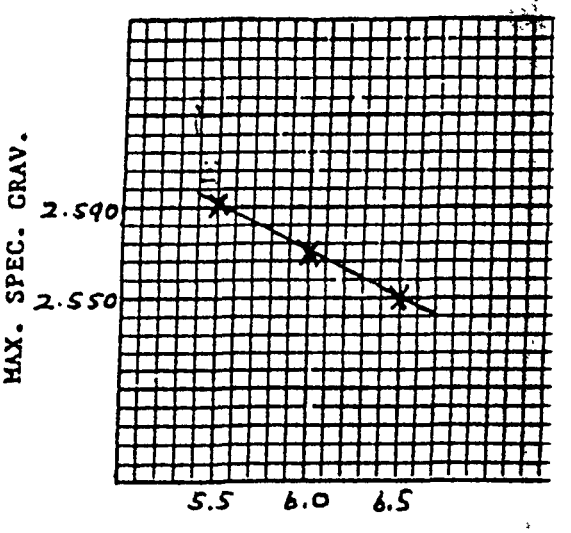
PRODUCER Genstar PLANT # 143

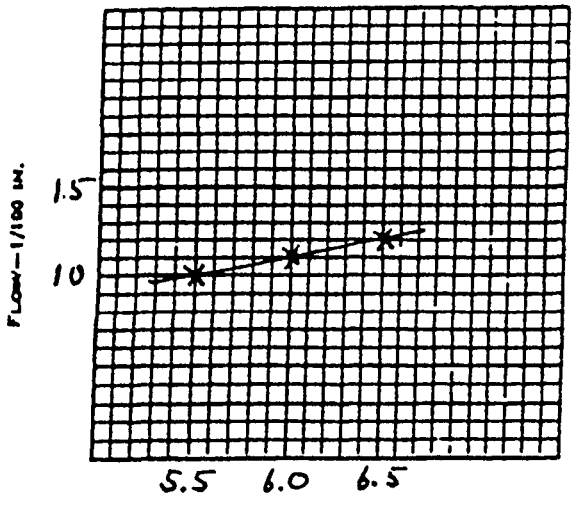
PLANT LOCATION Frederick BAND SMA Vesto. DATE 9-22-9

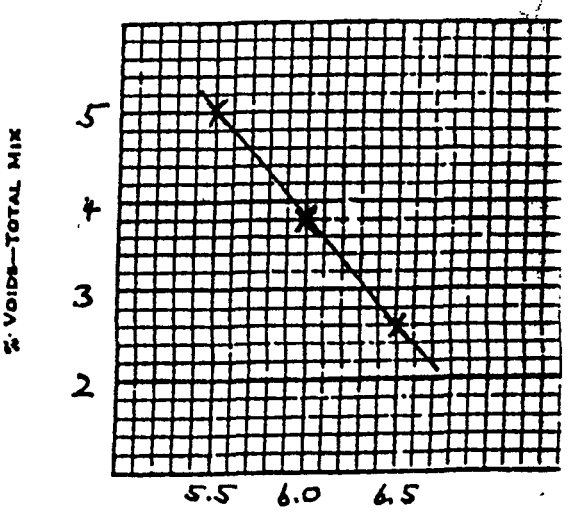












	% PASSING PLANT	JMF	LAB
2"	___	___	___
1 1/2"	___	___	___
	___	___	___
3/4"	___	100	___
1/2	___	81	___
3/8"	___	61	___
= 4	___	28	___
= 8	___	15	___
= 16	___	12	___
= 30	___	11.2	___
= 50	___	10.9	___
=100	___	10.2	___
=200	___	9.4	___
A.C.	___	6.0	___ %

RECOMMENDATION

A.C. _____%

BY _____

DATE _____

APPROVAL

A.C. _____%

BY _____

DATE _____

AGG. SP. GR. _____ A.C. SP GR. 1.025 TESTED BY SWK CALCULATED BY SWK

% A.C. BY WT	SPEC NO	WEIGHT - GRAMS IN AIR	WEIGHT - GRAMS IN WATER	VOL cc	SPECIFIC GRAVITY SPECIMEN	SPECIFIC GRAVITY ADJUSTED SPECIMEN	SPECIFIC GRAVITY MAX THEOR.	WEIGHT PER CU FT	% A.C. BY VOL	% VOIDS TOTAL MIX	% VOIDS AGG. ONLY	% VOIDS FILLED	STABILITY - LBS. MEASURED	STABILITY - LBS. ADJUSTED	FLOW .01"
		a	b	c	G_m	G_{ma}	G_t	U_t	S_c	V_t	V_{ma}	V_f			
				a-b	$\frac{a}{c}$	*	**	$62.4 \times G_m$	$\frac{G_m \times \%A.C.}{G_c}$	$100\frac{DH}{GT} \times 100$	$S_c \cdot V_t$	$\frac{S_c}{V_{ma}} \times 100$			
5.5	1	1277.3	759.3	518.0	2.466									1713	10
	2	1276.4	756.7	519.7	2.456									1750	9
	3	1276.9	757.8	519.1	2.460									1725	10
	AVG				2.461		2.591	153.6	13.2	5.0	18.2	72.5		1729	10
6.0	1	1282.5	764.9	517.6	2.478									1787	11
	2	1281.4	762.6	518.8	2.470									1763	11
	3	1281.9	762.7	519.2	2.469									1775	10
	AVG				2.472		2.570	154.3	14.5	3.8	18.3	79.2		1775	11
6.5	1	1289.7	771.3	518.4	2.488									1675	12
	2	1290.5	770.1	520.4	2.480									1700	12
	3	1289.1	769.9	519.2	2.483									1687	11
	AVG				2.484		2.550	155.0	15.8	2.6	18.4	85.9		1687	12
	AVG														
	AVG														

A = DRY PLUS 1" MATERIAL EXPRESSED AS PERCENT OF TOTAL BATCH.

B = 100% - A%

C = BULK SPECIFIC GRAVITY OF PLUS 1" MATERIAL

D = ACTUAL SPECIFIC GRAVITY OF COMPACTED SPECIMEN WITH PLUS 1" MATERIAL REMOVED.

0.995 = EMPIRICAL FACTOR.

* $G_{ma} = \frac{100}{\frac{A}{C}\frac{B}{D}} \times 0.995$

** $G_t = \frac{100}{\frac{P_a}{G_a} + \frac{P_c}{G_c}}$

G_a = SPECIFIC GRAVITY OF MINERAL AGGREGATE.

G_c = SPECIFIC GRAVITY OF ASPHALT CEMENT.

P_a = PERCENT AGGREGATE, BASED ON TOTAL BATCH.

P_c = PERCENT ASPHALT CEMENT, BASED ON TOTAL BATCH

NOTE: INSERT G_{ma} FOR G_m IN CALCULATIONS AT TOP WHEN USING ALTERNATE PROCEDURE.

CALCULATIONS BY: _____ DATE: 7-22-92

PRODUCER: Genstar MIX DESIGN NUMBER: _____

MAXIMUM SPECIFIC GRAVITY OF BITUMINOUS PAVING MIXTURES

ASTM D 2041

A = *weight of dry sample in air (grams)*

D = *weight of flask filled with water at 25°C (77°F) (grams)*

E = *weight of flask filled with sample and water at 25°C (77°F) (grams)*

$$\text{Maximum Specific Gravity} = \frac{A}{A+D-E}$$

TEST No. 1	5.5%	TEST No. 2	6.0%	TEST No. 3	6.5%	TEST No. 4	
TIME	AC	TIME	AC	TIME	AC	TIME	
TONNAGE		TONNAGE		TONNAGE		TONNAGE	
LOT No.		LOT No.		LOT No.		LOT No.	
A =	1280.6 grams	A =	1289.0 grams	A =	1295.6 grams	A =	grams
D =	8100.6 grams	D =	8100.6 grams	D =	8100.6 grams	D =	grams
E =	8887.0 grams	E =	8888.1 grams	E =	8888.1 grams	E =	grams
Length of Vacuum Time	15 min	Length of Vacuum Time	15 min	Length of Vacuum Time	15 min	Length of Vacuum Time	
Max. Sp. Gr. =	2.591	Max. Sp. Gr. =	2.570	Max. Sp. Gr. =	2.550	Max. Sp. Gr. =	

LOT = *1/1000 TONS OR FRACTION THEREOF*

Revised 4-4-87
by Jim Davis

PERCENTAGE ASPHALT	5.5	6.0	6.5		
TOTAL WEIGHT	1291	1298	1305		
WEIGHT OF VESTOPLAST	5.0	5.5	5.9		
WEIGHT OF ASPHALT	66.0	72.4	78.9		
AGGREGATE WEIGHT	1220	1220	1220		
	DRY JMF	WEIGHT PASSING		COLD FEED	PERCENTAGES
1 1/2"				VTR #68	47%
1"				Frederick #7	29%
3/4"	100	1220		Frederick Birdeye	14%
1/2"	81	988.2		Texas Aglime	10%
3/8"	61	744.2			
#4	28	341.6			
#8	14.1	172.0			
#16	11.0	134.2			
#30	10.7	130.5			
#50	10.4	126.9			
#100	9.8	119.6			
#200	7.4	90.3			

Contractor shall provide supplier with contract number and item number when ordering material.

Note 1: Material must be inspected by authorized SHA personnel or authorized agency prior to delivery on job site. Contractor is responsible to see that orders specify inspection prior to delivery. Project Engineer is to verify inspection prior to use.

Note 2: Project Engineer, please submit sample to laboratory for testing and approval prior to use.

Note 3: Project Engineer, please phone laboratory for inspection prior to use.

Note 4A: Material accepted on the basis of manufacturer's certificate of compliance. Manufacturer submit current original notarized certification of material analysis to the Bureau of Materials Control and a certification should accompany shipment of material to project.

Note 4B: Material accepted on the basis of manufacturer's certificate of compliance. Contractor is responsible for submitting notarized current original certificate of material analysis to the Regional Laboratory and the Project Engineer.

Note 5: Samples taken by Plant Personnel and witnessed by SHA Plant Inspector. Sample tested at plant or laboratory as required.

Note 6: Quality report is on file at the Regional Laboratory. Sampling done by laboratory personnel for source approval on a periodic basis.

Note 7: Materials inspected by representative of Bureau of Landscape.

Note 8: Source approval contingent upon submission and approval of catalog cuts.

Note 9: Source tentatively approved, subject to approval and tagging by Department of Agronomy, University of Maryland. Project Engineer submit tag numbers and prior to use date.

Note 10: Please submit only one source for this material. If necessary to change source at a later date, process request for source change at that time.

Note 11: Approval withheld pending facility check and sample test results.

Note 12: Visual inspection by Project Engineer. Form 14 to by submitted indicating whether or not "Materials meet specifications" or are "performing satisfactorily in field".

Note 13: Submit to District Office for approval as an equal to the "brand name(s)"/manufacturer(s) mentioned in the contract's special provisions.

Note 14: This material may be accepted based on the "brand name" which is mentioned in the contract's special provisions.

Note 15: Project Engineer to conduct test.

Revised: May, 1988

Genstar Stone Products Company

Executive Plaza IV, Hunt Valley, MD 21031-1091

ANT NAME AND NUMBER

FREDERICK BLACKTOP PHONE (301) 694 -4816

The operator of this truck is allowed a maximum of 20 minutes in which to unload. Trucks held at jobsite longer will be billed at the current holding time rate

INSPECTORS SIGNATURE	TEMP.	RECEIVED AND ACCEPTED MATERIAL
S.A.A	300°F.	X

SOLD TO	SHIP TO
FREDERICK CONTRACTS FREDERICK , MD 21701	I-70 FROM MD 144 EAST IJAMSVIL MD# F-223-501-777

* F-223-501-777 *

ROUTE NOTED HEREON IS SUBJECT TO CONDITIONS ON REVERSE SIDE

ROUTE NOTED HEREON IS SUGGESTED ONLY AND ACTUAL ROUTE TRAVERSED IS AT THE DISCRETION OF THE VEHICLE OPERATOR

ORDER NO	DELIVERY DATE	TKT. TIME	CUSTOMER I.D.	JOB SITE I.D.	ZONE
0295	05-Oct-92	10:37	6641000	J295092	21021016B

PRODUCT I.D.	PRODUCT DESCRIPTION	AUTO. TKT. NO.
B2200088	SMA VESTOPLAST	45901

JOB PHONE NO.	CUSTOMER REQUIRED NUMBERS
	JOB # 295092 J295 I-70 (MD 144 TO IJAMSVIL

VEHICLE	CARRIER/DRIVERS NAME	TYPE OF SALE	DELIVERY
7532	FH1409 H & H TRUCKING, INC. SBMC	CHARGE	DELIVER

CODE	DESCRIPTION	UOM	QUANTITY	TOTAL QUANTITY

UNLOAD 11:05 AM
TO 1B7400 S/L
TEMP 315°

Richard D. Halbrook

GROSS WEIGHT POUNDS	LOAD NUMBER	JOB DEPARTURE TIME
65140	1	
TARE WEIGHT POUNDS	TODAY'S JOB TOTAL	JOB ARRIVAL TIME
24900	20.12	
NET WEIGHT POUNDS	NET TONS	
40240	20.12	

PRODUCT	$
TRANSPORTATION	$
ADDITIONAL CHARGES	$
TAXES	$
TOTAL PRICE OF THIS LOAD	$
ACCUMULATIVE CASH SALE	$
HOLDING TIME	$
FINAL TOTAL	$

A-8

SHA-73.0-1
REVISED JAN. 1992

MARYLAND
STATE HIGHWAY ADMINISTRATION
MATERIALS AND RESEARCH

HMA FIELD COMPACTION REPORT

SAMPLING AND TESTING HAVE BEEN CONDUCTED IN ACCORDANCE WITH THE PROPER PROCEDURES. ACCEPTANCE ✓ IAST OTHER

SHEET 1 OF 1

DATE SAMPLED 10/1/92

CONTRACT NO.: F 223-501-777 F.A.P. NO.: NH-6-70-3(43)55 PRODUCER: Genstar

PLANT LOCATION: Frederick, Md PLANT NUMBER: 143 COURSE: Surface BASE SHA SC LAID OVER: Milled

MIX DESIGN NUMBER. WAS A CONTROL STRIP PERFORMED ON THIS MIX? ___ YES ✓ NO

CUT BY: Angie Poe WITNESSED BY: Kim Tillman TESTED BY: David Kallhoyer S.H.

LOT NO.: 1 LOT SIZE: 725.60 SUBLOT SIZE: 181.40

	CORE SAMPLE NUMBER	DATE & TIME TONNAGE LAID	LOCATION INDICATE STATION NO. AS PER MSMT 418	OFFSET	THICK-NESS	NUCLEAR GAUGE Max. Grav. ___ DRY	IN WATER	VOLUME IN CC.	CORE RESULTS SPECIFIC GRAVITY	SUBLOT AVERAGE SPECIFIC GRAVITY	MAXIMUM SPECIFIC GRAVITY	SUBLOT % DENSITY AVERAGE 87.0 MIN.	REMARKS
X	1	10-6 92 AM	1444+41 Mainline	25' RT	2¾"	804	466	338	2.379	2.370	2.489	95.22	
X	2		1445+50 "	40' LT	1¾"	748	431	317	2.360				
X	3	10-6 92 AM	1446+72 "	45' RT	2¼"	761	440	321	2.371	2.373		95.34	
X	4		1455+50 "	3' RT	2⅝"	767	444	323	2.375				
	5	10-6 92 PM	1466+19 "	45' RT	2"	681	396	285	2.389	2.394		96.18	
	6		1468+06 "	2' LT	1¾"	818	477	341	2.399				
	7	10-6 92 PM	1470+70 "	2' LT	3"	768	445	323	2.378	2.372		95.30	
	8		1475+50 "	15' LT	2"	807	466	341	2.366				
			Nuclear Gauge Lot Avg.						Core Lot Avg.			95.5	92.0 to 97.0 Required

Project Engineer: Send 3 copies to plant with cores

Plant Inspector: Send original to Regional Lab
Send 1st carbon to Project
Keep 2nd carbon for plant records

A-8 HMA Field Inspection Report

STATE HIGHWAY ADMINISTRATION
MATERIALS & RESEARCH
BITUMINOUS CONCRETE PLANT REPORT

Acceptance: ✓
I.A.S.T.: ____
Other: ____

CONTRACT NO: F-223-501-777 F.A.P. NO: IM-S-70-3(43)55 DATE: 10/5/92 SHEET 1 OF 1
PLANT OWNER: GENSTAR LOCATION: FRED. MD. PLANT NO.: 143
PLANT TYPE: DRUM AIR TEMP. MINIMUM: 50° WEATHER CLEAR
MIX DESIGNATION S.M.A. APPROVED DESIGN NO: ____ EXTRACTION SAMPLE NO: 8 A-E
ASPHALT PRODUCER: CITGO LOT NUMBER: 26 PROJECT CONSECUTIVE NO: 8

SIEVE SIZE	JOB MIX FORMULA	JOB MIX Tolerance	TEST NO.		109		110
			TIME Sampled		6:30		12:00
1	100	100			100		100
3/4	100	100			99		98
1/2	81	76-86			80		80
3/8	61	56-66			63		62
4	28	24-32			27		28
8	15.3	11.3-19.3			14		16
16	11.6	7.6-15.6			11		13
30	11.2	8.2-14.2			11		13
50	10.9	7.9-13.9			10		12
100	10.2	7.2-13.2			10		11
200	9.4	7.4-11.4			7.5		8.8
AC%	5.8	5.4-6.2					
FINES TO AC RATIO		1.2 max.			—		—

STRIP TEST

TIME: 10:51 A.M.	TIME:
ADD RATE: 0.2%	ADD RATE:
RESULTS: 95+	RESULTS:
PASS: ✓ FAIL: ____	PASS: ____ FAIL: ____

MAXIMUM GRAVITY 2.570

LOT NO.	1		
TIME	10:51 A.M.		
TONNAGE	80.50		
GRAVITY	2.573		

BATCH PLANT

HOT BIN %		COLD FEED %	
No.4	____	No.4	____
No.3	____	No.3	____
No.2	____	No.2	____
No.1	____	No.1	____
		FILLER	____
		R.A.P.	____

DRUM PLANT

COLD FEED% (VTR #68)			
No.1	41	No.5	____
No.2	#7 33	No.6	____
No.3	BIRDEYE 16	R.A.P.	____
No.4	AGLIME 12	AC	____

Tonnage Represented: 383.47 Total Tonnage For Contract: 383.47

✓ IN CONTROL (EXTRACTION PROGRAM) ASPHALT EXTRACTION RESULTS ____ IN CONTROL (EXTRACTION PROGRAM)

Producer's Laboratory Results	State Highway Administration Lab Results
SAMPLE NO: 8	SAMPLE NO:
TEST METHOD: MARYLAND	TEST METHOD:
Test Performed By: THOMAS STEGER (signature please)	Test Performed By: (signature please)
DATE TESTED: A 10/5/92 B ____	DATE TESTED: A ____ B ____
AC% SAMPLE 'A' 5.76 AC% SAMPLE 'B' ____	AC% SAMPLE 'A' ____ AC% SAMPLE 'B' ____
AVERAGE AC% OF 'A' & 'B' ____ %	AVERAGE AC% OF 'A' & 'B' ____ %
✓ MEETS SPECIFICATIONS	____ MEETS SPECIFICATIONS
____ DOES NOT MEET SPECIFICATIONS	____ DOES NOT MEET SPECIFICATIONS

EXTRACTION RANDOM NO.: N/A MAXIMUM GRAVITY RANDOM NO.: N/A

SHA LABORATORY LOG #

REMARKS S.M.A. VESTPLANT

MIX DESIGN APPROVED BY
F. BISHOP - N.R.L.

VTR# 68's - 41 #7's - 31
BIRDEYE - 16 AGLIME - 12

SHA Representative: [signature]

Distribution: ORIGINAL IN BOX SAMPLE
1st CARBON TO PROJECT
2nd CARBON PLANT FILE

SHA-13.0, 30-38
revised 3/87

MARYLAND
STATE HIGHWAY ADMINISTRATION
MATERIALS & RESEARCH

Acceptance: ✓
I.A.S.T.: ____
Other: ____

BITUMINOUS CONCRETE PLANT REPORT

CONTRACT NO: F-223-501-777 F.A.P. NO: IM-S-70-3(43)55 DATE: 10/5/92 SHEET 1 OF 1
PLANT OWNER: GENSTAR LOCATION: FRED. MD. PLANT NO.: 143
PLANT TYPE: DRUM AIR TEMP. MINIMUM: 50° WEATHER CLEAR
MIX DESIGNATION: SPS-9 APPROVED DESIGN NO: ____ EXTRACTION SAMPLE NO: 1 A-C
ASPHALT PRODUCER: CITGO LOT NUMBER: 26 PROJECT CONSECUTIVE NO: 1

SIEVE SIZE	JOB MIX FORMULA	JOB MIX Tolerance	TEST NO.		111		112
			TIME Sampled		12:45		4:00
3/4	100	100			100		100
1/2	98.2	91.2-100			98		99
3/8	89.6	82.6-96.6			91		92
4	56.7	49.7-63.7			59		54
8	35.8	31.8-39.8			36		34
16	25.4	21.4-29.4			23		23
30	17.8	13.8-21.8			16		16
50	10.7	6.7-14.7			11		11
100	7.4	3.4-11.4			8		8
200	6.1	4.1-8.1			6.5		6.4
AC%	5.4	5.0-5.8					
FINES TO AC RATIO 1.2 max.					1.20		1.18

STRIP TEST

TIME: 2137PM		TIME:	
ADD RATE: 0 %		ADD RATE:	
RESULTS: 95+		RESULTS:	
PASS: ✓ FAIL: ___		PASS: ___ FAIL: ___	
MAXIMUM GRAVITY 2.498			
LOT NO.	1		
TIME	2137PM		
TONNAGE	160.73		
GRAVITY	2.474		

BATCH PLANT

HOT BIN %		COLD FEED %	
No.4	___	No.4	___
No.3	___	No.3	___
No.2	___	No.2	___
No.1	___	No.1	___
FILLER	___	R.A.P.	___

DRUM PLANT COLD FEED%

No.1	___	No.5 #8	29
No.2 SAND	10	No.6 #10	41
No.3	___	R.A.P.	___
No.4 #7	20	AC	___

Tonnage Represented: 482.70 *Total Tonnage For Contract:* 482.70

___ IN CONTROL (EXTRACTION PROGRAM) ASPHALT EXTRACTION RESULTS ___ IN CONTROL (EXTRACTION PROGRAM)

Producer's Laboratory Results	*State Highway Administration Lab Results*
SAMPLE NO: 1	*SAMPLE NO:*
TEST METHOD: NUCLEAR	*TEST METHOD:*
Test Performed By: THOMAS STEGER (signature please)	*Test Performed By:* (signature please)
DATE TESTED: A 10/6/92 B	*DATE TESTED:* A B
AC% SAMPLE 'A' 6.11 *AC% SAMPLE 'B'*	*AC% SAMPLE 'A'* *AC% SAMPLE 'B'*
AVERAGE AC% OF 'A' & 'B' %	*AVERAGE AC% OF 'A' & 'B'* %
___ MEETS SPECIFICATIONS	___ MEETS SPECIFICATIONS
✓ DOES NOT MEET SPECIFICATIONS	___ DOES NOT MEET SPECIFICATIONS

EXTRACTION RANDOM NO.: N/A MAXIMUM GRAVITY RANDOM NO.: N/A

SHA LABORATORY LOG #

REMARKS
(SHRP) SPS-9 SURFACE

MIX DESIGN APPROVED BY
F. BISHOP - W.R.L.

Distribution: ORIGINAL IN BOX SAMPLE
1st CARBON TO PROJECT
2nd CARBON PLANT FILE

Rec'd 10-7-92 Alan C. McClain SHA

SHA Representative: John J. Kathmann

SHA-73.0, 36-58
revised 3/87

MARYLAND
STATE HIGHWAY ADMINISTRATION
MATERIALS & RESEARCH

Acceptance: ✓
I.A.S.T.: ____
Other: ____

BITUMINOUS CONCRETE PLANT REPORT

CONTRACT NO: F-223-501-777 F.A.P. NO: IM-S-703(43)55 DATE: 10/6/92 SHEET 1 OF 1
PLANT OWNER: GENSTAR LOCATION: FRED. MD. PLANT NO.: 143
PLANT TYPE: DRUM AIR TEMP. MINIMUM: 40° WEATHER CLEAR
MIX DESIGNATION: SC-V APPROVED DESIGN NO: — EXTRACTION SAMPLE NO: 13 A-C
ASPHALT PRODUCER: CITGO LOT NUMBER: 26 PROJECT CONSECUTIVE NO: 13

SIEVE SIZE	JOB MIX FORMULA	JOB MIX Tolerance	TEST NO.				
			TIME Sampled		6:15		
3/4	100	100			100		
1/2	97	90-100			99		
3/8	86	79-93			91		
4	50	43-57			50		
8	33	29-37			31		
16	23	19-27			21		
30	15	11-19			15		
50	8	4-12			10		
100	6	2-10			8		
200	5.1	3.1-7.1			6.2		
AC%	5.1	4.7-5.5					
FINES TO AC RATIO		1.25 max.			1.22		

STRIP TEST

TIME: 10:09 A.M.	TIME:
ADD RATE: 0 0 %	ADD RATE:
RESULTS: 95+	RESULTS:
PASS: ✓ FAIL: ___	PASS: ___ FAIL: ___

MAXIMUM GRAVITY 2.504

LOT NO.	1		
TIME	10:09 A.M.		
TONNAGE	241.26		
GRAVITY	2.489		

BATCH PLANT HOT BIN %		BATCH PLANT COLD FEED %		DRUM PLANT COLD FEED%			
No.4	___	No.4	___	No.1	___	No.5	#8-25
No.3	___	No.3	___	No.2	SAND	No.6	#10-35
No.2	___	No.2	___	No.3	___	R.A.P.	___
No.1	___	No.1	___	No.4	#7-30	AC	___
FILLER	___	R.A.P.	___				

Tonnage Represented: 725.60 *Total Tonnage For Contract*: 725.60

✓ IN CONTROL (EXTRACTION PROGRAM) ASPHALT EXTRACTION RESULTS ___ IN CONTROL (EXTRACTION PROGRAM)

Producer's Laboratory Results	*State Highway Administration Lab Results*
SAMPLE NO: 13	*SAMPLE NO*:
TEST METHOD: NUCLEAR	*TEST METHOD*:
Test Performed By: THOMAS STEGER (signature please)	*Test Performed By*: (signature please)
DATE TESTED: A 10/6/92 B ___	*DATE TESTED*: A ___ B ___
AC% SAMPLE 'A' 5.5% *AC% SAMPLE 'B'* ___	*AC% SAMPLE 'A'* ___ *AC% SAMPLE 'B'* ___
AVERAGE AC% OF 'A' & 'B' ___ %	*AVERAGE AC% OF 'A' & 'B'* ___ %
___ MEETS SPECIFICATIONS	___ MEETS SPECIFICATIONS
✓ DOES NOT MEET SPECIFICATIONS	___ DOES NOT MEET SPECIFICATIONS

EXTRACTION RANDOM NO.: N/A MAXIMUM GRAVITY RANDOM NO.: N/A

SHA LABORATORY LOG #

REMARKS

LAB # W92143SCV011

SHRP

Distribution: ORIGINAL IN BOX SAMPLE
1st CARBON TO PROJECT
2nd CARBON PLANT FILE

REC'D 10-7-92 Arthur C. McClain SHA

SHA Representative: [signature]

LTPP-SPS CONSTRUCTION DATA LAYER THICKNESS MEASUREMENTS CONSTRUCTION DATA SHEET 10	* STATE CODE [2 4] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 5]

LAYER THICKNESS MEASUREMENTS (Inches)

SHEET 1 OF 2

STATION NUMBER	OFFSET (Inches)	RUT LEVEL-UP	MILL REPLACEMENT	BINDER COURSE	SURFACE COURSE	SURFACE FRCTION LAYER
0+00	00	— — . —	— — . —	— — . —	— 1 . 9	— — . —
	36	— — . —	— — . —	— — . —	— 1 . 3	— — . —
	72	— — . —	— — . —	— — . —	— 1 . 4	— — . —
	108	— — . —	— — . —	— — . —	— 1 . 5	— — . —
	144	— — . —	— — . —	— — . —	— 1 . 5	— — . —
0+50	00	— — . —	— — . —	— — . —	— 2 . 0	— — . —
	36	— — . —	— — . —	— — . —	— 1 . 5	— — . —
	72	— — . —	— — . —	— — . —	— 1 . 8	— — . —
	108	— — . —	— — . —	— — . —	— 1 . 6	— — . —
	144	— — . —	— — . —	— — . —	— 1 . 8	— — . —
1+00	00	— — . —	— — . —	— — . —	— 2 . 0	— — . —
	36	— — . —	— — . —	— — . —	— 1 . 6	— — . —
	72	— — . —	— — . —	— — . —	— 1 . 6	— — . —
	108	— — . —	— — . —	— — . —	— 1 . 8	— — . —
	144	— — . —	— — . —	— — . —	— 1 . 9	— — . —
1+50	00	— — . —	— — . —	— — . —	— 2 . 0	— — . —
	36	— — . —	— — . —	— — . —	— 1 . 8	— — . —
	72	— — . —	— — . —	— — . —	— 1 . 6	— — . —
	108	— — . —	— — . —	— — . —	— 1 . 8	— — . —
	144	— — . —	— — . —	— — . —	— 1 . 9	— — . —
2+00	00	— — . —	— — . —	— — . —	— 2 . 0	— — . —
	36	— — . —	— — . —	— — . —	— 1 . 9	— — . —
	72	— — . —	— — . —	— — . —	— 1 . 8	— — . —
	108	— — . —	— — . —	— — . —	— 1 . 9	— — . —
	144	— — . —	— — . —	— — . —	— 1 . 9	— — . —
2+50	00	— — . —	— — . —	— — . —	— 2 . 2	— — . —
	36	— — . —	— — . —	— — . —	— 1 . 9	— — . —
	72	— — . —	— — . —	— — . —	— 1 . 8	— — . —
	108	— — . —	— — . —	— — . —	— 1 . 8	— — . —
	144	— — . —	— — . —	— — . —	— 1 . 9	— — . —
3+00	00	— — . —	— — . —	— — . —	— 2 . 0	— — . —
	36	— — . —	— — . —	— — . —	— 1 . 8	— — . —
	72	— — . —	— — . —	— — . —	— 1 . 8	— — . —
	108	— — . —	— — . —	— — . —	— 1 . 9	— — . —
	144	— — . —	— — . —	— — . —	— 2 . 0	— — . —
LAYER NUMBER		— —	— —	— —	— —	— —

PREPARER KEVIN HOWELL EMPLOYER SHA DATE OCT 26 / 92

LTPP-SPS CONSTRUCTION DATA LAYER THICKNESS MEASUREMENTS CONSTRUCTION DATA SHEET 10	* STATE CODE [24] * SPS PROJECT CODE [09] * TEST SECTION NO. [05]

LAYER THICKNESS MEASUREMENTS (Inches)

SHEET 2 OF 2

STATION NUMBER	OFFSET (Inches)	RUT LEVEL-UP	MILL REPLACEMENT	BINDER COURSE	SURFACE COURSE	SURFACE FRCTION LAYER
3+50	00.0				2.2	
	36.0				1.7	
	72.0				1.7	
	108.0				1.7	
	144.0				1.8	
4+00	00.0		1.0		1.9	
	36.0				1.6	
	72.0				1.6	
	108.0				1.6	
	144.0				1.6	
4+50	00.0				1.8	
	36.0				1.7	
	72.0				1.7	
	108.0				1.7	
	144.0				1.8	
5+00	00.0				2.0	
	36.0				1.6	
	72.0				1.7	
	108.0				1.7	
	144.0				1.9	
_+__						
_+__						
_+__						
LAYER NUMBER						

PREPARER KEVIN HOWELL EMPLOYER SHA DATE OCT 26/92

PAVEMENT MANAGEMENT SYSTEMS

MEMORANDUM

TO:	Dr. Haleem Tahir Al Blazuckl	**DATE:**	September 18, 1992
FROM:	Dr. Bill Phang	**PROJECT:**	50450810
SUBJECT:	Post Construction Sampling and Testing for SPS-9, I-70 WB, Frederick, MD	**FILE:**	13.17.9
		COPIES TO:	See Below

Forwarded enclosed are updated and more specific descriptions of materials sampling and testing during and after construction of the overlay materials and mixes in the SPS-9 test sections. These updates supplement item 4 of my memo of July 29, 1992.

The enclosure consists of:

1. During and Post Construction Sampling and Field Testing Layout
2. Typical Coring Layout for SHA and SHRP Mixes at Various Times
3. Field and Laboratory Testing Plans

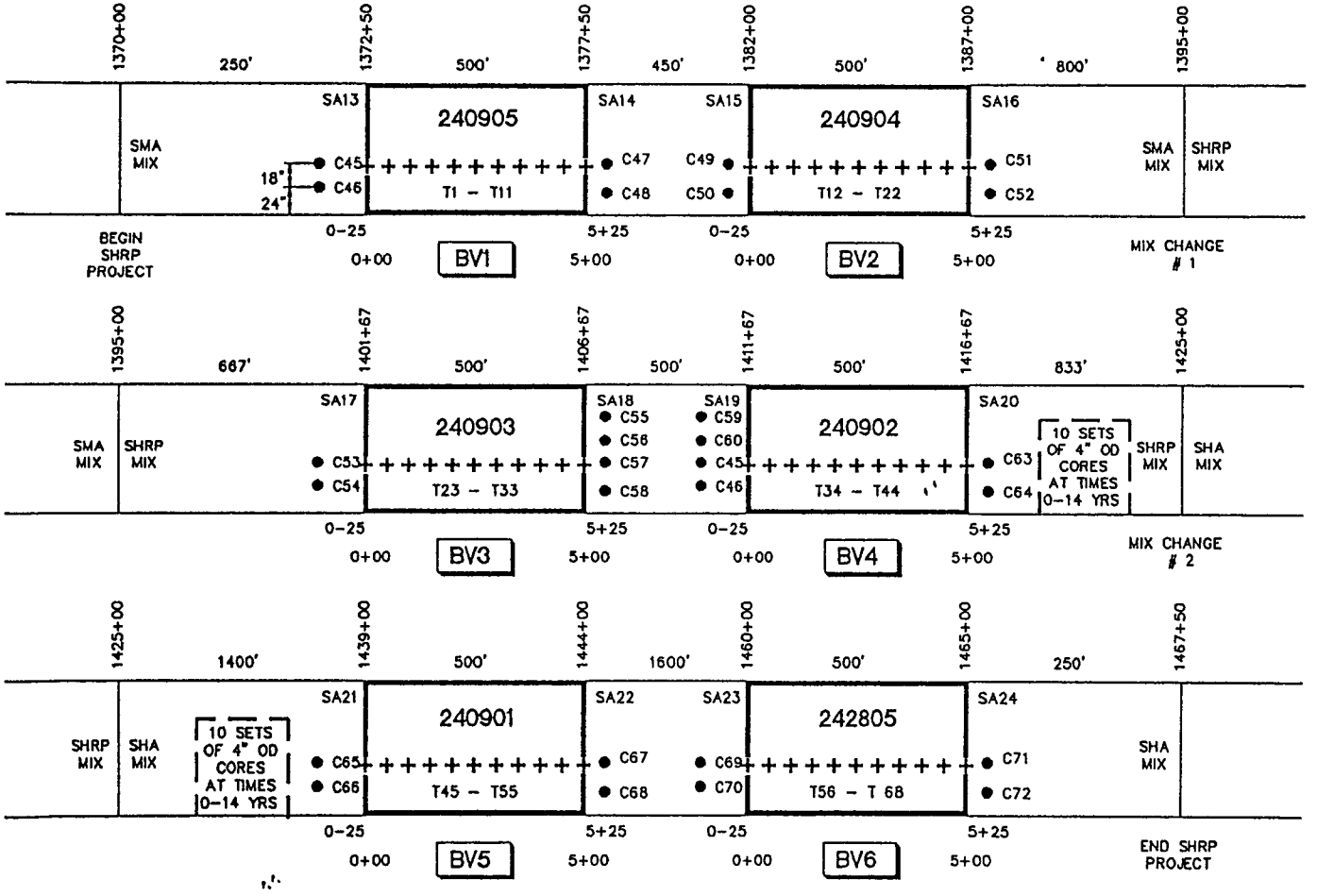
The Asphalt Institute (as represented by Mr. Jerry Huber) has agreed to supply the gyratory compactor and operator to produce the 6" diameter briquettes of SHRP mix which are to be tested for comparison with the mix design. These briquettes, and the cores of the SHRP mix which are to be tested by a laboratory yet to be named (by FHWA), are to be bubble wrapped, plastic wrapped, taped, and stored until instructions are received about shipment.

Distribution to:
I.J. Pecnik
R. Cominsky
M. Symons
A. Brigg
A. Rutka

415 LAWRENCE BELL DRIVE
UNIT #3
AMHERST, N.Y. 14221
TEL. (716) 632-0804
FAX (716) 632-4808

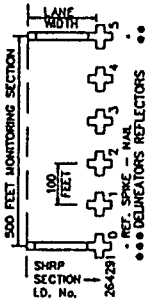
FHWA–LTPP SPS 9P MARYLAND SAMPLING PLAN
VERIFICATION OF SHRP ASPHALT SPECIFICATION AND MIX DESIGN

PAVEMENT MANAGEMENT SYSTEMS LIMITED



DURING AND POST CONSTRUCTION SAMPLING AND TESTING PLAN

TYPICAL SITE SIGNING & MARKING



ROAD TEST

● 4" OD CORE

\+ NUCLEAR DENSITY 11 TESTS AT 50' SPACING

BV3 BULK PLANT SAMPLE

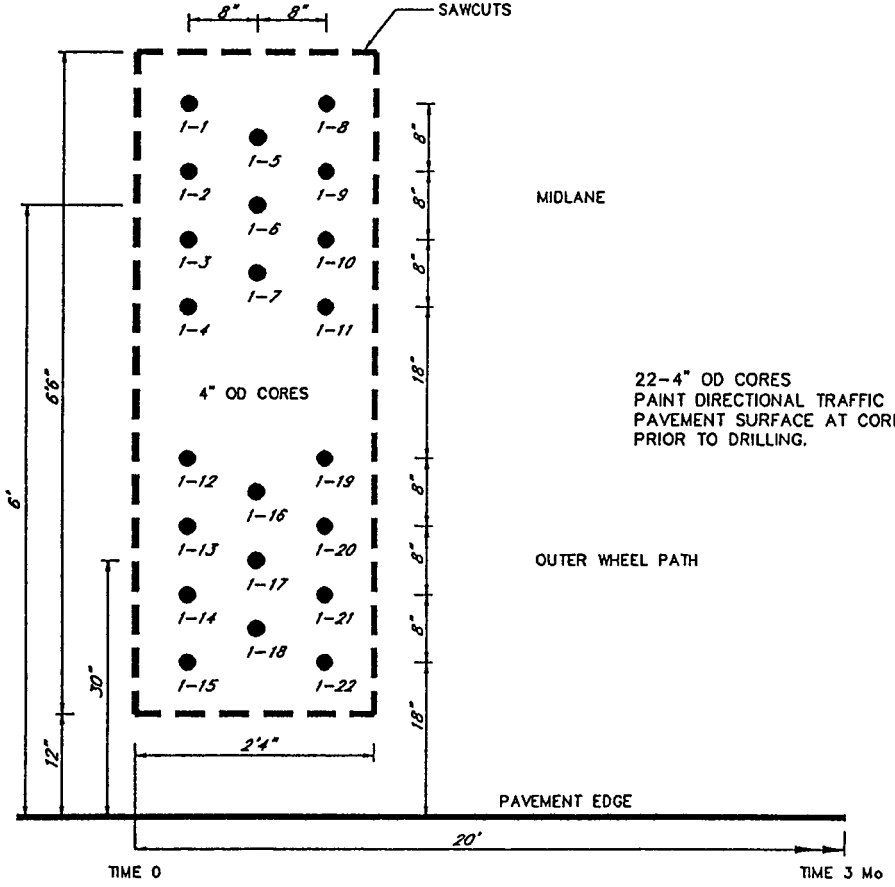
NOTE
SAMPLES FOR GPS OVERLAY TESTING TO BE OBTAINED DURING 2nd SCHEDULED SAMPLING OF SHA AND SHRP MIXES.

MD SHA SPS-9P
170 WB, FREDERICK, MD.

PLOTDATE: SEPT 16/93	FHWA SPS-9P TEST SECTIONS ONLY DIMENSIONAL DETAILS ONLY DRAWING NOT TO SCALE
SPS-9P-1	

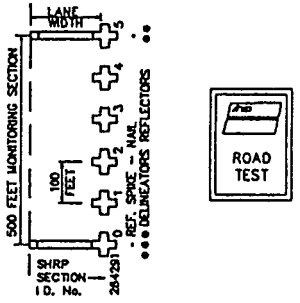
FHWA–LTPP SPS 9P MARYLAND SAMPLING PLAN
VERIFICATION OF SHRP ASPHALT SPECIFICATION AND MIX DESIGN

PAVEMENT MANAGEMENT SYSTEMS LIMITED



TYPICAL CORING LAYOUT FOR SHA AND SHRP
MIXES AT TIMES 0,3,6,9,12,18,24,48,96 and 168 MONTHS

TYPICAL SITE SIGNING & MARKING



MD SHA SPS-9P
170 WB, FREDERICK, MD.

PLOTDATE: SEPT 16/93	FHWA SPS-9P TEST SECTIONS ONLY DIMENSIONAL DETAILS ONLY DRAWING NOT TO SCALE
SPS-9P-2	

SPS-9P-2

TABLE
MD SHA SPS–9 Field and Laboratory Testing Plans
Asphalt Mixes for Overlays

Material Type and Properties	SHRP Test	SHRP Protocol	Number of Tests	Samples
NEW ASPHALT CONCRETE				
Nuclear Density Field Tests			78	T1–T66, SA13–SA24
Core Examination/Thickness	AC01	P01	28	C45–C72
Bulk Specific Gravity	AC02	P02	6	C45, C52, C53, C64, C65, C72
Maximum Specific Gravity	AC03	P03	6	BV1–BV6
Asphalt Content (Extraction)	AC04	P04	6	BV1–BV6
Moisture Susceptibility	AC05	P05	6	BV1–BV6
Creep Compliance	AC06	P06	6	BV1–BV6
Resilient Modulus	AC07	P07	3	C47–C50, C57–C60, C67–C70
Tensile Strength	AC07	P07	9	(from Mr)
Superpave Tests on SHRP mix (Testing Laboratory to be assigned)				C54–C56, C61–C63, BV3*, BV4*
AGGREGATES (Extracted from NEW Asphalt Concrete)				
Bulk Specific Gravity				
Coarse Aggregate	AG01	P11	6	BV1–BV6
Fine Aggregate	AG02	P12	6	BV1–BV6
Type and Classification	AG03	P13	6	BV1–BV6
Gradation of Aggregate	AG04	P14	6	BV1–BV6
NAA Test for Fine Aggregate Particle Shape	AG05	P14A	6	BV1–BV6
Coarse Aggregate Particle Shape	AG06	P14B	6	BV1–BV6
ASPHALT CEMENT (Recovered from NEW Asphalt Concrete)				
Penetration at 50F, 77F, 90F	AE02	P22	6	BV1–BV6
Specific Gravity	AE03	P23	6	BV1–BV6
Viscosity at 77F	AE04	P24	6	BV1–BV6
Viscosity at 140F, 275F	AE05	P25	6	BV1–BV6

* 6" diameter briquettes in gyratory compactor at mix design compaction temperature, from each bulk sample BV3 and BV4
8 – at mix design gyrations
6 – at gyrations to target of 7+/– 1% air voids
6 – at gyrations to target of 10 +/– 1% air voids

DRAFT 07/28/92

SPS-9 Materials Sampling and Testing During Construction
I-70 WB, Frederick, Maryland

A. **Sampling for Plant Control** is based on one day or partial day mix production. Samples will be taken each day twice in the morning and twice in the afternoon. Samples will consist of one five (5) gallon can of materials plus sufficient material to carry out the following tests:

Level 1 (ALL MIXES) — Materials Proportioning
- o Extraction of Asphalt Cement (State specified solvent)
- o Aggregate Gradation
- o Rice test for Maximum S.G.

Levels 2 and 3 (SHRP MIX ONLY) — Mixture Volumetric and Plant Mixture Engineering Properties

a 8x6" diameter specimen at number of design gyrations and compaction temperature (for comparing with design volumetric properties and for simple shear and indirect tensile creep testing)

b 6x6" diameter specimen at gyrations to target air voids of 7± 1% from one a.m. sample and from one p.m. sample. 6x6" diameter specimen at gyrations to target air voids of 10± 1% from the other a.m. sample and from the other p.m. sample

Note: After manufacture all specimen are to be bubble wrapped, plastic wrapped, and taped for shipment to the testing laboratory (not yet designated).

B. **Material Sampling for SHRP Asphalt Research Program**

The following bulk samples are to be obtained at the plant:

1. 11 - 5 gallon pails of asphalt cement
2. 2 - 5 gallon pails for fillers (mineral, cellulose)
3. 9 - 5 gallon pails for asphalt mixes (SHA, SHRP, SMA)
4. 6 - 55 gallon drums for combined aggregates (SHA, SHRP, SMA)

The 5 gallon pails and 55 gallon drum containers will be supplied by the SHRP Asphalt Research Program complete with labels. The samples (and empty containers if any) are to be returned to:

Mr. James Moulthrop
SHRP Asphalt Research Program
The University of Texas at Austin
8701 North Mopac Blvd., Suite 450
Austin, TEXAS 78759

Telephone (512)471-8585
Fax (512)471-0909

C. **Pavement Sampling and Testing During Construction** (SHRP and SHA Mixes)

Nuclear Density tests on the completed overlay will by conducted in the wheelpath at 50' intervals within the monitoring section. Density tests should also be taken at core locations outside of the monitoring section just after compaction and before cores are obtained. Eight 6" diameter cores are to be obtained before the section is opened to traffic. (4"OD CORES MAY BE SUBSTITUTED)

Two of these cores are to be used to determine bulk S.G., Maximum S.G., A.C. content, ~~and binder properties~~. The other 6 cores are to be wrapped in plastic, bubble wrap and taped before shipping to the testing laboratory, together with bulk samples of SHRP and SHA mixes for determination of binder properties. (to be assigned by FHWA)

are to be determined from uncompacted loose mix.

D. **Post Construction Sampling and Testing**

Immediately after construction and at 9 subsequent times over the next 14 years, 22x4" O.D. cores of the overlay shall be obtained. Half of these 22 cores are from the outer wheel track, the other half from mid lane. The samples are obtained at time 0, 3, 6, 9, 12 and 18 months, 2, 4, 8, and 14 years.

Details of locations for obtaining the cores, and tests on binder and mix properties are still to be determined.

TABLE
MD SHA SPS-9 Field and Laboratory Testing Plans
Asphalt Mixes for Overlays

Material Type and Properties	SHRP Test	SHRP Protocol	Number of Tests	Samples
NEW ASPHALT CONCRETE				
Nuclear Density Field Tests			78	T1-T66, SA13-SA24
Core Examination/Thickness	AC01	P01	28	C45-C72
Bulk Specific Gravity	AC02	P02	6	C45, C52, C53, C64, C65, C72
Maximum Specific Gravity	AC03	P03	6	BV1-BV6
Asphalt Content (Extraction)	AC04	P04	6	BV1-BV6
Moisture Susceptibility	AC05	P05	6	BV1-BV6
Creep Compliance	AC06	P06	6	BV1-BV6
Resilient Modulus	AC07	P07	3	C47-C50, C57-C60, C67-C70
Tensile Strength	AC07	P07	9	(from Mr)
Superpave Tests on SHRP mix (Testing Laboratory to be assigned)				C54-C56, C61-C63, BV3*, BV4*
AGGREGATES (Extracted from NEW Asphalt Concrete)				
Bulk Specific Gravity				
Coarse Aggregate	AG01	P11	6	BV1-BV6
Fine Aggregate	AG02	P12	6	BV1-BV6
Type and Classification	AG03	P13	6	BV1-BV6
Gradation of Aggregate	AG04	P14	6	BV1-BV6
NAA Test for Fine Aggregate Particle Shape	AG05	P14A	6	BV1-BV6
Coarse Aggregate Particle Shape	AG06	P14B	6	BV1-BV6
ASPHALT CEMENT (Recovered from NEW Asphalt Concrete)				
Penetration at 50F, 77F, 90F	AE02	P22	6	BV1-BV6
Specific Gravity -	AE03	P23	6	BV1-BV6
Viscosity at 77F	AE04	P24	6	BV1-BV6
Viscosity at 140F, 275F	AE05	P25	6	BV1-BV6

* 6" diameter briquettes in gyratory compactor at mix design compaction temperature, from each bulk sample BV3 and BV4
8 – at mix design gyrations
6 – at gyrations to target of 7+/– 1% air voids
6 – at gyrations to target of 10 +/– 1% air voids

TABLE 1
SUMMARY OF CONSTRUCTION DATA – SURFACE COURSE

SECTION	MIX	CONST MIX	AVG TIME TO UNLOAD (MIN)	PAVING TIME (MIN)			MIX TEMP (F)			AIR TEMP	NOMINAL THICK (IN.)	PAVEMENT WIDTH	O/S (FT.)	QC MEASUREMENTS		
				AT 0+00	AT 5+00	TIME	PLANT	ROAD	LAY–DOWN					PCF	% DENSITY	PROF. (IN.)
240905	SMA	Oct. 05	38	11:44 AM	11:59 AM	15	300	300	263	58	2.2	12.0	0.4R	152.4	94.8	2
240904	SMA	Oct. 05	36	12:10 PM	12:31 PM	21	300	318	277	58	2.2	12.0	0.2L	153.4	95.5	12
240903	SHRP	Oct. 05	29	3:04 PM	3:21 PM	16	300	318	274	65	2.2	12.5	0.5R	152.8	99.0	4
240902	SHRP	Oct. 05	28	3:38 PM	4.03 PM	25	300	308	282	64	2.2	12.4	0.4R	151.7	98.2	1
240901	SHA	Oct. 06	35	10:20 AM	10:47 AM	27	310	319	288	55	2.2	12.0	0	151.5	97.0	1
242805	SHA	Oct. 06	49	12:11 PM	12:21 PM	10	310	304	282	55	2.2	12.0	0	149.2	95.6	2

TABLE 2
HOT MIX DESIGNS AND PLANT REPORTS – SURFACE COURSE
(TOTAL PERCENT PASSING EACH SIEVE)

	SMA MIX					SHRP MIX					SHA MIX			
SIEVE SIZE	JMF	JOB MIX TOLERANCE		PLANT RPT 109	110	JMF	JOB MIX TOLERANCE		PLANT RPT 111	112	JMF	JOB MIX TOLERANCE		PLANT 113
1	100	100		100	100									
3/4	100	100		99	98	100	100	100	100	100	100	100	100	100
1/2	81	76	86	80	80	98 2	91 2	100	98	99	97	90	100	99
3/8	67	58	66	63	62	89.6	82 6	96 6	91	92	86	79	93	91
#4	28	24	32	27	28	56.7	49.7	63 7	59	54	50	43	57	50
#8	15	11.3	19.3	14	16	35.8	31.8	39 8	36	34	33	29	37	31
#16	12	7.6	15.6	11	13	25 4	21.4	29 4	23	23	23	19	27	21
#30	11 2	8.2	14.2	11	13	17.8	13 8	21.8	16	16	15	11	19	15
#50	10 9	7.9	13 9	10	12	10.7	6.7	14.7	11	11	8	4	12	10
#100	10 2	7.2	13 2	10	11	7 4	3.4	11.4	8	8	6	2	10	8
#200	9 4	7.4	11.4	7 5	8 8	6.1	4.1	8.1	6 5	6.4	5.1	3.1	7.1	6.2
AC%	6 00	5.4	6.2	5 76		5.4	5 0	5 8	6.11		5.1	4.7	5.5	5.56
ASPHALT CONTENT	6.00													
VESTOPLAST @ 7%	0 42													
AC 20	5 58													
MARSHALL DESIGN														
STABILITY	1775													
FLOW VALUE (0.01 IN.)	11													
AIR VOIDS %						16								
VMA %						74								
VFA %														
MAX SG	2 570			2 573		2.491			2.474		2.501			2 489
ANTI–STRIP														
ACRA – 600 L											0.2			

TABLE 3
PAVEMENT DENSITY DATA
TEST SECTION 24 09 05 – SMA MIX

STATIONS		CORE		NUCLEAR DENSITY DATA				CORE DATA			
						TEST SECTION AVG.					% DENSITY
CONSTRUCTION	SHRP	SAMPLE	OFFSET	PCF	% DENSITY	PCF	% DENSITY	SP. GR.	AVG. S.G.	MAX. S.G.	AVG.
								2.495		2.573	
1372+25	–0–25	C45	42"	151.6	94.4						
	–0–25	C46	24"	155.0	96.6	153.3	95.5	2.478	2.486		96.6
1372+50	0+00		32"	153.3	95.5						
	+50		32"	155.4	96.7						
	1+00		32"	151.7	94.4						
	+50		32"	151.4	94.2						
	2+00		32"	150.5	93.7						
	+50		32"	150.7	93.8						
	3+00		32"	153.4	95.5						
	+50		32"	150 7	93.8						
	4+00		32"	151.3	94.2						
	+50		32"	155.9	97.1						
1377+50	5+00		32"	151.8	94.5	152.4	94.8				
								2.478			
1377+75	5+25	C47	42"	152.5	94.9						
	5+25	C48	24"	152.4	94.7	152.4	94.8	2.428	2.448		95.1
										Avg.	95.8
STATE Q.C. CORES											
								2.516			
1370+05		1	3'RT					2.492	2.504		97.3
1371+95		2	2.5'LT					2.503			
1379+00		3	6'RT					2.485	2.494		96.9
1393+50		4	4'RT							Avg.	97.1

TABLE 4
PAVEMENT DENSITY DATA
TEST SECTION 24 09 04 – SMA MIX

STATIONS		CORE		NUCLEAR DENSITY DATA				CORE DATA			
						TEST SECTION AVG.					% DENSITY
CONSTRUCTION	SHRP	SAMPLE	OFFSET	PCF	% DENSITY	PCF	% DENSITY	SP. GR.	AVG. S.G.	MAX. S.G.	AVG.
1381+75	–0–25	C49	42"	155.0	96.5			2.468		2.573	
	–0–25	C50	24"	148.5	92.5	151.7	94.5	2.451	2.459		95.6
1382+00	0+00		32"	151.8	94.5						
	+50		32"	151.1	94.1						
	1+00		32"	151.8	94.6						
	+50		32"	153.7	95.7						
	2+00		32"	154.7	96.3						
	+50		32"	156.7	97.6						
	3+00		32"	152.1	94.7						
	+50		32"	154.6	96.3						
	4+00		32"	155.5	96 8						
	+50		32"	153.3	95.5						
1387+00	5+00		32"	151.7	94.5	153.4	95.5				
1387+25	5+25	C51	42"	149.8	93.3			2.443			
	5+25	C52	24"	150.2	93.6	150.0	93.4	2.437	2.440		94 8
										Avg.	95.2

TABLE 5
PAVEMENT DENSITY DATA
TEST SECTION 24 09 03 – SHRP MIX

STATIONS		CORE		NUCLEAR DENSITY DATA				CORE DATA			
						TEST SECTION AVG.					% DENSITY
CONSTRUCTION	SHRP	SAMPLE	OFFSET	PCF	% DENSITY	PCF	% DENSITY	SP. GR.	AVG. S.G.	MAX. S.G.	AVG.
1401+42	–0–25	C53	42"	152.1	98.5			2.407		2.474	
	–0–25	C54	24"	153.4	99.3	152.7	98.9	2.396	2.401		97.0
1401+67	0+00		32"	152.2	98.6						
	+50		32"	153.5	99.4						
	1+00		32"	150.7	97.6						
	+50		32"	152.8	98.9						
	2+00		32"	152.3	98.7						
	+50		32"	151.1	97.9						
	3+00		32"	155.3	100.6						
	+50		32"	155.8	100.9						
	4+00		32"	153.5	99.4						
1406+17	+50		32"	151.2	97.9	152.8	99.0				
1406+92	5+25	C55	78"	149.6	96.9			2.388			
		C56	60"	149.8	97.0			2.372			
		C57	42"	152.9	99.0			2.382			
		C58	24"	149.2	96.6	150.4	97.4	2.372	2.378		96.1
										Avg.	96.5
State Q.C. Cores											
1401+12		1–1	3'LT					2.376			
1407+15		1–2	2'RT					2.367	2.372		95.9
1417+35		1–3	4'SRT					2.392			
1422+30		1–4	2.1'LT					2.381	2.386		96.4
(Also Includes "240902).										Avg.	96.2

TABLE 6
PAVEMENT DENSITY DATA
TEST SECTION 24 09 02 – SHRP MIX

STATIONS		CORE		NUCLEAR DENSITY DATA				CORE DATA			
						TEST SECTION AVG.					% DENSITY
CONSTRUCTION	SHRP	SAMPLE	OFFSET	PCF	% DENSITY	PCF	% DENSITY	SP. GR.	AVG. S.G.	MAX. S.G.	AVG.
1411+42	–0–25	C59	78	154.0	99.8			2.403		2.474	
		C60	60	151.8	99.2			2.402			
		C61	42	153.1	99.2			2.391			
		C62	24	150.6	97.0	152.4	99.0	2.383	2.395		96.8
1411+67	0+00		32	153.1	100.4						
	+50		32	154.7	100.2						
	1+00		32	153.2	99.2						
	+50		32	152.0	98.5						
	2+00		32	150.0	97.2						
	+50		32	152.2	98.5						
	3+00		32	152.5	98.8						
	+50		32	148.9	96.5						
	4+00		32	153.0	99.0						
	+50		32	147.3	95.4						
	5+00		32	149.5	96.9	151.7	98.2				
1416+92	5+25	C63	42	149.9	97.0			2.374			
		C64	24	151.7	98.2	150.8	97.6	2.381	2.377		96.1
										Avg.	96.4
STATE QC CORES											
1401+12		1–1	3'LT					2.376			
1407+15		1–2	2'RT					2.367	2.372		95.9
1417+35		1–3	4'5'RT					2.392			
1422+30		1–4	2'1'LT					2.381	2.386		96.4
										Avg.	96.2

TABLE 7
PAVEMENT DENSITY DATA
TEST SECTION 24 09 01 – SHA MIX

STATIONS		CORE		NUCLEAR DENSITY DATA				CORE DATA			
						TEST SECTION AVG.					% DENSITY
CONSTRUCTION	SHRP	SAMPLE	OFFSET	PCF	% DENSITY	PCF	% DENSITY	SP. GR.	AVG. S.G.	MAX. S.G.	AVG.
										2.489	
1438+75	–0–25	C65	42	148 6	95.2			2.360			
		C66		151.7	97.2	150.1	96.2	2350	2.355		94.6
1439+00	1+00		32	153.2	98.1						
	+50		32	150.6	96.4						
	2+00		32	150.3	96.3						
	+50		32	151.9	97.3						
	3+00		32	153.2	98.2						
	+50		32	153.5	98.3						
	4+00		32	151.3	96.9						
	+50		32	149.7	95.9						
1444+00	5+00		32	149.9	96.0	151.5	97.0				
1444+25	5+25	C67	42	150.1	96.2			2.373			
		C68	24	152.2	97.5	151.1	96.8	2.383	2.378		95.5
										Avg.	95.0
SHA QC Cores											
1444+40		1	2.5RT					2.379			
1445+50		2	4.0LT					2.360	2.370		95.2
1448+72		3	4.5RT					2.371			
1455+50		4	3'RT					2.375	2.373		95.3
1466+19		5	4'5RT					2.389			
1468+06		6	2'LT					2.399	2.394		96.2
1470+70		7	2'LT					2.378			
1475+50		8	1.5LT					2.366	2.372		95.3
(also includes 242805)										Avg.	95.5

TABLE 8
PAVEMENT DENSITY DATA
TEST SECTION 24 28 05 – SHA MIX

STATIONS		CORE		NUCLEAR DENSITY DATA				CORE DATA			
						TEST SECTION AVG.					% DENSITY
CONSTRUCTION	SHRP	SAMPLE	OFFSET	PCF	% DENSITY	PCF	% DENSITY	SP. GR.	AVG. S.G.	MAX. S.G.	AVG.
										2.489	
1459+75	–0–25	69	42	151.7	97.1			2.381			
		70	24	147.1	94.2	149.4	95.6	2.350	2.365		95.0
1460+00	0+00		32	148.4	95.1						
	+50		32	152.4	97.6						
	1+00		32	146.2	93 2						
	+50		32	143.5	91.9						
	2+00		32	149.3	95.6						
	+50		32	151.6	97.3						
	3+00		32	148.5	95.2						
	+50		32	152.4	97.6						
	4+00		32	148.7	95.3						
	+50		32	151.1	96.8						
	5+00		32	149.7	95.9	149.2	95.6				
1465+25	5+25		42	152.0	97.3			2.378			
			24	153.0	98 0	152.5	97.6	2.381	2.379		95.6
										Avg.	95.3

TABLE 9
SUMMARY OF PAVEMENT DENSITY RESULTS FROM TABLES 2, 3, 4, 5, 6, 7

TEST SECTION	MIX	NUCLEAR DENSITIES		DENSITIES FROM END OF SECTION				SHA Q.C. CORES DENSITIES	
				NUCLEAR		CORES			
		PCF	%	PCF	%	PCF*	%	PCF*	%
240905	SMA	152.4	94.8	152.8	95.1	153.8	95.8	155.9	97.1
240904	SMA	153.4	95.5	150.8	93.9	152.8	95.2	155.9	97.1
240903	SHRP	152.8	99.0	151.5	98.1	149.0	96.5	148.5	96.2
240902	SHRP	151.7	98.2	151.6	98.3	149.0	96.5	148.5	96.2
240901	SHA	151.5	97.0	150.4	96.5	149.1	96.0	148.3	95.5
242805	SHA	149.2	95.6	150.9	96.6	148.0	95.3	148.3	95.5

* determined from maximum specific gravity.

TABLE 10
SAMPLES REQUIRED AND TAKEN

FOR REFERENCE LIBRARY				FOR SHA & SHRP TESTS		
MIX	MATERIAL	SAMPLE LOCATION	SAMPLE SIZE	PURPOSE	SAMPLE SIZE	REMARKS
SMA	HMAC	Truck	3–5 gal pails	Control & SHRP tests	100 #BV1 100#BV2	SHA to supply containers
SHRP	Courses & fine Aggregate combined	Conveyor	2–55 gal drums	SHA & SHRP tests	100#	SHA to supply containers
	HMAC	Truck	3–5 gal pails	SHA & SHRP tests	100#BV3	SHA to supply containers
					100#BV4	
				6" gyratory briq.	100#BV3	Bubble Wrap briquettes to be shipped to designated testing lab.
				8 @ Mix design 6@ 7 + 1% air V 6@ 10+ 1% air V	100#BV4	
SHA	Course & fine aggregate combined	Conveyor	2–55 gal drums	SHA & SHRP tests	100#	
	HMAC	Truck	3–5 gal drums	SHA & SHRP tests	100# BV 5 100#BV 6	
	Domestic fibre or vesto plast	Bag	1–5 gal pail			
	Mineral filler		1–5 gal pail			

LIST OF FIGURES

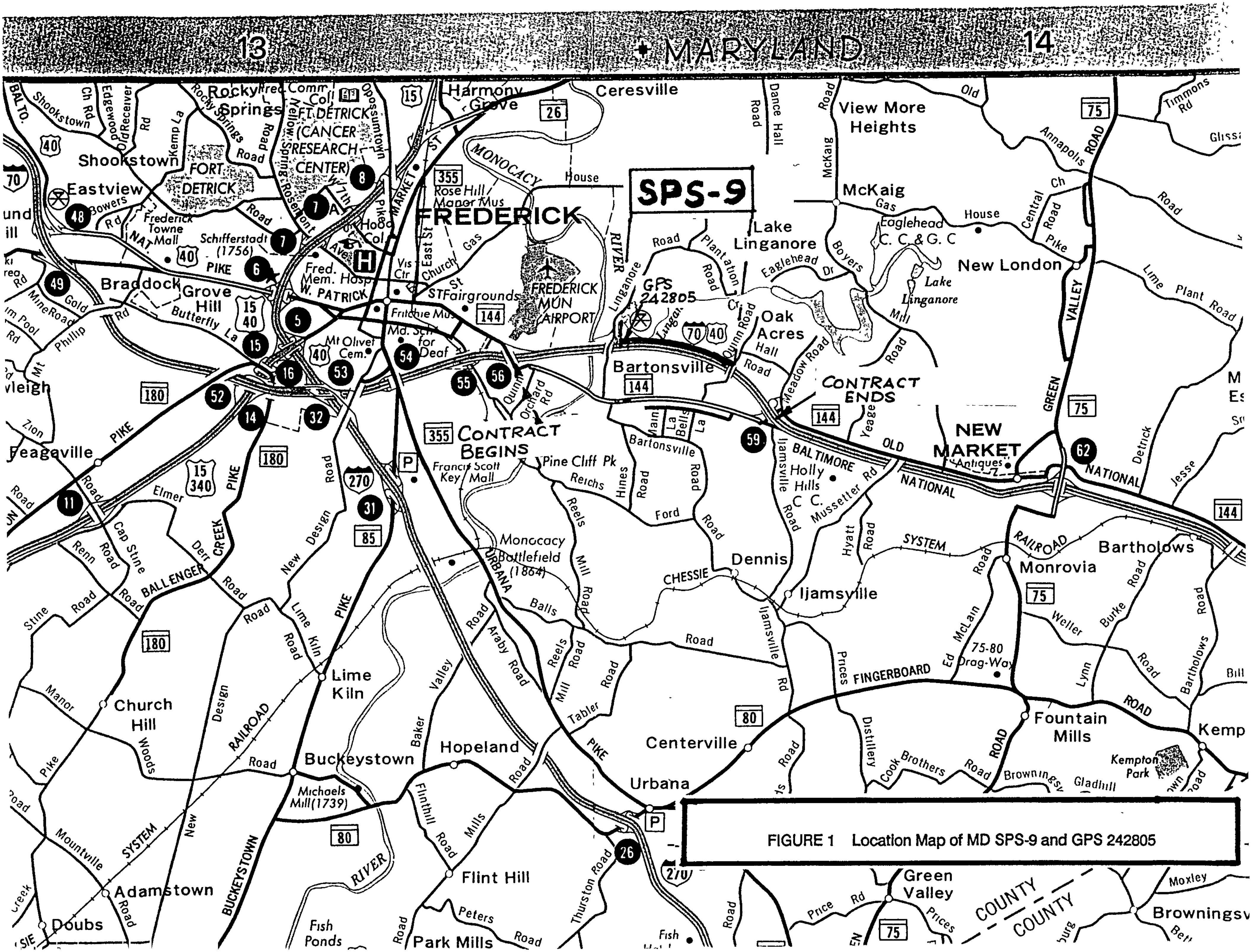


FIGURE 1 Location Map of MD SPS-9 and GPS 242805

Tentative

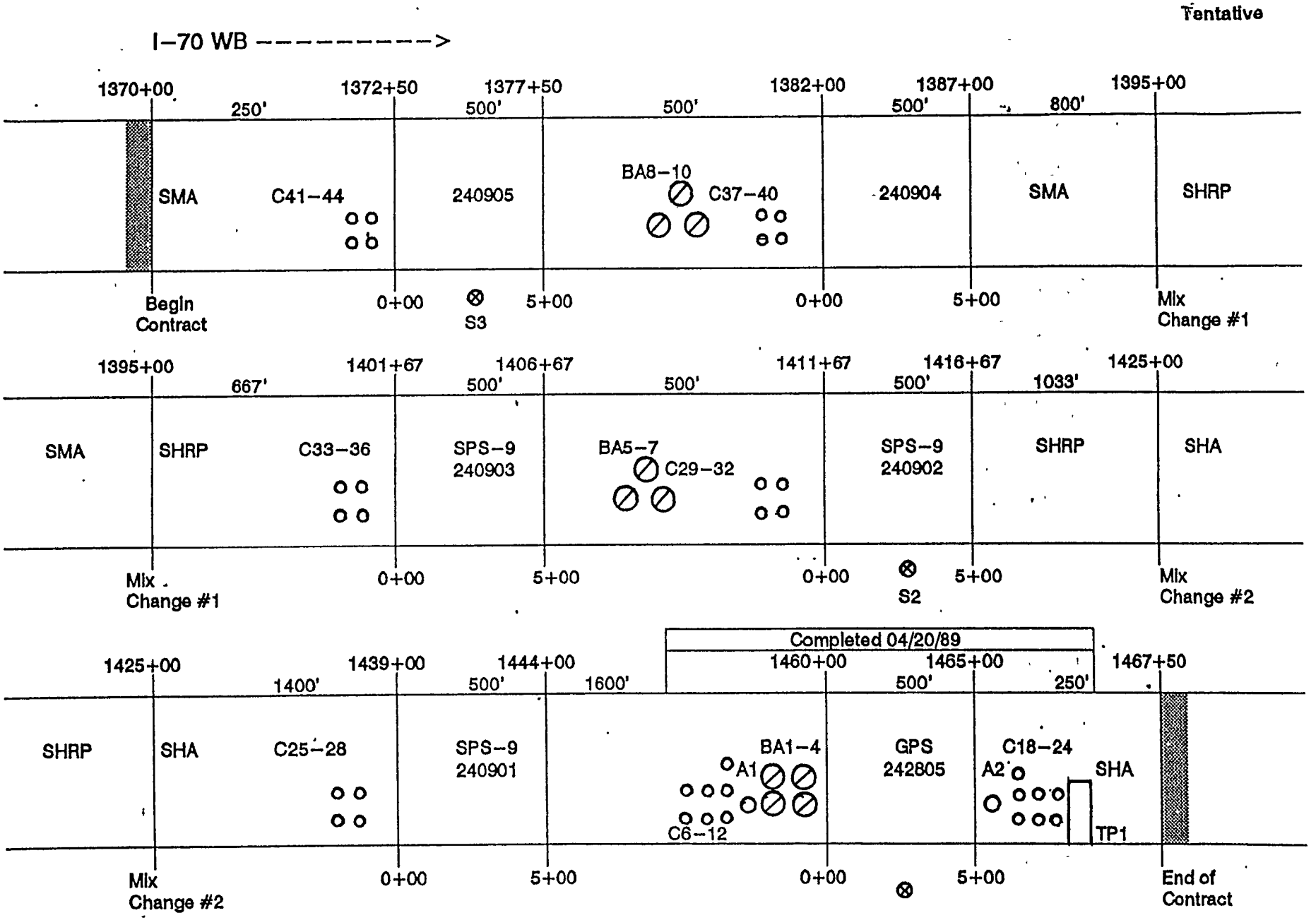


FIGURE 2

Pre–Construction Sampling Plan and Maryland SHA SPS–9 Pilot Layout

--------> I–70 WB to Exit 59

North Atlantic Regional Office
July 29, 1992

FIGURE 3 Typical Pavement Section - WBR

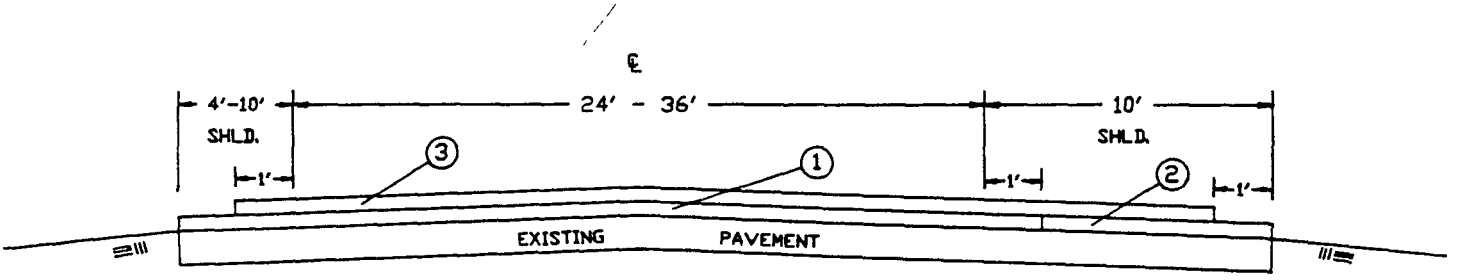
I-70 W.B.R.
TYPICAL SECTIONS

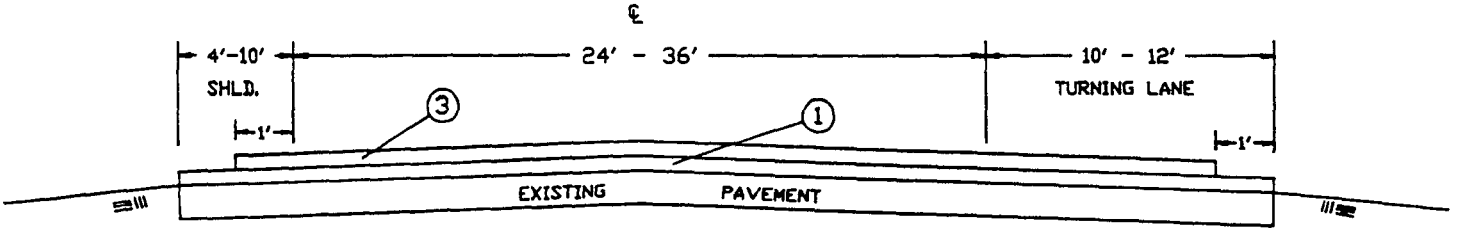
LEGEND

① PAVE WITH 1 1/2" BITUMINOUS CONCRETE SURFACE - BAND SC

② PAVE WITH 1 1/2" BITUMINOUS CONCRETE SURFACE FOR SHOULDERS - BAND SC

③ 3/4" PLANT MIXED SEAL (POLYMER MODIFIED)





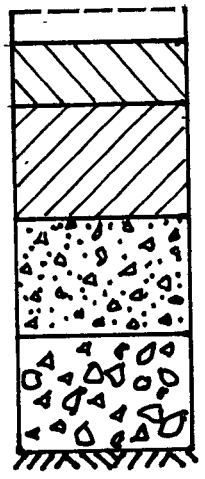
NORMAL SECTION

* IN NORMAL & SUPERELEVATED SECTIONS MATCH EXISTING CROSS SLOPES

NOT TO SCALE

FIGURE 4

TYPICAL PAVEMENT STRUCTURE PROFILE



1" OPEN GRADED MIX REMOVED*

3" HM SURFACE COURSE

6" HM BINDER COURSE

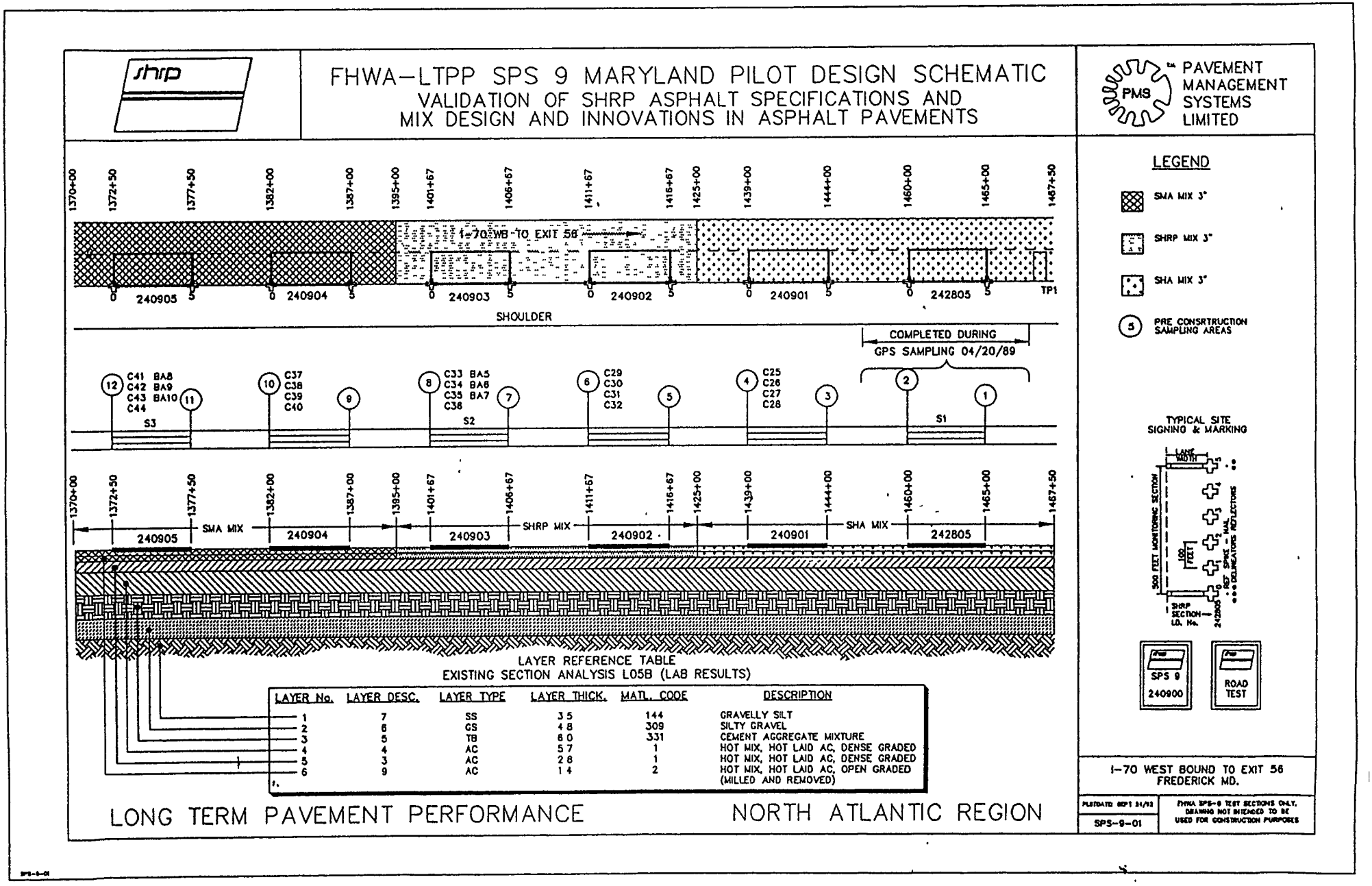
6" CEMENT TREATED BASE

6" CRUSHED STONE SUBBASE

SILT SUBGRADE

* MILLED OFF PRIOR TO CONSTRUCTION

FIGURE 5 Pilot Design Schematic - Layout Of Test Sections



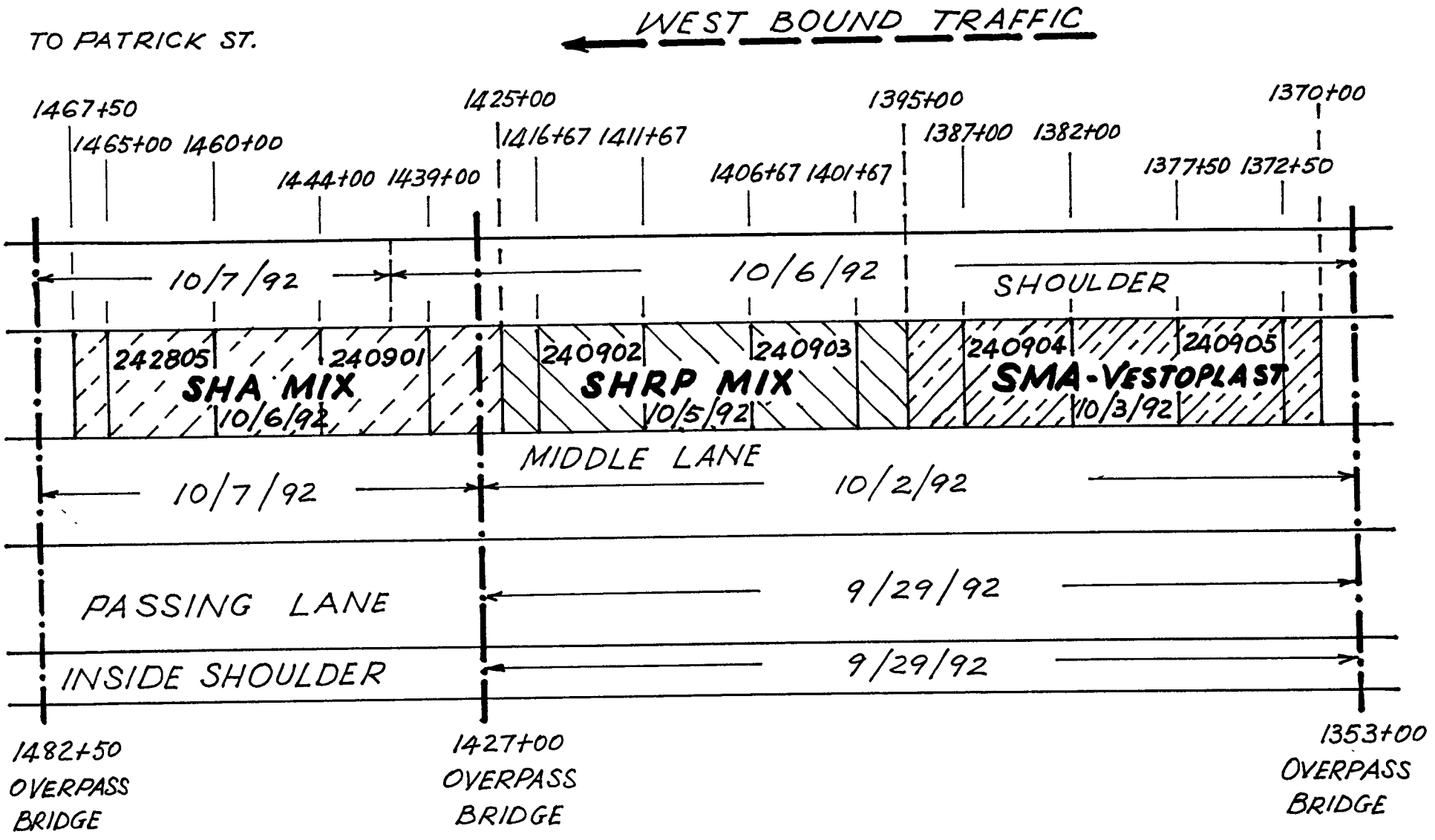


FIGURE 6 - OVERLAY DATES

FIGURE 7 During And Post Construction Sampling And Testing Plan

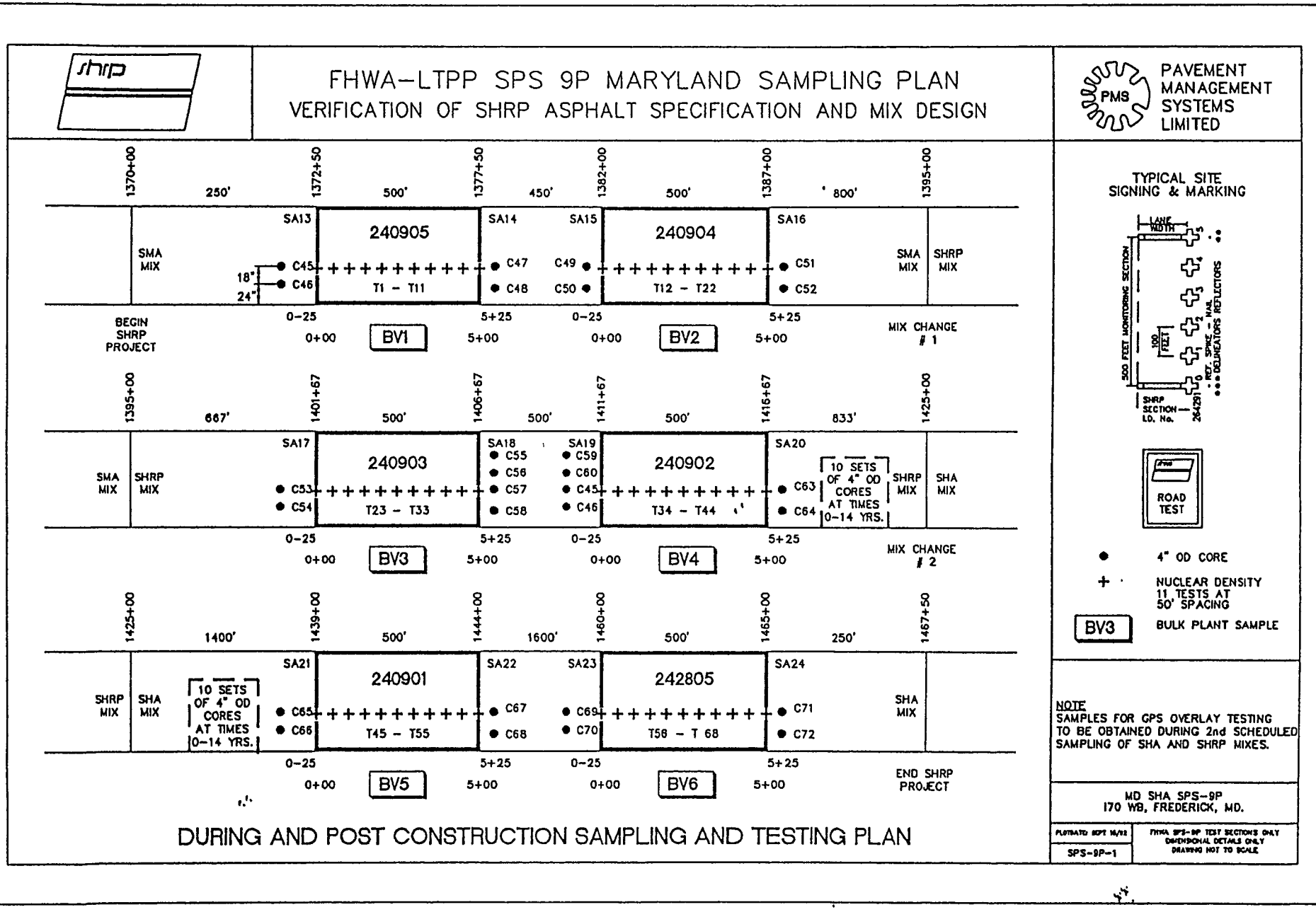
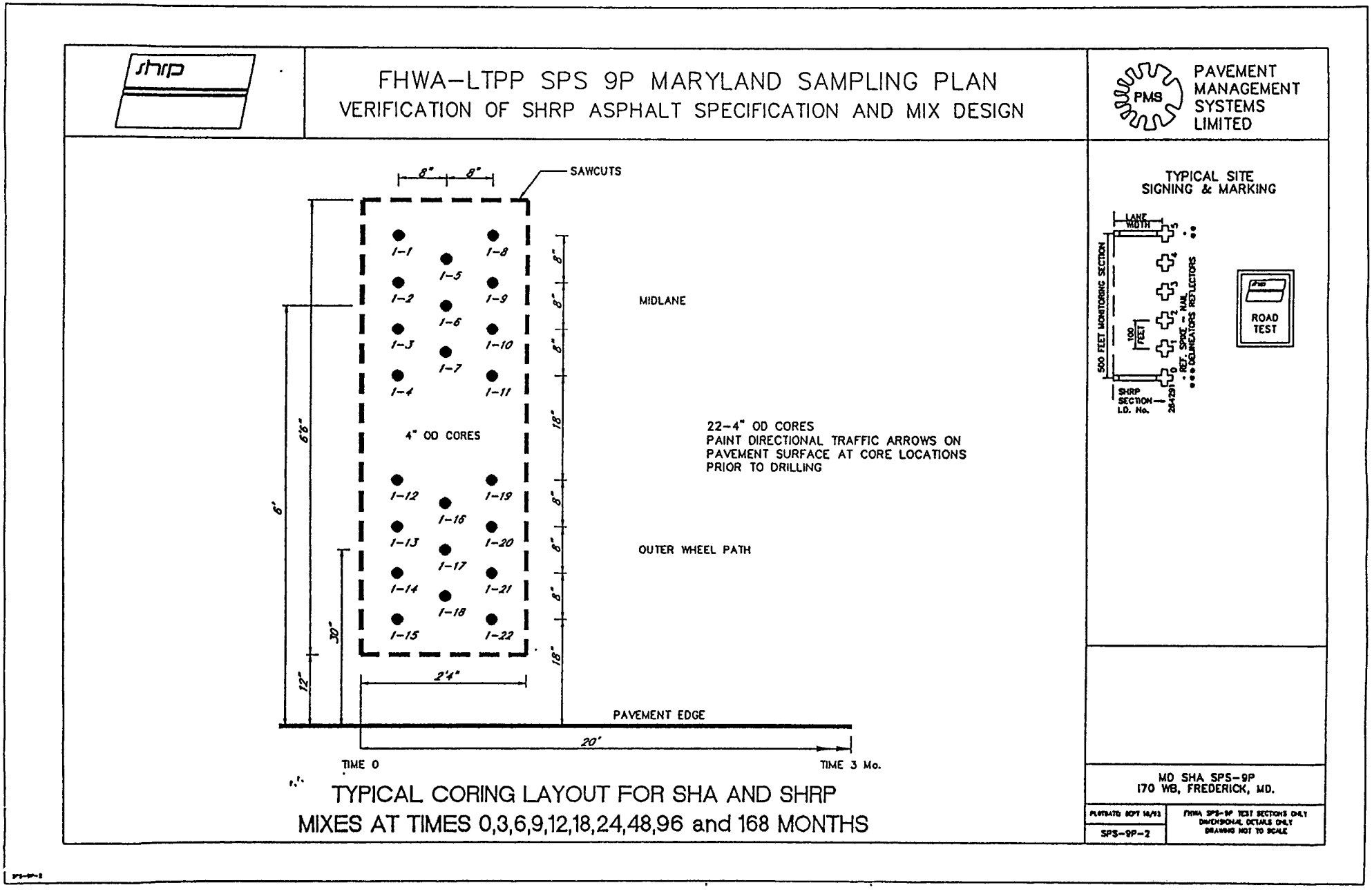


FIGURE 8 Typical Coring Layout For SHA And SHRP Mixes At Various Times After Construction



LIST OF PHOTOS

PHOTO 1 I-70 WB Milled Texture Worn Smooth Under Traffic

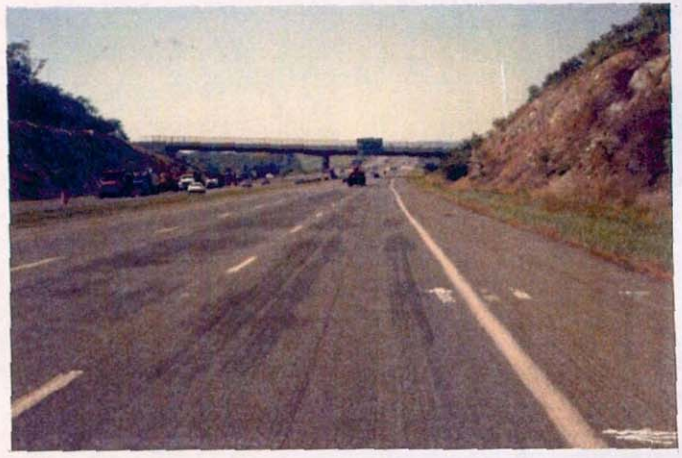


PHOTO 2 Dark Streaks Indicate Minimum Milling

PHOTO 3 Good Surface To Bond Overlay

PHOTO 4 Milling A 2nd Cut To Below Delaminations

PHOTO 5 SPS-9 Paving Train Includes Materials Transfer Vehicle

PHOTO 6 I-70 WB - Flushing At Start Of Project Paving Discloses Plant Hopper that should have been closed (Wrong Gradation)

PHOTO 7 SPS-9 Placing SMA With Vestoplast, 240905

PHOTO 8 I-70 WB Gap In Edge Of SMA Mat At Sta 1+50, 240904, Being Filled By Hand

PHOTO 9 SPS-9 SHRP Mix Shows Pronounced Depression After First Pass Of Breakdown Roller *Rollers Kept Back.*

PHOTO 10 SPS-9 SHRP MIX Shows Some Fat Spots

PHOTO 11 SPS-9 SHA Mix Resembles SMA

PHOTO 12 *SPS-9 SHA Mix With Deep Markings After* Breakdown. Roller Kept Back.

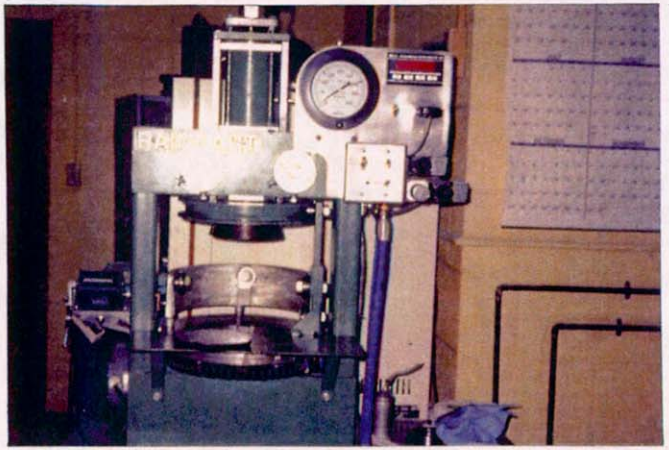


PHOTO 13 Gyratory Compactor Used At Plant To Make 6" Dia. Briquettes From Plant Mix.

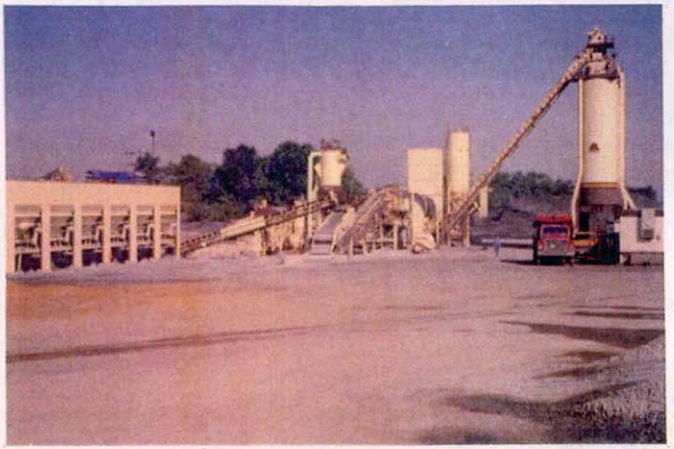


PHOTO 14 Genstar Astec Drum Mix Plant, Frederick, MD

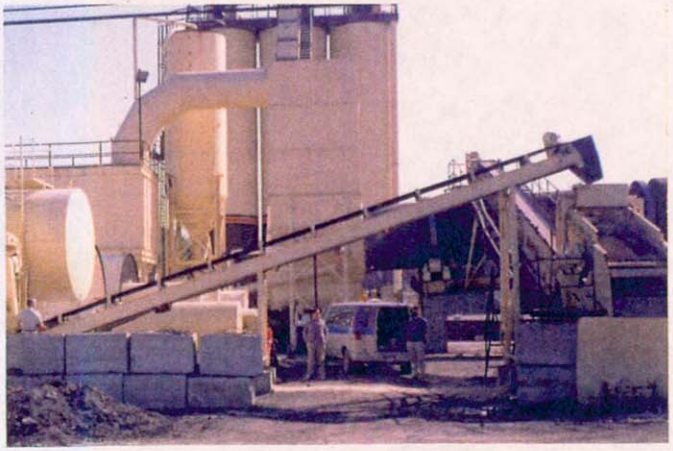


PHOTO 15 Vestoplast SMA Additive Loaded Via Recycling Ring In Drum Mix Plant

PHOTO 16 Nuclear Density Testing For Construction Quality Control, And Rod And Level Measurements For Layer Thickness.