FEDERAL HIGHWAY ADMINISTRATION

Long Term Pavement Performance (LTPP)
Specific Pavement Studies

MONTANA SPS-8

Construction Report on Site 300800
Montana Department of Transportation

FINAL

Prepared by:

Western Region Contractor
Nichols Consulting Engineers, Chtd.

August 1996

Table of Contents

List of Tables

List of Figures

ABSTRACT

Environmental conditions alone or interacting with pavement materials may generate major distresses in pavements. The impact of the natural environment on long term performance of pavements has been difficult to quantify as have the interactions between environmental stresses and load stresses. The Montana SPS-8 project combines two test sections with varying asphalt and granular base thicknesses in a low traffic environment with a weather station to continuously monitor environmental conditions. Over time, the effect of the environment on the performance of these sections will be monitored.

The Montana SPS-8 project was constructed on State Route 273, in the vicinity of Anaconda, Montana. Construction began on April 6th, 1994 and was completed on June 29th, 1994. Details of construction are presented along with minor deviations and problems during construction which may affect the pavement performance.

I. INTRODUCTION

The Strategic Highway Research Program (SHRP) Specific Pavement Studies experiment, SPS-8, was designed as a "Study of Environmental Effects in the Absence of Heavy Loads." Environmental conditions alone or interacting with pavement materials may generate major distresses in pavements. Frost heave, soil swell and transverse low temperature cracks are common environmentally related distresses which have little or no traffic related component. The objective of the SPS-8 experiment is to measure the deterioration in pavement performance in the absence of heavy loads. This report covers the construction of the SPS-8 project in Montana in 1994.

II. SPS-8 PROJECT DESCRIPTION

The Montana SPS-8 project was constructed in Deer Lodge County on State Route 273 in the vicinity of Anaconda, as shown in Figure 1. Two sections, both 600 feet long (500' for monitoring), were constructed with varying asphalt and base thicknesses, as shown in Figure 2. The sections are in the northbound lane starting at milepost 0.66. The cross-sections for the sections are shown in Figures 3 and 4.

The terrain in the area consists of scattered brush and trees and is slightly rolling. The site is located on a silty-sand material. The site has a longitude of 112°73' and latitude of 46°38'. The elevation is 4200'. The test sections are located on a -1% grade from beginning to end and are horizontally straight. A 50' taper was introduced at the beginning of the sections to allow a change of materials from the State Standard design to the SHRP design. Between sections, a 100' taper was used, and at the end, a 50' taper back to the State Standard design.

The annual average daily traffic in two directions for this section of roadway was 660 in 1994, with 5% heavy trucks and combinations. For a design period of 20-years, the total design 18k Equivalent Single Axle Load (ESAL) applications in the design lane is 41,683.

Based on existing climatic data, the maximum air temperature for this area is 99°F, which can be translated to a maximum pavement temperature of 131°F. The minimum air temperature is minus 47°F (-47°F).

This site is rated as a moderately active site due to frost heave. It falls in the dry-freeze SHRP environmental zone, and in the coarse grained subgrade soil category. Following construction of these test sections, a weather station was installed at the site to monitor the environmental changes throughout the life of the pavement.

The contractor for this project was Gilman Construction from Butte, Montana. The project engineer for Montana Department of Transportation (MDOT) was Jay O'Brien and the MDOT fill inspector was Bill Shegina. Personnel present for LTPP monitoring were Tim Sauer, representing MDOT, and Doug Frith and Bob Szrot representing the Western Region.

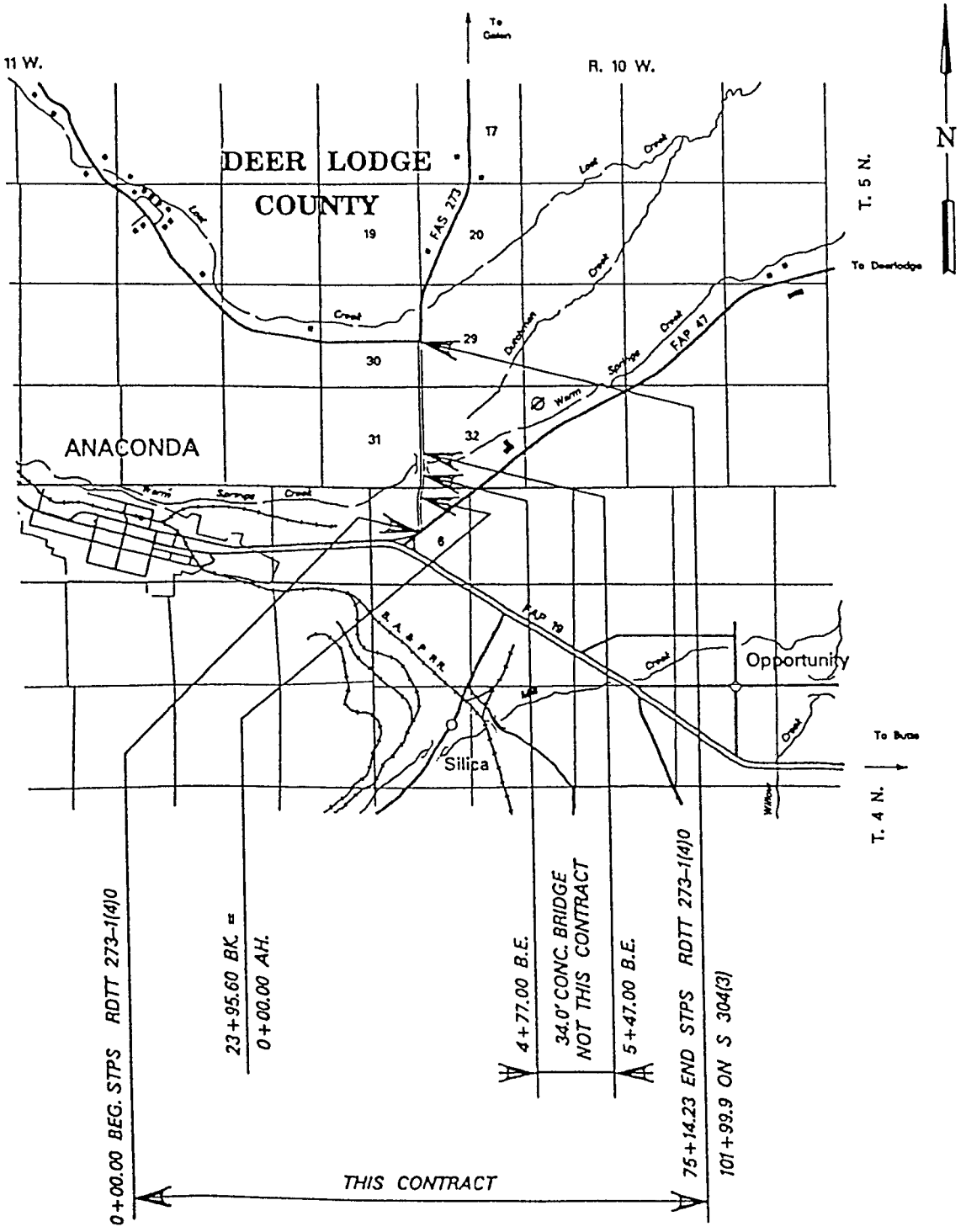


Figure 1. Montana SPS-8 project layout.

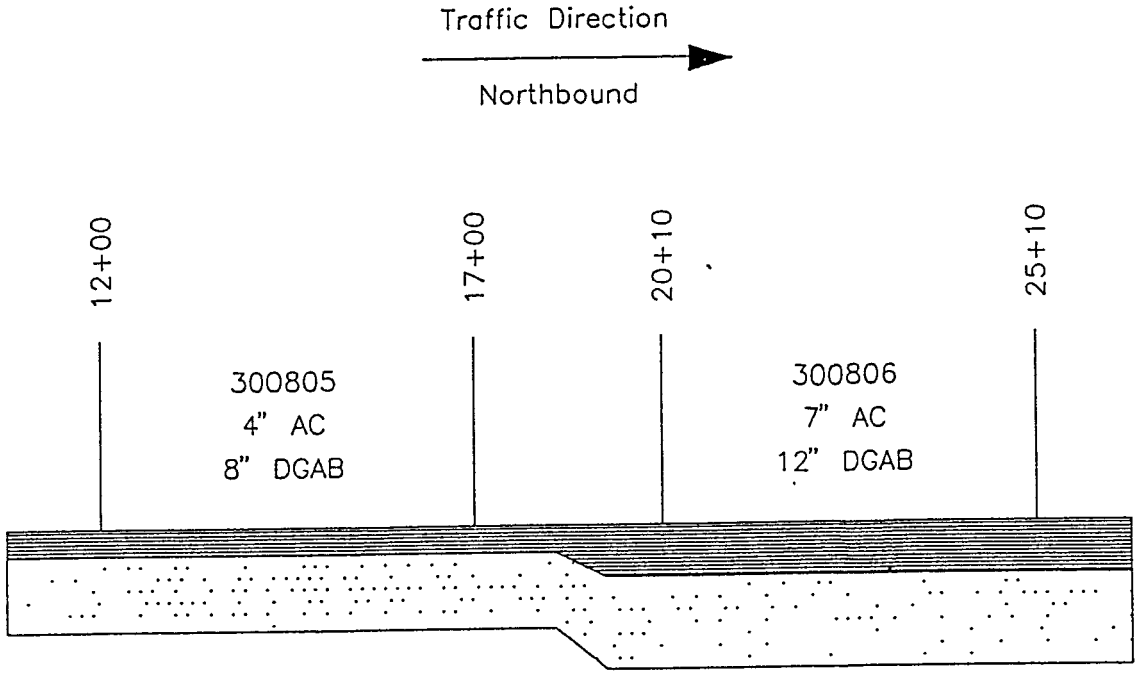


Figure 2. Layout of experimental test sections, Montana SPS-8 project, RS 273.

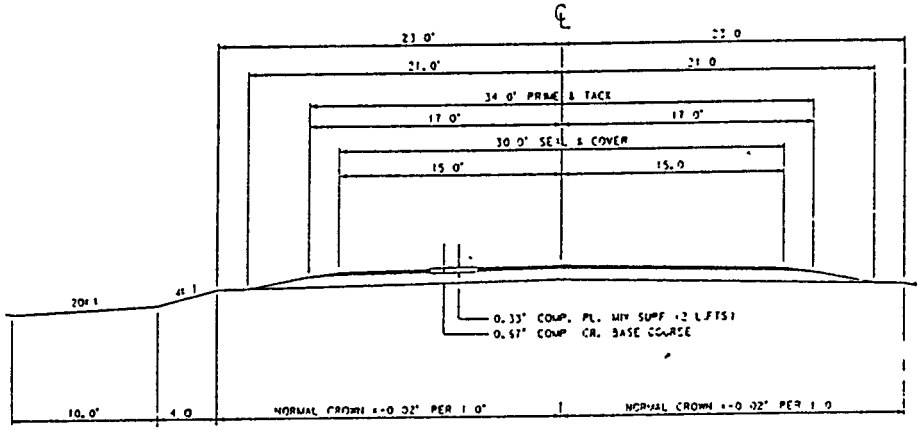


Figure 3. Section 300805 cross-section.

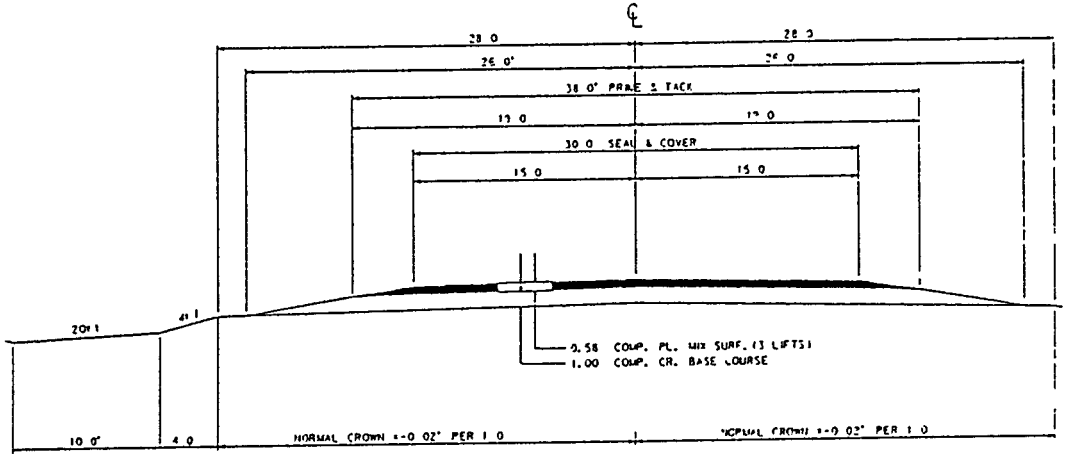


Figure 4. Section 300806 cross-section.

III. CONSTRUCTION

The construction portion of this report is divided into three sections; Subgrade, Dense Graded Aggregate Base and Asphalt Concrete. Each section is then further divided into Construction Procedures, Materials and QA Tests.

SUBGRADE

Equipment and Construction Methods

Subgrade preparation began on April 6, 1994. (Photo 2, Appendix A) Section 300805 required fill material, while most of Section 300806 was in a cut. In the fill section, the existing asphalt surface was pulverized, left in place, and covered with approximately 12" of fill. In the cut section, the existing asphalt was completely removed. Both cut and fill sections had the upper 12" of subgrade compacted to the appropriate specification.

The cut area in Section 300806 began at approximately Station 21+00 and continued to the end of the section. Photo 3 in Appendix A shows how the subgrade was ripped in the cut area. During excavation, soft material was encountered. Three areas within Section 300806 required large over-excavations due to the soft material. The over-excavations occurred near Stations 20+00, 22+50 and 25+00. Each excavation was approximately 100-150 feet long by 1-3 feet in depth by 12 feet wide. The over-excavation at Station 25+00 is pictured in Photo 4 in Appendix A. Photo 5 in Appendix A illustrates the scraper used for excavating and Photo 6 shows the compactor used on both sections.

The excavations were filled with the same borrow material used for Section 300805; which is described in the Materials Section. Due to the large amount of fill in the excavations, Section 300806 was, in essence, a fill section. Per SHRP SPS-8 Specifications, sections are required to be located all on fill material or all on cut material. In essence, both section will perform as fill sections.

The equipment used for subgrade preparation consisted of the following:

- 2 631 Caterpillar Scrapers
- 2 627 Caterpillar Scrapers
- 1 D-9 Caterpillar Dozer for ripping
- 1 Ingersoll Rand Steel Vibrating Compactor 33,000 lbs. (Model SD-150D)
- 1 Caterpillar 16G Grader Motor Patrol (Photo 7, Appendix A)
- 1 Watering Truck

The subgrade preparation was completed on April 20, 1994.

Materials

The borrow pit used for the fill material in both sections is shown in Photo 1 in Appendix A. The pit was located west of the project at approximately Station 20+00.

Table 1 shows gradations for the fill material obtained from samples taken on April 18th, 1994.

Table 1. Field subgrade fill material gradations (material sampled 4/18/94).

Sieve Size	Percent Passing by Sieve Size		
	Section 300805	Section 300806(1)	Section 300806(2)
3"	100	99	97
2"	97	92	85
1-1/2"	91	86	81
1"	82	75	71
3/4"	76	69	66
1/2"	66	59	55
3/8"	59	53	50
#4	45	40	39
#10	35	28	31
#40	19	14	17
#80	12	10	11
#200	7.7	6.3	6.9

QA Sampling and Testing

Compaction and moisture data taken during the subgrade fill operation are listed in Table 2. The maximum dry density was 136.2 pcf and the optimum moisture content was 6.8%. Table 3 lists the moisture and compaction data obtained at the locations shown in Appendix C, following completion of the fill operation. Both compaction and moisture data were obtained using a Troxler Nuclear Density gauge. Traffic was allowed on the subgrade until the base preparation began.

Table 2. Montana SPS-8 subgrade compaction data during fill operation.

Date	C/L Ref.	Station	% Compaction	Deviation from Optimum Moisture (%)
Section 300805 (Northbound Lane)				
3/30	11' Rt.	3+15	95	-1.3
4/4	6' Rt.	1+50	96	-0.6
4/4	21' Rt.	-1+00	98	-1.1
4/4	3' Rt.	1+90	97	-0.5
4/5	2' Rt.	4+05	96	-0.5
4/5	5' Rt.	2+10	95	-1.1
4/5	10' Rt.	-0+25	95	-1.5
Section 300806 (Northbound Lane)				
4/4	5' Rt.	-1+15	99	-0.5
4/4	11' Rt.	2+00	95	-0.1
4/5	15' Rt.	0+90	95	-1.8
4/6	2' Rt.	2+05	97	+0.8

Table 3. Montana SPS-8 subgrade compaction data on completed subgrade.

Section	Date	C/L Ref.	Station	Average Dry Density (pcf)	In Situ Moisture Content (%)
300805	4/30/94	5' Rt.	0-10	131.1	5.5
			1+00	133.2	4.9
			2+50	133.5	6.9
			4+00	135.9	7.1
300806	4/30/94	5'Rt	0-20	131.2	4.0
			1+00	129.8	5.1
			2+50	132.1	4.5
			4+00	134.5	5.0
			5+05	132.8	3.3

FWD testing was performed in both sections on April 21st, 1994. The deflections (in mils) at 25' intervals for both sections are illustrated in Figure 5. These plots also show the DGAB and AC deflections, which will be discussed in later sections. All deflections were obtained at a 9,000 lb. load level. The subgrade deflections in Section 300806 were significantly higher than in Section 300805 and were also more variable. A significant soft spot is evident from Figure 5 between Station 300 and Station 450 of Section 300806. Some shearing of the subgrade may have been taking place on Section 300806 due to the high load, but regardless, Section 300806 appears to have a weaker subgrade.

The materials sampling layout for the subgrade is shown in Appendix C. Results of this testing are not reported here. Photo 8 in Appendix A shows the Nuclear Density Testing being performed. Photo 9 shows a shoulder borehole being drilled, and Photo 10 shows a test pit in the subgrade.

DENSE GRADED AGGREGATE BASE (DGAB)

Equipment and Construction Methods

Placement of the dense graded aggregate base was performed on May 4, 1994 for both sections 300805 and 300806. Section 300805 was placed with belly dump trucks in two lifts, six inches and two inches, and Section 300806 was placed in two six inch lifts. Compaction was

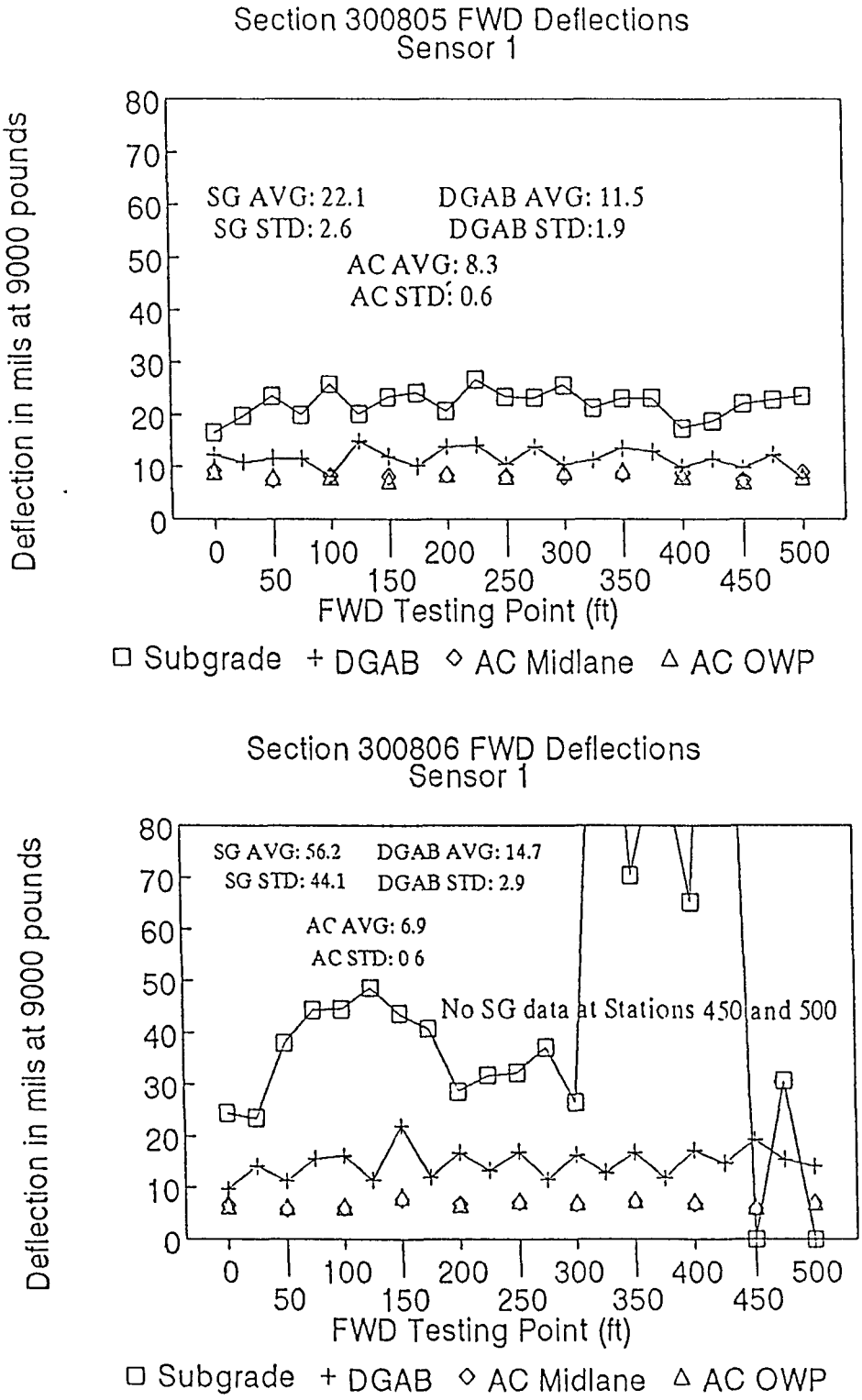


Figure 5. FWD deflection plots for subgrade, DGAB and AC.

accomplished using a Dynapac steel double-drum vibrating compactor. The roller pattern and roller weight were not recorded. Water was periodically spread during DGAB placement.

Following DGAB placement, a prime coat of MC-70 oil was placed on May 12, 1994. The application rate for both sections was 0.29 gallons/yd^2. A blotter of natural fines was used on top of the prime coat to reduce tracking. Traffic was diverted around the sections during construction and then allowed to travel over the DGAB until AC placement.

Due to the traffic and over a months exposure to the environment, the DGAB developed significant potholing. The potholes were 6-12" in diameter and 2-3" deep (Photo 11 in Appendix A). Prior to paving, an AC mix was graded into the potholed areas and then compacted. (Photo 17, Appendix A)

Materials

The DGAB was a crushed gravel with field gradations as shown in Table 4. The aggregate source was the borrow pit used for the asphalt mixture aggregate and was located within the project limits.

Table 4. Field aggregate base gradations (sampled May 4, 1994).

Sieve Size	Percent Passing by Sieve Size		
	Section 300805	Section 300806 Sample 1	Section 300806 Sample 2
1-1/2"	100	100	100
1"	95	98	96
3/4"	88	92	91
1/2"	74	80	80
3/8"	66	71	71
#4	47	49	49
#10	34	35	38
#40	19	19	22
#80	13	13	15
#200	8.1	8.3	9.3

QA Testing and Sampling

Nuclear density tests were completed on the finished DGAB surface and the results are given in Table 5 (next page). These tests were completed prior to the pothole development.

Table 6 lists the thickness statistics obtained from both sections. The measurements were taken 0, 3, 6, 9 and 12 feet to the right of the centerline, at 50' intervals, by rod and level survey.

Table 6. Dense graded aggregate base thickness.

Section	Minimum Thickness (inch)	Maximum Thickness (inch)	Average Thickness (inch)	Specified Thickness (inch)	Standard Deviation (inch)
300805	5.6	10.1	7.1	8	0.91
300806	10.7	13.6	12.0	12	0.73

Figure 6 shows the variation in the DGAB thicknesses, deviating from the 8" and 12" specified thicknesses. This variation is most likely due to inconsistent subgrade elevations. The surface of the DGAB was relatively level, resulting in fairly consistent surface thicknesses, shown in Figure 6.

The complete DGAB sampling layout and field and laboratory test plan is shown in Appendix C, however, these test results are not reported here.

FWD testing was performed on the completed DGAB on June 3rd, prior to filling the potholes with the AC mix. Figure 5 showed the deflection plots for each section. The 8" thick DGAB in section 300805 had an average deflection of 11.5 mils while the 12" DGAB in section 300806 had an average deflection of 14.7 mils. The soft subgrade in Section 300806 likely contributed to the higher DGAB deflections.

ASPHALT CONCRETE (AC)

Paving of the asphalt surface layers for this project began on June 27, 1994 and was completed on June 29, 1994. The weather during paving was clear and sunny with temperatures in the 70s (°F). Section 300805 received two 2" lifts while Section 300806 received two 2" lifts followed by a 3" final lift.

Following placement of the lifts, traffic was diverted around the sections. Traffic was allowed onto the sections immediately after finish rolling.

Table 5. Montana SPS-8 DGAB compaction data on completed base.

Section	Date	C/L Ref.	Station	Average Dry Density (pcf)	% Optimum Density	Average In-Situ Moisture Content	% Optimum Moisture Content
300805	5/9/94	6' Rt.	0-30	135.2	98	5.9	79
			1+00	136.2	99	6.2	83
			2+50	136.5	99	5.6	75
			4+00	134.1	98	5.7	76
300806	5/10/94	6' Rt.	0-50	135.0	98	6.2	83
			1+00	131.2	95	6.1	81
			2+50	133.3	97	6.0	80
			5+30	135.7	99	5.9	79

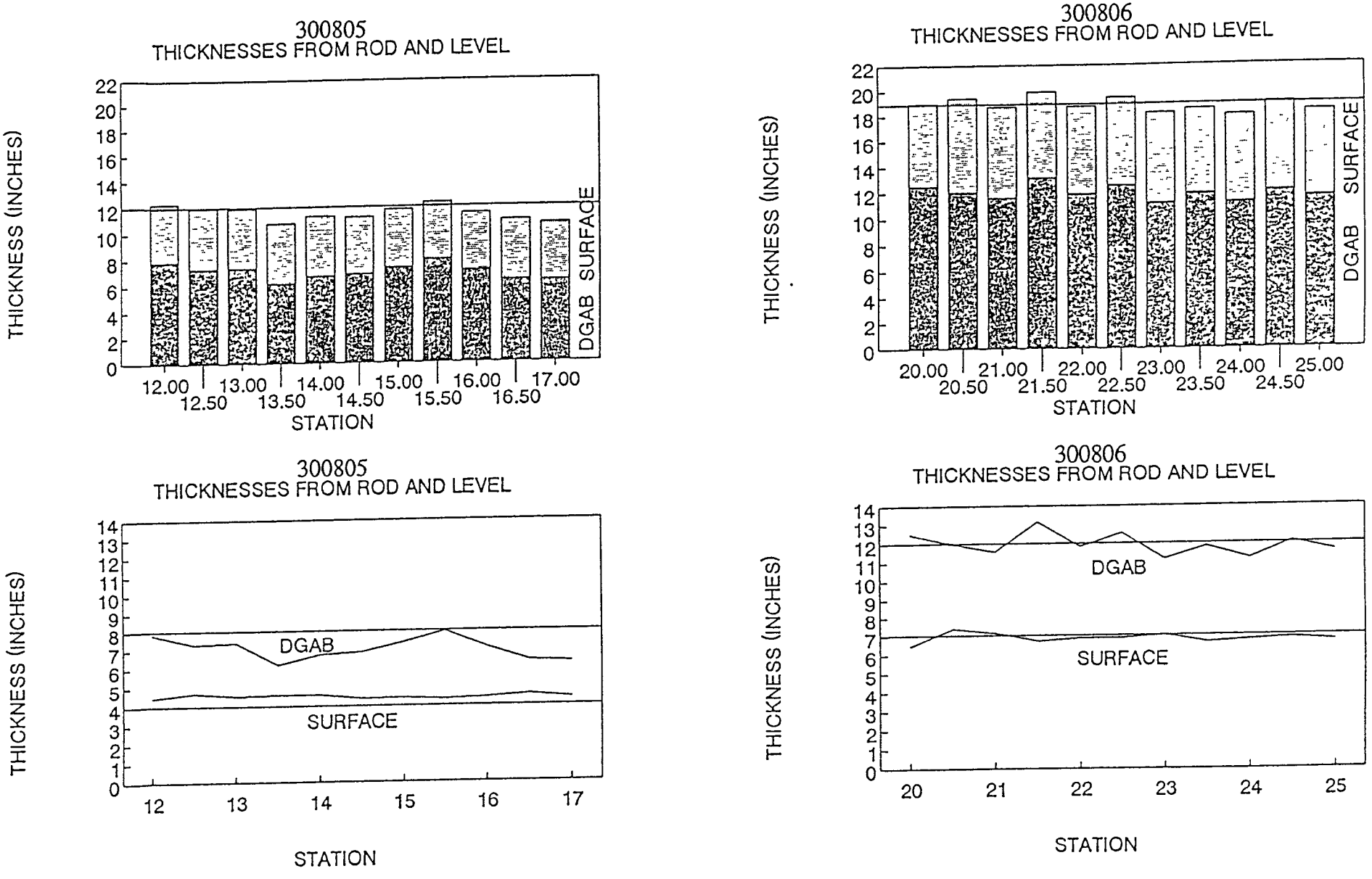


Figure 6. DGAB and AC layer thicknesses.

Equipment and Construction Methods

Prior to paving all lifts, an SS-1 tack coat was spread at a rate of 0.04 gallons/yd^2. A Barber Green DM 71 drum dryer asphalt plant was used for asphalt production (Photo 13, Appendix A). The plant was located less than one mile from the end of Section 300806. Belly dump trucks placed the AC in windrows to be picked up by the paver. The paver used was a Blow Knox DF-200, (Photo 14, Appendix A) with a ski located on the left hand side of the paver for grade control. Lifts were placed in approximately 15' widths and then compacted with an Ingersoll-Rand DD-110 double drum steel vibrating roller. (Photos 15 and 16, Appendix A)

Compaction patterns for all lifts generally followed:

- Breakdown: 3 passes vibratory mode
- Intermediate: 3 passes static mode
- Final: 4 passes static mode

Table 7 (on following page) lists the nominal paving thicknesses and placement temperatures during construction.

Materials

The asphalt mix design consisted of 5% of an 85-100 penetration asphalt mixed with a 3/4" PMS GRADE "D" aggregate. The aggregate source was located within the project limits and is shown in Photo 12, Appendix A. Hydrated lime was added dry to the aggregate. The complete mix design in shown in Appendix B, however a summary is shown in Table 8.

Table 8. Asphalt concrete mix design summary (75 Blow Marshall Compaction).

Asphalt Type:	85/100 (MRC, Montana Refining Co.)
Asphalt Percent:	5%
Admixture & Percent:	1.4% Hydrated Lime (by weight of aggregate)
Stability (lb):	2704
Flow:	13
Voids (%):	3.8

Table 7. AC loose paving thicknesses and placement temperatures.

Section	Lift		Nominal Thicknesses (in)	Laydown Temperature(°F)
300805	1	Mean	2.8	270
		S.D.	0.02	3.6
		High	3.1	276
		Low	2.4	264
	2	Mean	3.2	271
		S.D.	0.01	4.8
		High	3.4	277
		Low	3.0	261
300806	1	Mean	3.0	263
		S.D.	0.02	5.4
		High	3.5	270
		Low	2.6	252
	2	Mean	3.1	266
		S.D.	0.02	7.3
		High	3.5	278
		Low	2.6	258
	3	Mean	3.0	272
		S.D.	0.01	7.9
		High	3.2	284
		Low	2.6	252

QA Testing and Sampling

The complete AC sampling layout and field and laboratory testing plan is shown in Appendix C. Nuclear densities taken on the AC surface are given in Table 9.

Table 9. Montana SPS-8 AC layer compaction data on completed surface.

Section	Date	C/L Ref.	Station	In-Situ Density (pcf)
300805	6/29/94	6' Rt.	1+00	142.5
			2+50	137.9
			4+00	142.7
300806	6/29/94	6' Rt.	1+00	140.9
			2+50	143.2
			4+00	140.4

Table 10 shows final measured layer thicknesses obtained by an elevation survey. The elevation measurements were taken at 0, 3, 6, 9 and 12' to the right of centerline, at 50' intervals longitudinally. Figure 6 showed that the thicknesses of the surface courses were relatively consistent, resulting in low standard deviations.

Table 10. Asphalt concrete compacted thickness measurements.

Section	Minimum Thickness	Maximum Thickness	Average Thickness	Specified Thickness	Standard Deviation
300805	3.5	5.3	4.5	4	0.39
300806	6.2	7.7	6.9	7	0.33

A combination of three AC samples obtained in the field on June 29th had an AC content of 5.3% and a gradation as shown in Table 11.

Table 11. AC field gradation (extracted sample 6/29/94).

Sieve Size	Percent Passing
3/4"	100
1/2"	90
3/8"	75
#4	50
#10	34
#40	20
#80	--
#200	9.0

FWD testing was performed on the AC surface on August 23rd. Figure 5 showed the deflection plots for both sections. The 4" section 300805 had an average deflection of 8.3 mils for the midlane and outer wheel path combined, and the thicker 7" Section 300806 had an average deflection of 6.9 mils.

Completed LTPP construction data sheets for the entire project are given in Appendix D.

Detailed AC Construction

Section 300805

Lift 1 was placed on June 28th. The paving width was 14'3". Just prior to paving the AC lift, a layer of AC was bladed into the potholes in the aggregate base and compacted. Photo 17 in Appendix A shows the AC mix bladed into the potholes. The AC fill layer was spread most of the width of the road. A tack coat was applied prior to placing the pothole fill mix. The tack coat was an SS-1, spread at a rate of 0.08-0.1 gallons/yd^2.

Lift 1 was spread in a 2.8" loose lift and then compacted. The air temperature was approximately 75°F during placement. The average AC placement temperature was 270°F.

Lift 2 was placed on June 29th, starting at 10:32 a.m. and finishing at 11:10 a.m. The temperature was near 70°F during paving and the surface temperature was 95°F. A tack coat was spread at a rate of 0.04 gallons/yd^2. The loose lift thickness averaged 3.2". The average AC placement temperature was 271°F. Segregation was present near Station 2+50 in the middle of

the travel lane about 4-1/2 to 6' right of the centerline. The state had problems with their gradation during asphalt production, and this most likely caused the segregation. Photo 18 in Appendix A shows the segregation.

Section 300806

Placement of lift 1 took place on June 27th starting at 1:00 p.m. and finishing at 1:30 p.m. As with Section 300805, a tack coat was applied prior to placing the pothole-fill layer. The rate of application of the SS-1 emulsion was 0.08-0.1 gallons/yd^2. The ambient air temperature during placement was in the 70s (°F). The average loose lift placement thickness was 3" and the average AC placement temperature was 263°F. Lift 1 had a 15' paving width.

On June 28th, the second lift was placed in an average loose thickness of 3.1". The average AC placement temperature was 266°F. The air temperature was near 80°F. The surface was tacked prior to paving.

Lift 3 was placed on June 29th, starting at 11:28 a.m. and finishing at 12:00 p.m. The air temperature was near 80°F. The mix for this lift was significantly richer than the prior mixes. Photo 19, Appendix A shows a patch of bleeding in the transition at Station 19+50 and Photo 20, shows typical bleeding within the section. The average AC placement temperature was 272°F. The paving width was 14'6". The average loose thickness was 3".

Segregation of the AC mix showed up 4-1/2 - 6' right of centerline throughout the section, as shown in Photo 21, Appendix A.

IV. SUMMARY

Construction on the Montana SPS-8 project located in Deer Lodge County began on April 6, 1994 with subgrade preparations. A fill material was required throughout Section 300805 and in most of Section 300806. The subgrade fill was obtained from a nearby borrow source and was a river gravel. The subgrade was completed on April 20th.

On May 4th, the aggregate base was placed, with an average thickness of 7.1" on Section 300805, and 12" on Section 300806. An MC-70 prime coat was placed on May 12th. Traffic was allowed on the DGAB until AC paving on June 27th. The DGAB developed significant potholing. The potholes were filled with an AC mix and compacted prior to placing the AC surface layer.

Asphalt placement took place from June 27th through June 29th. Section 300805 received an average 4.5" thickness, while Section 300806 received a 7" average thickness.

Following construction, a weather station was installed at the site to monitor environmental conditions.

V. KEY OBSERVATIONS

During subgrade excavation on Section 300806, soft spots were encountered below the grade, and subsequently subexcavated. Three areas of over-excavation 100-150' long by 12' wide by 1' to 3' deep were performed within the section. This, in essence, made Section 300806 a fill section, since a significant portion of the section contained fill.

The FWD deflections (at 9000 lbs for sensor 1) on the subgrade averaged 22.1 mils in section 300805 and 56.2 in Section 300806. The standard deviation in Section 300805 was 2.6 and in Section 300806 was 44.1. A large soft area existed from Station 300 to Station 425 in section 300806, as evident from the very high deflections in Figure 5.

Following placement of the DGAB on May 4th, the AC layer was not placed until June 27th. Traffic and weather caused significant potholing in the primed DGAB surface. The potholes were filled with an AC mix, graded, and then compacted and covered with the AC surface layer.

The 7.1" average thickness of the DGAB on Section 300805 was 0.9" less than the specified 8" thickness. Section 300806 had a 12" average thickness, as specified.

The average DGAB FWD deflection (at 9000 lbs. for sensor 1) in Section 300805 was 11.5 mils. Although Section 300806 had 5" more DGAB, the average deflection was 14.7 mils, likely due to the soft subgrade. The standard deviation in Section 300806 was 2.9 and the deflections did not show the soft spot that existed in the subgrade.

The final lift of the AC layer on Section 300806 appeared to contain excessive asphalt and may cause performance problems in the future.

Section 300805, with 7" of DGAB and 4" of AC had an 8.3 mil average deflection at 9000 lbs. Although Section 300806 had 12" of DGAB and 7" of AC, the average deflection at 9000 lbs was only slightly lower at 6.9 mils. Both sections had standard deviations of 0.6 mils.

Due to the suspect subgrade in Section 300806, the comparisons of the future performance with that of Section 300805 should account for the subgrade differences.

APPENDIX A

PHOTOGRAPHS OF MONTANA SPS-8 CONSTRUCTION

APPENDIX A
PHOTOGRAPHS OF SPS-8 CONSTRUCTION

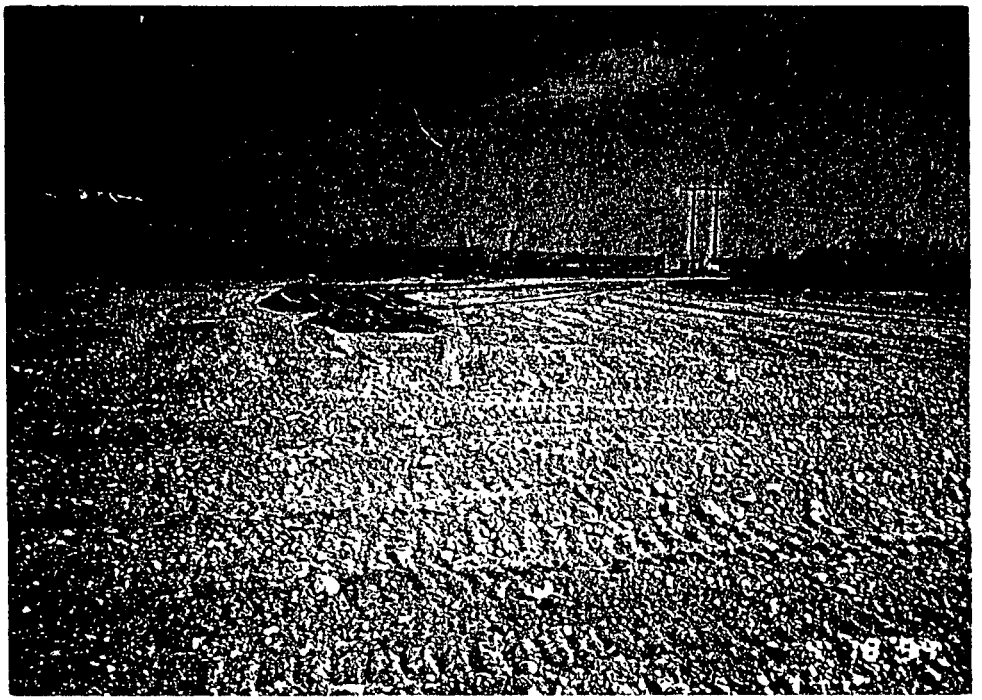


Photo 1. Borrow Pit West of Project at Approximately Station 20+00

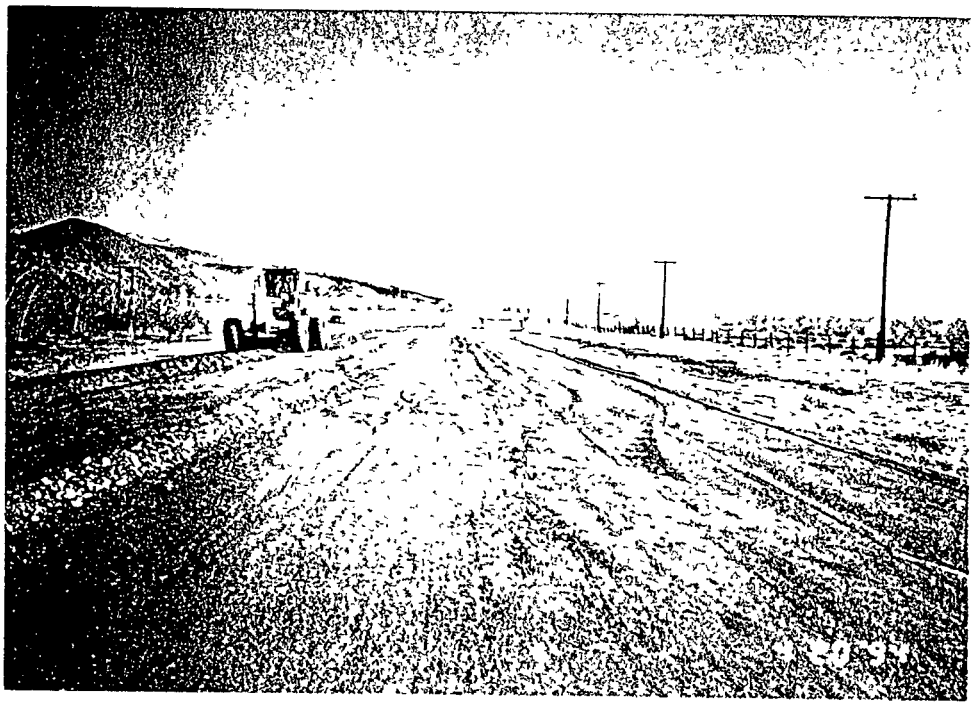


Photo 2. Grader Preparing Subgrade

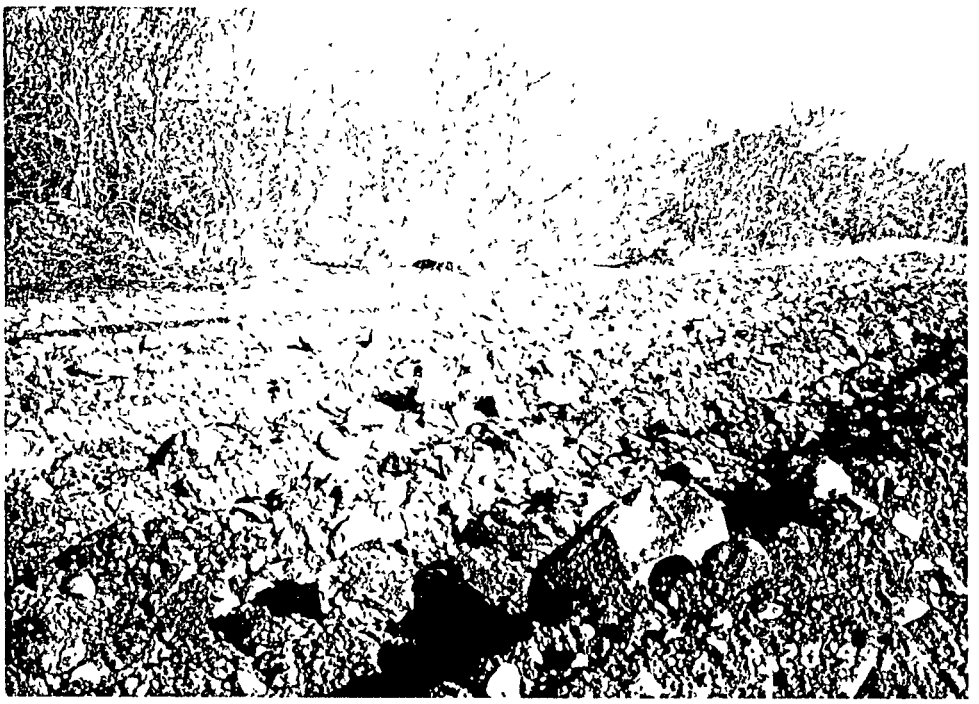


Photo 3. Subgrade Ripping Procedure

Photo 4. Digout at Approximately Station 25+00

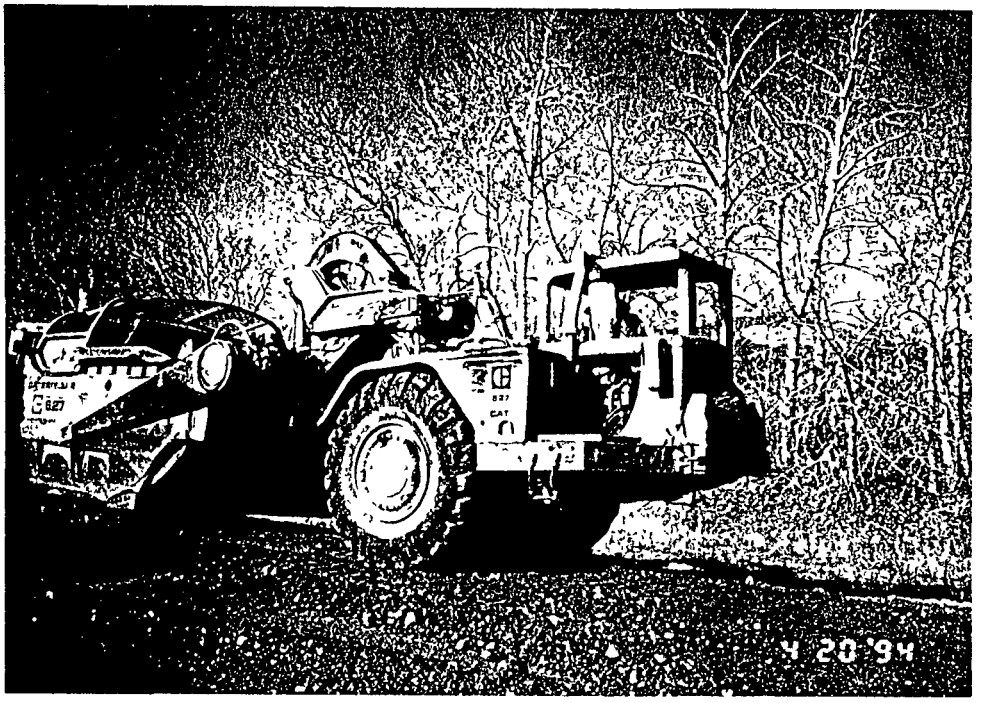


Photo 5. Caterpillar 627 Scraper

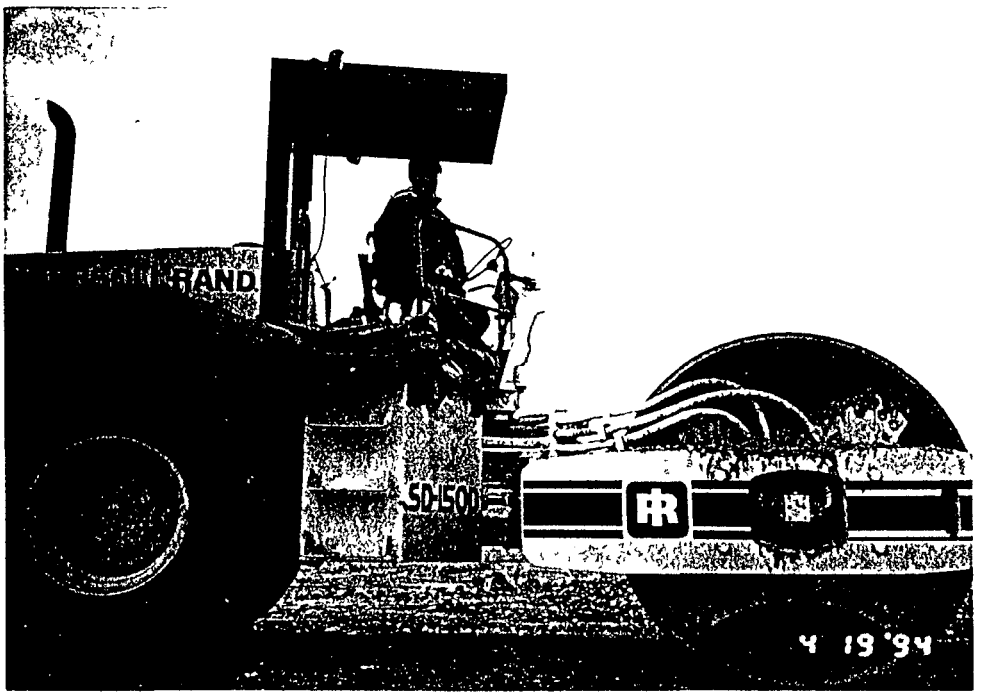


Photo 6. Ingersoll-Rand SD-150D Compactor

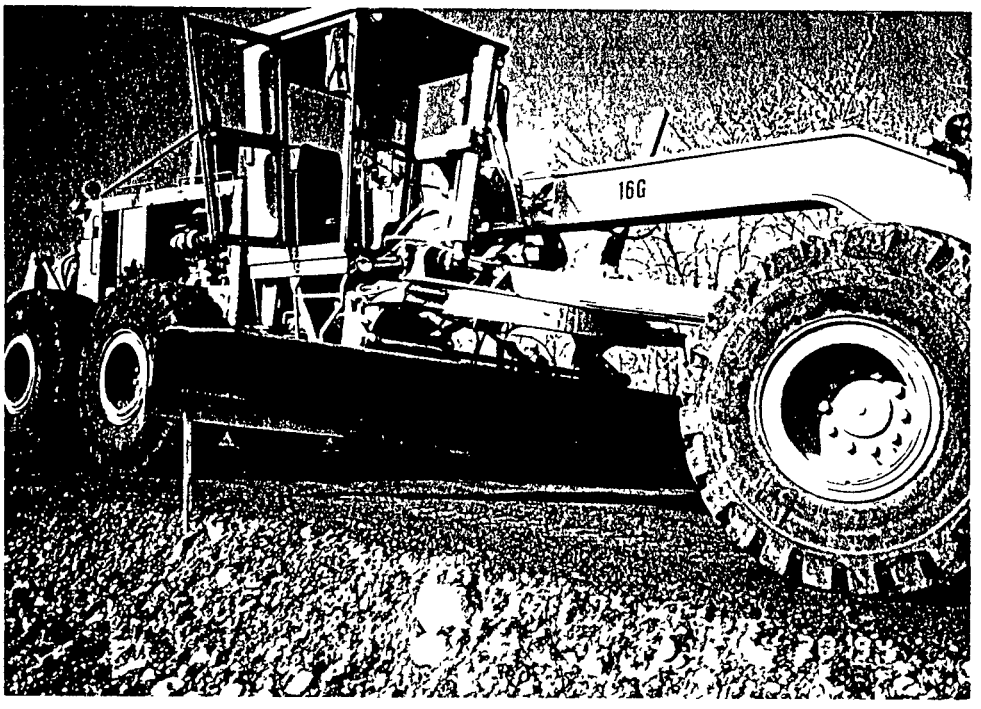


Photo 7. 16G Grader

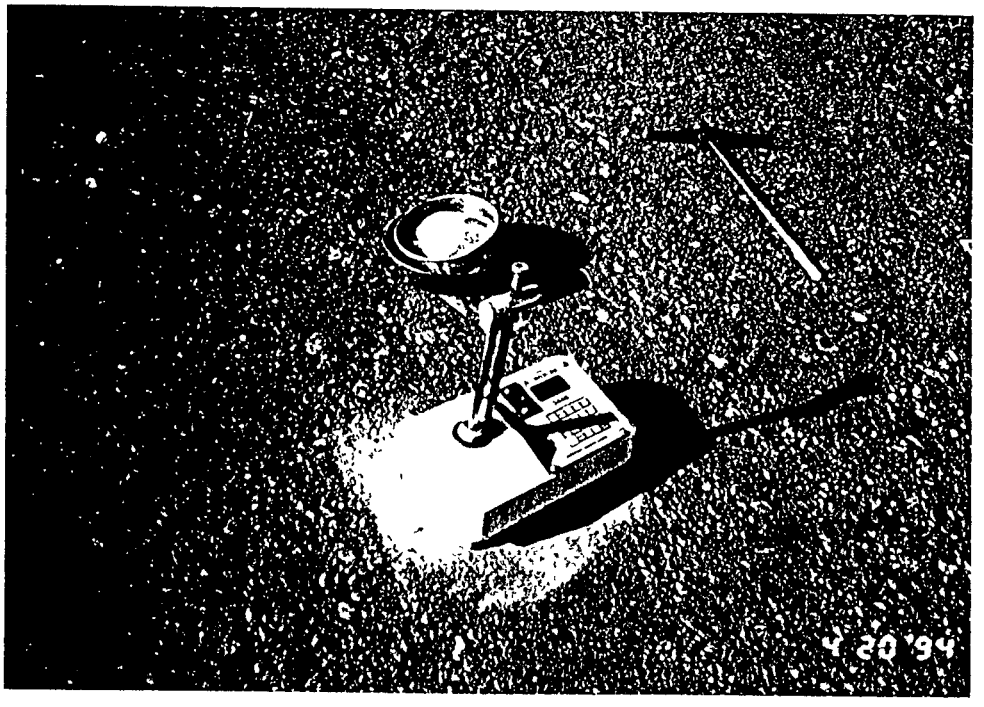


Photo 8. Subbase Nuclear Density Testing

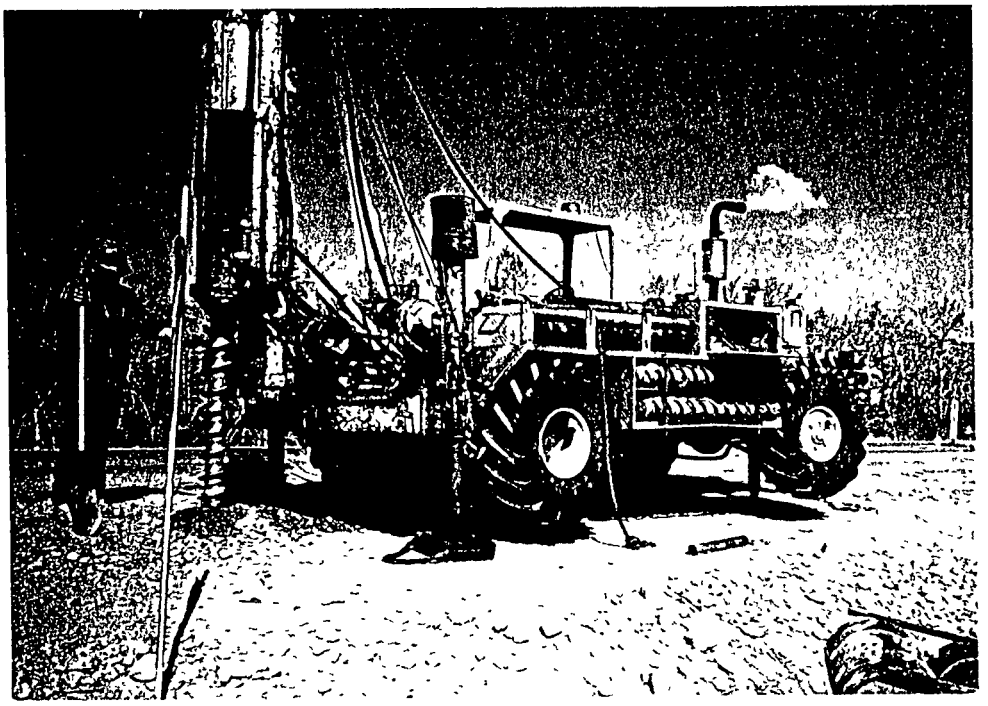


Photo 9. Borehole in Shoulder

Photo 10. Test Pit Subgrade, Station 11+75

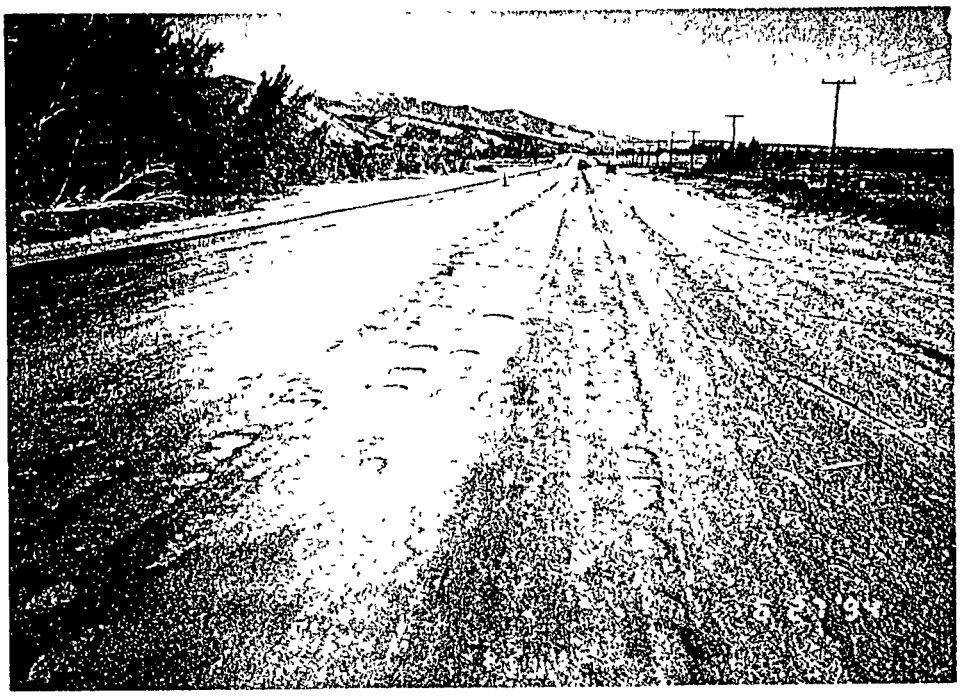


Photo 11. DGAB Potholes, Station 19+00 Northbound

Photo 12 Aggregate Stockpiles - AC Plant

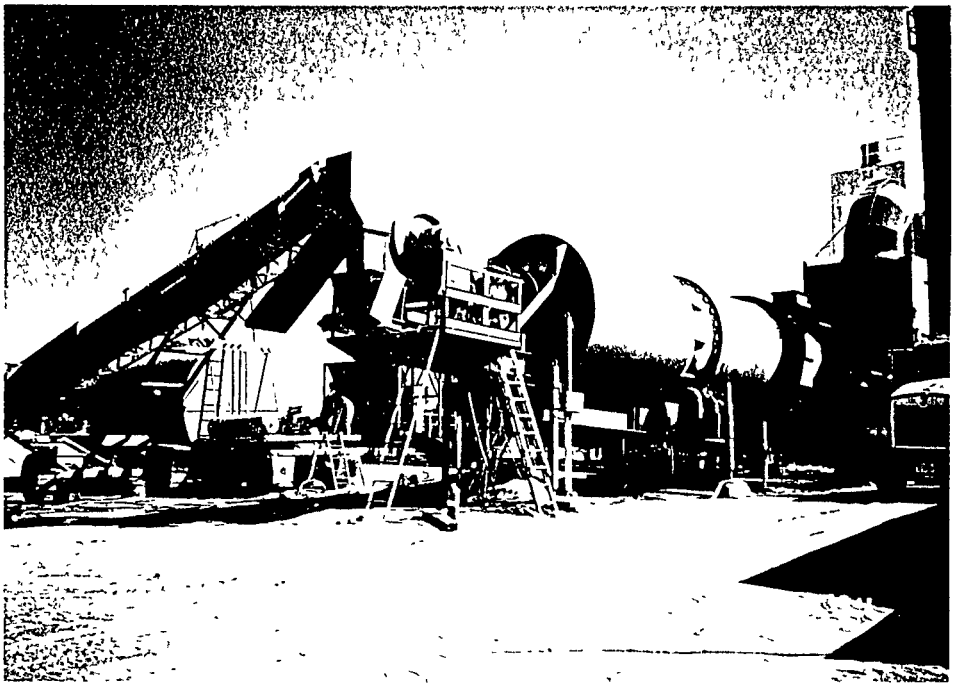


Photo 13. Asphalt Plant Drum Mixer

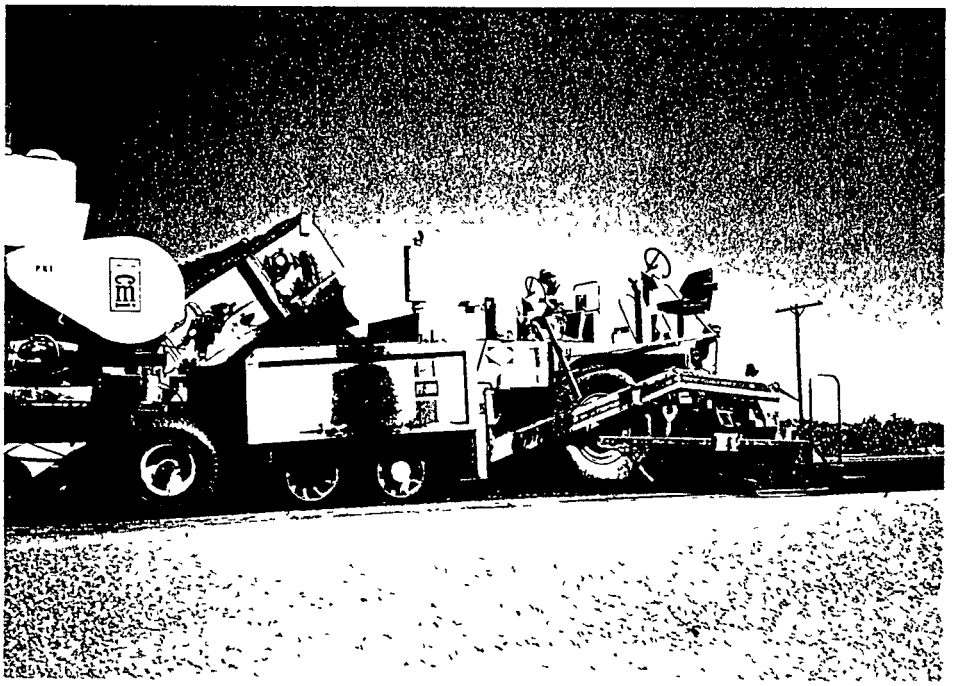


Photo 14. Blaw Knox PF-200 Paver

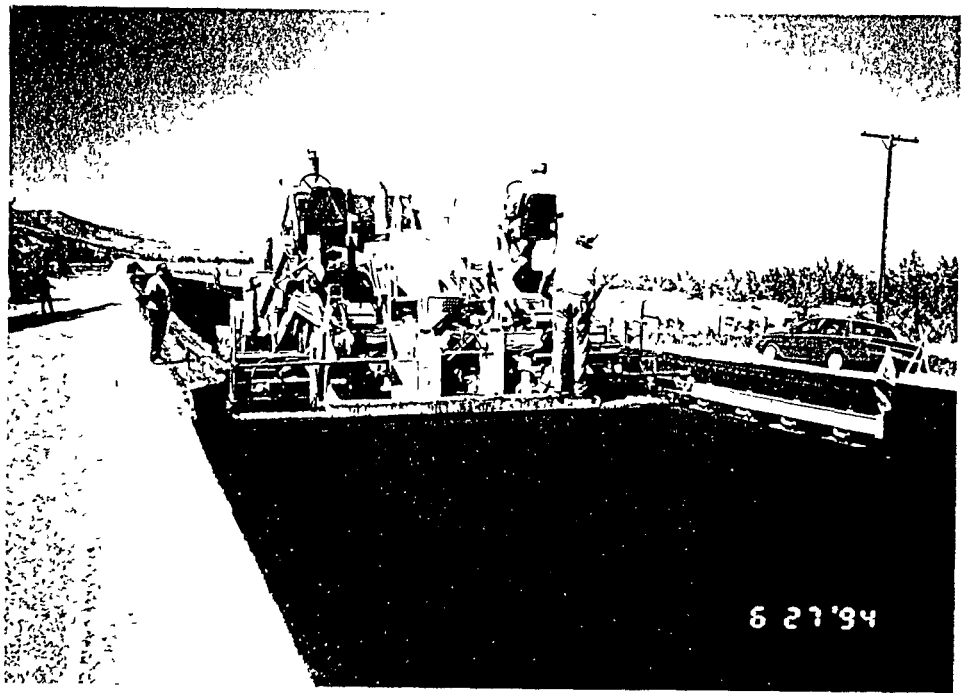


Photo 15. Paving Close to Station 19+00, Southbound

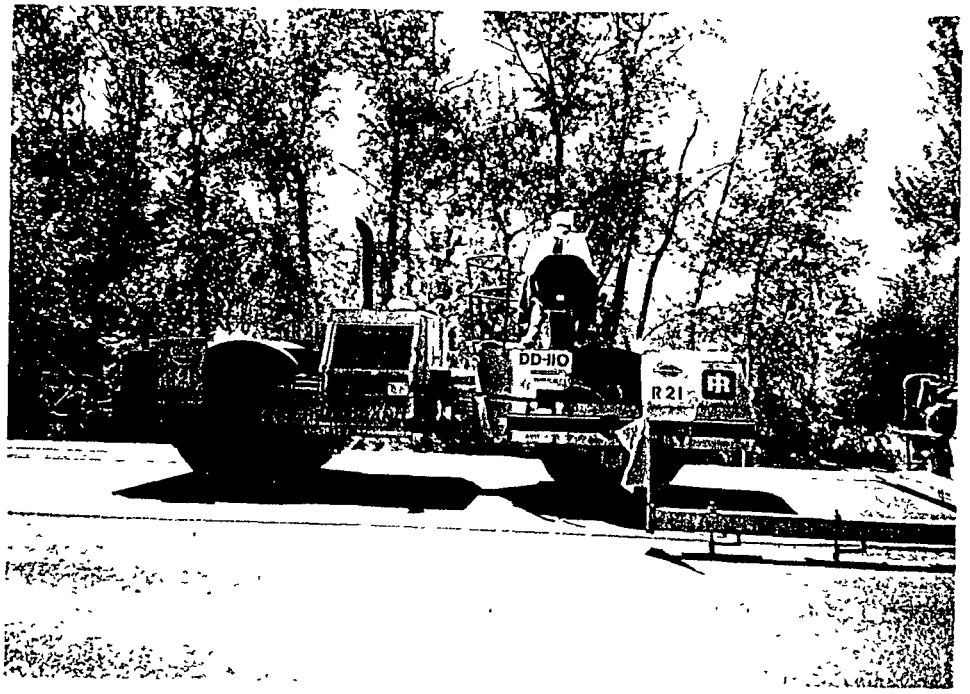


Photo 16. DD-110 AC Compactor

Photo 17. AC Mix Bladed into AB Potholes, Station 11+00 Northbound

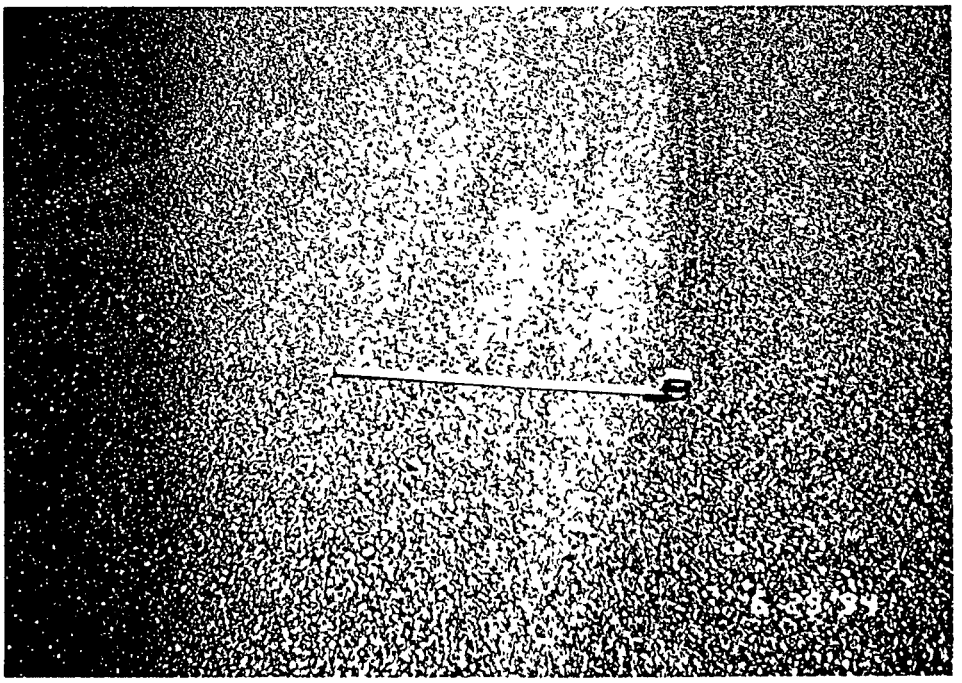


Photo 18. Segregation Close to Station 2+50, Section 300805

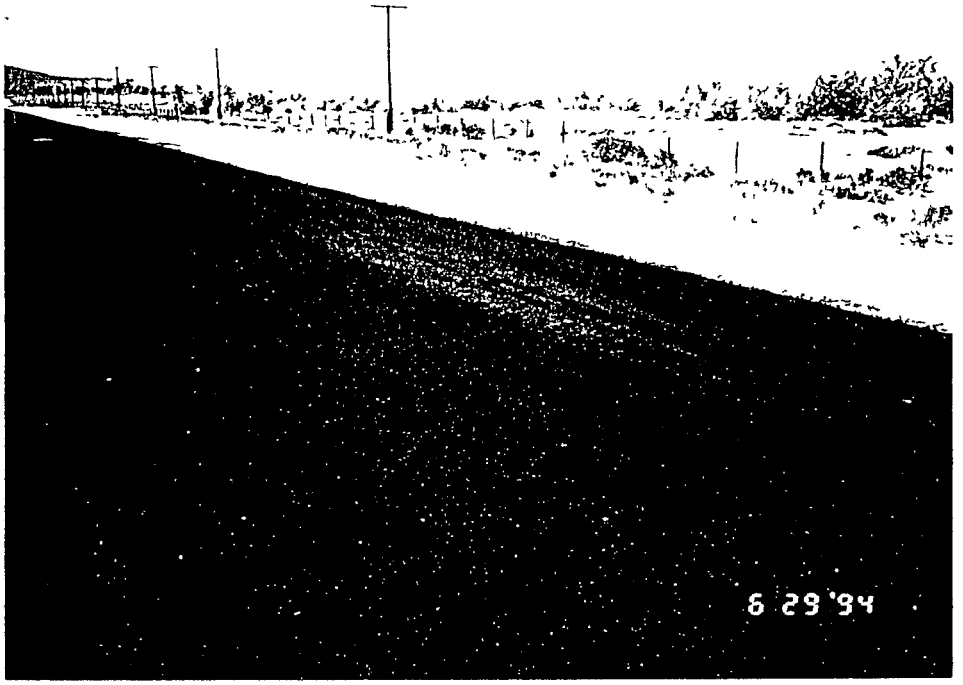


Photo 19. Patch of Bleeding, Station 19+50, Section 300806

Photo 20. Typical Bleeding, Section 300806

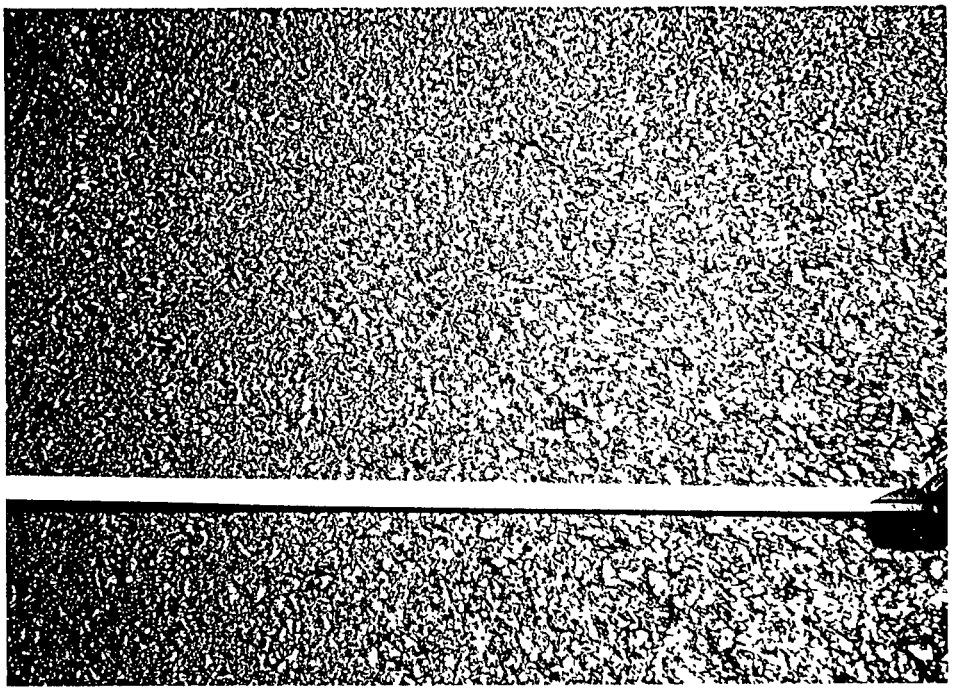


Photo 21. Segregation, Section 300806

APPENDIX B

MIX DESIGN - AC SURFACING

Montana Department of Transportation
Helena, MT 59620-1001

Memorandum

To: Jason Giard, P.E.
District Engineer - Butte

From: R. Scott Barnes, P.E., Supervisor
Physical Testing Section

Date: April 28, 1994

Project: STPS-RDTT 273-1(4)0

Termini: E. of Anaconda - N.

Bit. Surf. Type: 3/4" PMS Grade "D" (1st Mix Design)

Lab No.: 697171

Attached please find the results of tests performed on aggregate submitted from the Deer Lodge County source.

The material was graded to the job mix target before testing. The gradation shown "As Tested" results by combining 57% of the crushed fine stockpile and 43% of the coarse stockpile.

The temperature used during mixing was 295°F. To conform to the AASHTO asphalt temperature viscosity requirement of 170± 20 centistokes (cSt.) during mixing, the contractor must discharge hot bituminous mixture within the temperature range of 290°F to 300°F. Field production within this temperature range should reasonably reproduce design values. Compaction of the Marshall specimens was performed at temperatures such that the asphalt viscosity was 280±30 centistokes. Use of these temperatures is necessary to produce Marshall specimens that are comparable to those produced in the Helena Laboratory. Using the asphalt proposed for this project, the temperature range is 270°F to 279°F.

The following Rice Gravities should be used at the start of production only to determine the percent voids of the field Marshall test specimens. These values are as follows:

% Asphalt	Max. Density
5.0	2.520
5.5	2.494
6.0	2.467
6.5	2.441
7.0	2.414

Field Rice Gravities testing should be started and continued throughout Bituminous Plant Mix production to determine any change in the voids.

1. Based on this data, we recommend that production commence at 5.0% 85/100 Asphalt Cement from the MRC refinery.

2. 1.4% hydrated lime is required as a chemical additive to improve the Immersion Compression and the Modified Lottman. The attached data indicates this mixture is susceptible to moisture induced damage. Even dispersal of the hydrated lime throughout the entire mixture is essential to avoid structural damage by moisture intrusion.

For the first three days of full production, it will be necessary to submit monitor samples.

These monitor samples will be used to verify design recommendations. Obtain the first sample after approximately three hours of continuous production and the second sample about three hours later. These samples are to be transported to the Helena Materials Bureau by the quickest possible practical means.

If you have any questions regarding these results or recommendations, please contact us.

RSB:PE:D:MT:105.cg

Attachments

Lab. Form No. 606
(Rev. 3/29/90)

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
Materials Bureau

1,443 ADT 660
2012 ADT 800
18K 60

PLANT MIX SURFACING, GRADE ____

Lab. No. 697171 Sample No. ____ Project No. STPS RDTT 273-1(4)0
Termini ANACONDA NORTH
Date Sampled 3-29-94 Date Received APR 19 1994
Sampled by Snow Title LT II Address Butte
Submitted by Grmoljez Title D.M.S. Address ____
Area Source Represented by Lab. No. ____ Sample taken at ____
Owner Deer Lodge County Address Anaconda

TEST RESULTS ON AGGREGATE

	% Passing As Tested
1-½"	
1"	
¾"	100
½"	83
3/8"	68
4M	42
10M	28
40M	15
200M	6.5

LL NP
PL NP
PI NP
SE 68

Fracture 1 face 94
2 face 80

Dust
Asphalt Ratio 1.30

Volume Swell
NO 2.5 % hard
HL 1.0 % hard
CF 2.8 % hard
— — % —

Absorption CS 1.235 Fine 0.350 Blend 0.846

Bulk Dry Sp. Gr. of Agg. Fine 2.717 CS 2.664

NOTE: VMA of this Mix Design 14.4

MARSHALL TESTS

%	Type	% Asphalt	Rice Gravity	Unit Weight Lbs./Ft.³	% Voids	Lb. Stability	Flow	Appearance
	NONE	5.0	2.520	151.2	3.8	2637	13	NORMAL
		5.5	2.494	151.8	2.5	2716	12	SLIGHTLY R
		6.0	2.467	151.9	1.3	2412	13	SLIGHTLY R
		6.5	2.441	151.4	0.3	2478	13	RICH
		7.0	2.414	150.5	0.1	2178	13	VERY RICH
1.4	HYDLIME	5.0	2.520	151.2	3.8	2704	12	NORMAL
		5.5	2.494	152.1	2.3	3310	13	SLIGHTLY R
		6.0	2.467	150.8	2.1	2522	14	SLIGHTLY R
		6.5	2.441	151.6	0.5	2271	13	RICH
		7.0	2.414	150.5	0.1	1973	17	VERY RICH
1.4	hydlime	5.0	2.520	151.2	3.8	2704	12	NORMAL

Mineral Filler %	Mineral Filler Type	Percent Asphalt	IMMERSION COMPRESSION Breaks (PSI) Dry	Breaks (PSI) Wet	Retained Strength	MODIFIED LOTTMAN Breaks (PSI) Dry	Breaks (PSI) Wet	Retained Strength	Adhesion
---	None	5.0	187.2	99.4	53.1 %	58.8	15.5	26.4 %	80
1.4	Hyd. Lime	5.0	222.6	214.4	96.3 %	62.9	54.9	87.4 %	90
					%			%	

Recommended: 5.0% 85/100 A/C 1.4% hydrated lime

Refinery MRC

75 BLOW COMPACTION

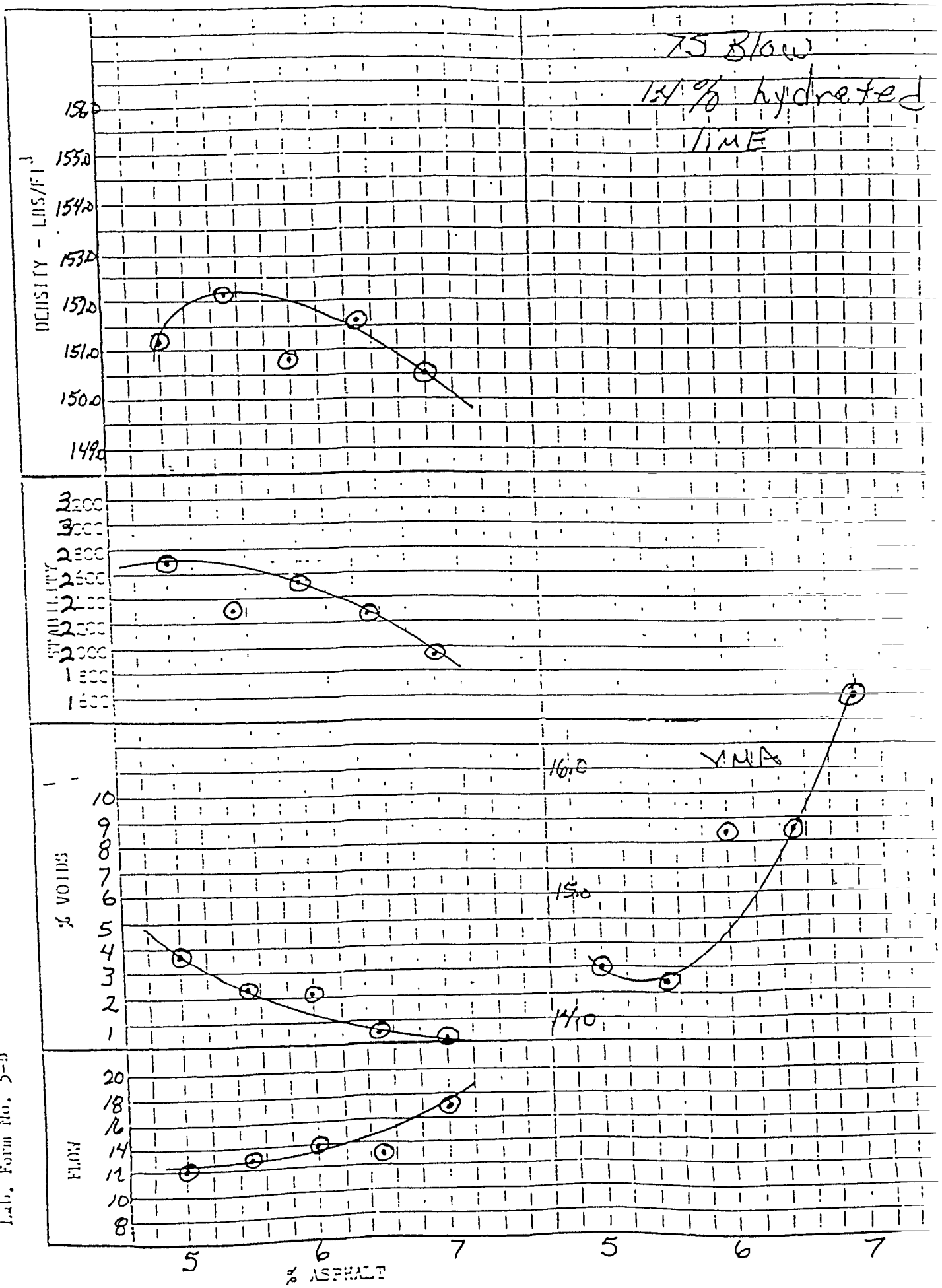
REMARKS:

___ Admin. Maintenance Div.
2 District Engineer Butte
1 Dist. Mat. Supr. Butte
___ Area Lab ____
1 Chief Const. Bureau
1 Chief Materials Bureau
___ Surfacing Design Section
2 Bit. Mix Design Sect.
1 FHWA
1 Materials Bureau File
1 Gilman Const., Inc.

Date Name
Checked 4/28/94 G Bruce

Q:MT:5.nr
>1 Sauer

PRODUCT NO. STPS-RDTT273-1410 LOT NO. 697171



MARSHALL METHOD GRAPH

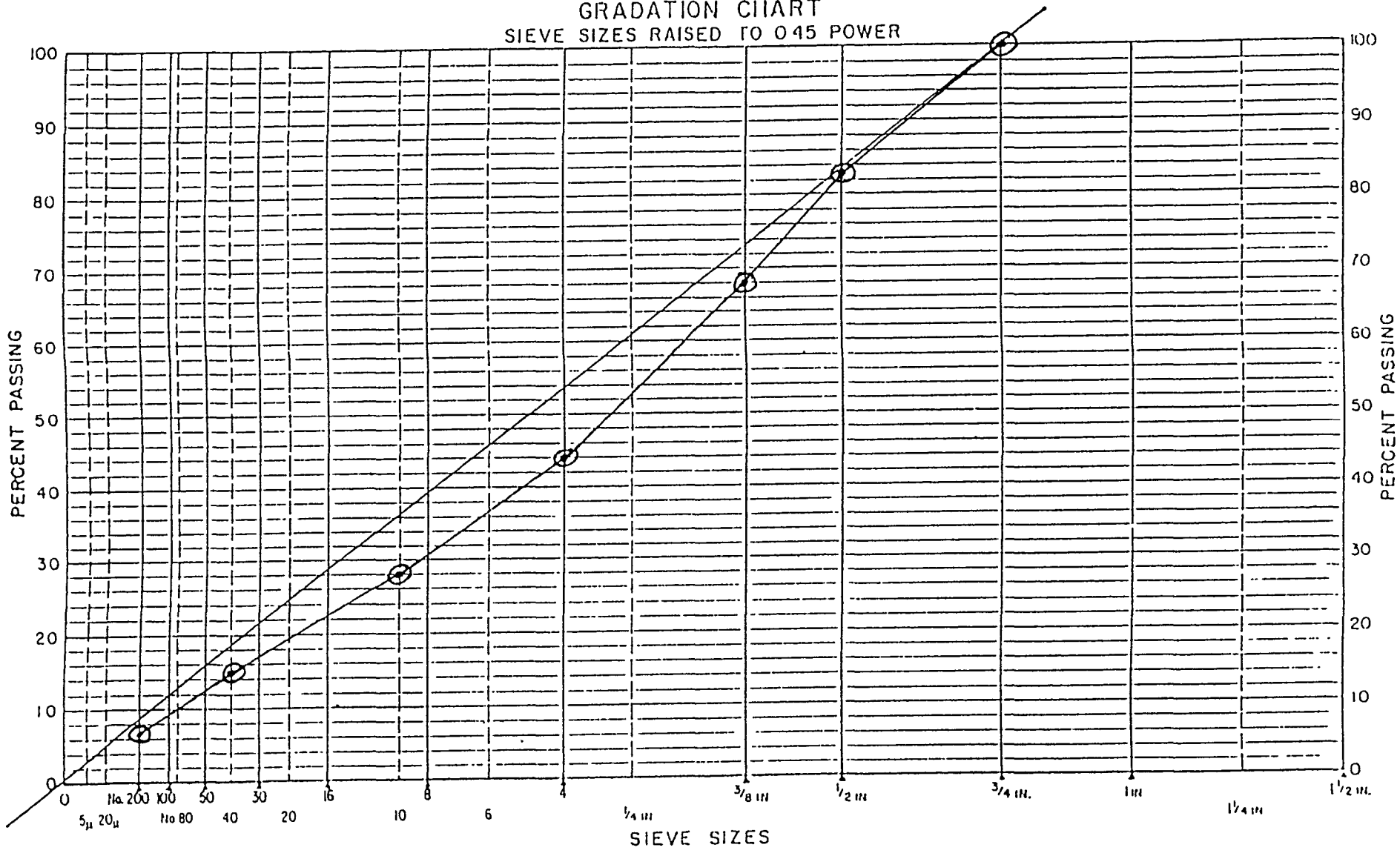
Lab. Form No. 5-B

FORM PR-1115
(2-62)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

GRADATION CHART

SIEVE SIZES RAISED TO 0.45 POWER



▲ THIS SYMBOL IDENTIFIES SIMPLIFIED PRACTICE AND COMPATIBLE SIEVE SIZES

Identification of gradations: E. of Anaconda-N.
STPS-RDTT 273-1(4)0
69717

Sheet No

Date

USCOMM-DC 43822-P62

a termination order. Modified asphalt being produced or in transit or stored on or off the project will not be paid for if the construction with polymer modified asphalt is terminated by the engineer. The department will not pay for modified asphalt that is not placed in designated areas.

Payment will be made under:

Pay Item	Unit of Measure
Kraton modified asphalt	per ton
Exxpave modified asphalt	per ton

Payment for plant mix bituminous surfacing containing polymer modified asphalt cement will be at contract price per ton for Grade B or Grade D as applicable

I. Removal Sections

Modified asphalt sections that the engineer orders removed will be paid at the contract bid prices for items of work required. The plant mix removed shall become the property of the contractor.

27. PLANT MIX BITUMINOUS SURFACING - GRADE D

Plant Mix Bituminous Surfacing Grade D shall conform to all requirements of the Standard Specifications except as changed below.

Article 701.03 Aggregate for Bituminous Surfacing
Change Table 1 to:

Sieve Size	Job Mix Target Limits		Job Mix Tolerance
3/4"	100		0
1/2"	79-83	72-90	±7
3/8"	68-72	61-77	±7
No. 4	44-50	36-57	±7
No. 10	27-33	21 39	±6
No. 40	12-15	8 - 19	±4
No. 200	4.5-6.5	3 - 6	±1.5

Change Article 701.03(A)(3) to read not less than 60% of coarse aggregate particles by weight shall have at least two mechanically fractured faces as determined by MT-217.

Aggregates used in the mix shall consist of crushed particles. Natural fines shall be separated before crushing. The feed to the crusher shall contain no more than 5% passing the No. 4 sieve.

The target Marshall field density will be established by the engineer from results of tests made according to MT-311 from specimens molded with 75 blows per side.

28. DUST COLLECTION SYSTEM FINES

Fine material collected from air pollution control equipment (bag house fines) shall not be returned to mix unless authorized in writing by the engineer. Authorization may be terminated when test results indicate air voids or other mix properties are outside of parameters established by the engineer. Bag house fines, when authorized, shall

APPENDIX C

MATERIALS SAMPLING PLAN

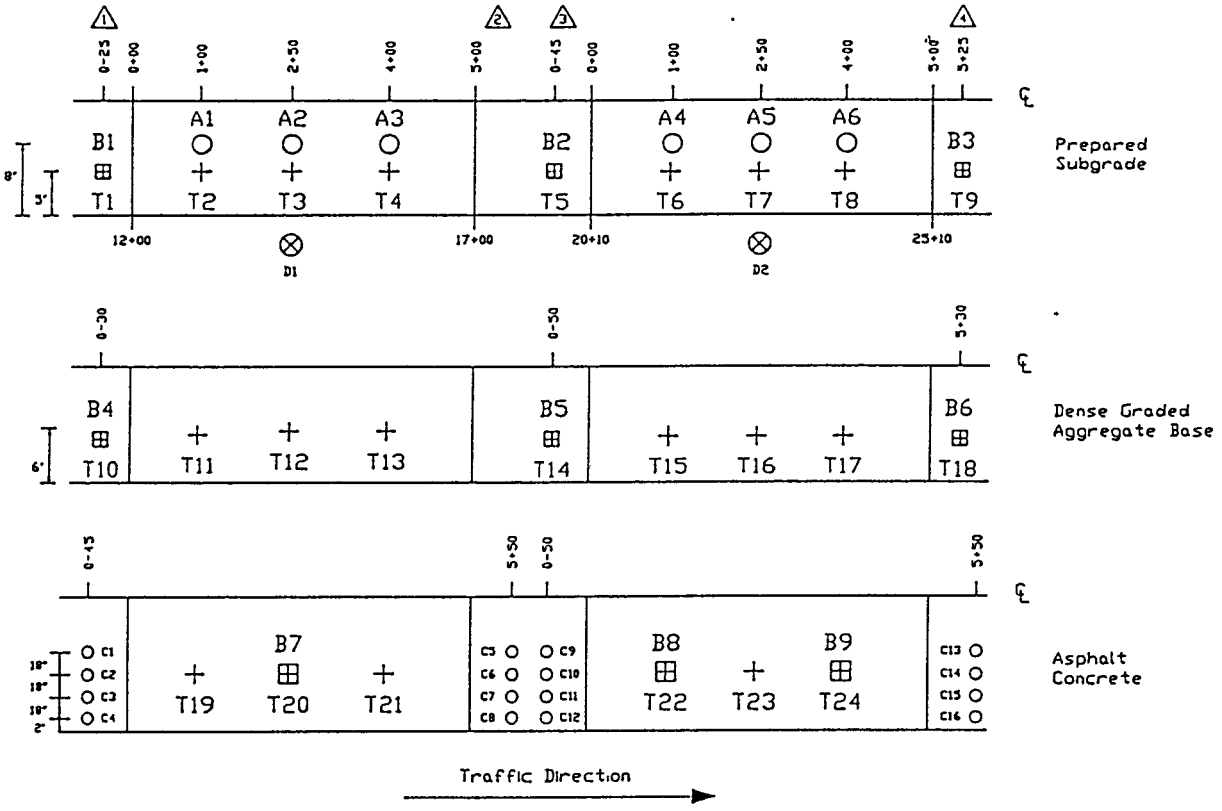


Figure C1. Overview of sampling, testing and coring plan for Asphalt Concrete sections on SPS-8 Montana project.

Field and laboratory test plan for **Subgrade** materials, SPS-8 Montana.

Test Name	SHRP Test Designation	SHRP Protocol	Number of Tests	Material Source / Test Location
Sieve Analysis	SS01	Ship to FHWA Lab	3	B1 - B3
Hydrometer to 0.01 mm	SS02	Ship to FHWA Lab	3	B1 - B3
Atterberg Limits	SS03	Ship to FHWA Lab	3	B1 - B3
Classification and Type of Subgrade	SS04	Ship to FHWA Lab	6	B1 - B3, A1, A3, A5
Classification and Type of Subgrade	SS04	P52[1]	3	A2, A4, A6
Moisture-Density Relations	SS05	Ship to FHWA Lab	3	B1 - B3
Resilient Modulus	SS07	Ship to FHWA Lab	3	A1, A3, A5 or B1 - B3
Unit Weight	SS08	P56	2	A4, A6
Natural Moisture Content	SS09	Ship to FHWA Lab	3	B1 - B3
Unconfined Compression Strength	SS10	P54	2	A2, A4
Permeability	SS11 or UG09	P57 or P48	1	A2 or B2
In-Place Density		SHRP-LTPP Method	9	B1-B3, T1-T6
Expansion Index	SS12	P60	20	D1, D2

Note 1. Visual-manual classification method ONLY.

Field and laboratory test plan for **Dense Graded Aggregate Base** materials, SPS-8 Montana.

Test Name	SHRP Test Designation	SHRP Protocol	Number of Tests	Material Source / Test Location
Particle Size Analysis	UG01	Ship to FHWA lab[1]	3	B4 - B6
Sieve Analysis (washed)	UG02	Ship to FHWA lab[1]	3	B4 - B6
Atterberg Limits	UG04	Ship to FHWA lab[1]	3	B4 - B6
Moisture-Density Relations	UG05	Ship to FHWA lab[1]	3	B4 - B6
Resilient Modulus	UG07	Ship to FHWA lab[1]	3	B4 - B6
Classification	UG08	Ship to FHWA lab[1]	3	B4 - B6
Permeability	UG09	P48	3	B4 - B6
Natural Moisture Content	UG10	Ship to FHWA lab[1]	3	B4 - B6
In-Place Density		SHRP-LTPP Method	9	T10 - T18

Note 1: Ship to FHWA lab after splitting and quartering a 100 pound sample for the state testing.

Field and laboratory test plan for **Asphalt Concrete** surface materials, SPS-8 Montana.

Test Name	SHRP Test Designation	SHRP Protocol	Number of Tests	Material Source / Test Location
Core Examination/Thickness	AC01	P01	3	C10 - C12
Bulk Specific Gravity	AC02	P02	3	C10 - C12
Maximum Specific Gravity	AC03	P03	3	B7 - B9 from paver
Asphalt Content (Extraction)	AC04	P04	3	B7 - B9 from paver
Moisture Susceptibility	AC05	P05	3	B7 - B9 from paver
Creep compliance	AC06	Ship to FHWA Lab	1	C9
Resilient Modulus	AC07	Ship to FHWA Lab	3	C1-C3, C5-C7, C13-C15
Indirect Tensile Strength	AC07	Ship to FHWA Lab	3	C4, C8, C16
In-Place Density		SHRP-LTPP Method	6	T19-T24
Asphalt Cement				
Abson Recovery	AE01	P21	3	B7 - B9 from paver
Penetration @ 50F, 77F, 90F	AE02	P22	3	B7 - B9 from paver
Specific Gravity @ 60F	AE03	P23	3	B7 - B9 from paver
Viscosity @ 77F	AE04	P24	3	B7 - B9 from paver
Viscosity @ 140F, 275F	AE05	P25	3	B7 - B9 from paver
Extracted Aggregate				
Specific Gravity of Coarse Aggregate	AG01	P11	3	B7 - B9 from paver
Specific Gravity of Fine Aggregate	AG02	P12	3	B7 - B9 from paver
Type and Class of Coarse Aggregate	AG03	P13	3	B7 - B9 from paver
~~Type and Class of Fine Aggregate~~	~~AG03~~	~~P13~~	~~3~~	~~B7 - B9 from paver~~
Aggregate Gradation	AG04	P14	3	B7 - B9 from paver
NAA Test for Fine Aggregate Particle Shape	AG05	P14A	3	B7 - B9 from paver
~~NAA Test for Coarse Aggregate Particle Shape~~	~~AG06~~	~~P14B~~	~~3~~	~~B7 - B9 from paver~~
Asphalt Cement (From Plant)				
Penetration @ 50F, 77F, 90F	AE02	P22	3	B10 - B12 from plant
Specific Gravity @ 60F	AE03	P23	3	B10 - B12 from plant
Viscosity @ 77F	AE04	P24	3	B10 - B12 from plant
Viscosity @ 140F, 275F	AE05	P25	3	B10 - B12 from plant

APPENDIX D

CONSTRUCTION DATA FORMS

SPS-8 CONSTRUCTION DATA SHEET 1 PROJECT IDENTIFICATION	* STATE CODE [30] * SPS PROJECT CODE [08] * TEST SECTION NO. [00]

*1. DATE OF DATA COLLECTION OR UPDATE (Month/Year) [04/94]

*2. STATE HIGHWAY AGENCY (SHA) DISTRICT NUMBER [02.]

*3. COUNTY OR PARISH [023.]

4. FUNCTIONAL CLASS (SEE TABLE A.2, APPENDIX A) [09.]

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

*6. ROUTE NUMBER [__273.]

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

8. NUMBER OF THROUGH LANES (ONE DIRECTION) [1.]

*9. DATE OF CONSTRUCTION COMPLETION (Month/Year) [0694]

*10. DATE OPENED TO TRAFFIC (Month/Year) [0694]

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

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

PROJECT STARTING POINT LOCATION

*13. MILEPOINT [__0.66]

*14. ELEVATION [_4200]

*15. LATITUDE [46° 38' __.__"]

*16. LONGITUDE [112° 73' __.__"]

17. ADDITIONAL LOCATION INFORMATION (SIGNIFICANT LANDMARKS): [Located North of Junction with Highway 48, East of Anaconda]

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

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

PREPARER Marco Fellin EMPLOYER NCE DATE 2/1/95

SPS-1 CONSTRUCTION DATA SHEET 2 GEOMETRIC, SHOULDER AND DRAINAGE INFORMATION	* STATE CODE [30] * SPS PROJECT CODE [08] * TEST SECTION NO. [0 3 5]

*1. LANE WIDTH (FEET) [12.]

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

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

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

SHOULDER DATA	INSIDE SHOULDER	OUTSIDE SHOULDER
*5. SURFACE TYPE Turf... 1 Granular.... 2 Asphalt Concrete... 3 Concrete... 4 Surface Treatment... 5 Other (Specify)... 6 _____	[N.]	[3.]
*6. TOTAL WIDTH (FEET)	[__.]	[3.]
*7. PAVED WIDTH (FEET)	[__.]	[3.]
8. SHOULDER BASE TYPE (CODES-TABLE A.6)	[__.]	[23.]
9. SURFACE THICKNESS (INCHES)	[__.]	[7.0]
10. SHOULDER BASE THICKNESS (INCHES)	[__.]	[12.0]
11. DIAMETER OF LONGITUDINAL DRAINPIPES (INCHES)		[N.]
12. SPACING OF LATERALS (FEET)		[N.]

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 3 REFERENCE PROJECT STATION TABLE	* STATE CODE [30] * SPS PROJECT CODE [08] * TEST SECTION NO. [05]

ORDER	*1 TEST SECTION ID NO	REFERENCE PROJECT STATION NUMBER		*4 CUT-FILL[1]	
		*2 START	*3 END	TYPE	STATION
1	300805	0+00	5+00	2	+
2	300806	8+10	13+10	4	VARIES +
3		+	+		+
4		+	+		+
5		+	+		+
6		+	+		+
7		+	+		+
8		+	+		+
9		+	+		+
10		+	+		+
11		+	+		+
12		+	+		+
13		+	+		+
14		+	+		+
15		+	+		+
16		+	+		+
17		+	+		+
18		+	+		+
19		+	+		+
20		+	+		+

*5 INTERSECTIONS BETWEEN TEST SECTION ON THE PROJECT ROUTE	PROJECT STATION NO.	RAMPS EXIT	RAMPS ENT	INTERSECTION STOP	INTERSECTION SIGNAL	INTERSECTION UNSIG
	+					
	+					
	+					

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

PREPARER Nigro Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 4 LAYER DESCRIPTIONS	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 3]

5

*1 LAYER NUMBER	*2 LAYER DESCRIPTION	*3 MATERIAL TYPE CLASS	*4 LAYER THICKNESSES (Inches)			
			AVERAGE	MINIMUM	MAXIMUM	STD. DEV.
1	SUBGRADE(7)	[5 9]				
2	[0 5]	[2 3]	[7.1]	5.6	10.1	0.9
3	[0 3]	[0 1]	[4.5]	3.5	5.3	0.4
4	[ ]	[ ]	[ ]			
5	[ ]	[ ]	[ ]			
6	[ ]	[ ]	[ ]			
7	[ ]	[ ]	[ ]			
8	[ ]	[ ]	[ ]			
9	[ ]	[ ]	[ ]			
10	[ ]	[ ]	[ ]			
11	[ ]	[ ]	[ ]			
12	[ ]	[ ]	[ ]			
13	[ ]	[ ]	[ ]			
14	[ ]	[ ]	[ ]			
15	[ ]	[ ]	[ ]			

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

NOTES:

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

2. Layer description codes:

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

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

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

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 5 PLANT-MIXED ASPHALT BOUND LAYERS AGGREGATE PROPERTIES	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 3]

5

*1. LAYER NUMBER (FROM SHEET 4) [2]

		TYPE	PERCENT
	COMPOSITION OF COARSE AGGREGATE		
*2.	Crushed Stone... 1 Gravel... 2 Crushed Gravel... 3	[3]	[1 0 0.]
*3.	Crushed Slag... 4 Manufactured Lightweight... 5	[__]	[__ __ __.]
*4.	Other (Specify)... 6 _____	[__]	[__ __ __.]
	COMPOSITION OF FINE AGGREGATE	TYPE	PERCENT
*5.	Natural Sand... 1	[2]	[1 0 0.]
*6.	Crushed or Manufactured Sand (From Crushed Gravel or	[__]	[__ __ __.]
*7.	Stone... 2 Recycled Concrete... 3 Other (Specify)... 4 _____	[__]	[__ __ __.]

*8. TYPE OF MINERAL FILLER [2]
Stone Dust... 1 Hydrated Lime... 2 Portland Cement... 3
Fly Ash... 4
Other (Specify)... 5 _____

BULK SPECIFIC GRAVITIES:

*9.	Coarse Aggregate (AASHTO T85 or ASTM C127)	[2.664]
*10.	Fine Aggregate (AASHTO T84 or ASTM C128)	[2.717]
*11.	Mineral Filler (AASHTO T100 or ASTM D854)	[__.__ __ U]
*12.	Aggregate Combination (Calculated)	[2.694]
13.	Effective Specific Gravity of Aggregate Combination (Calculated)	[__.__ __ U]

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

	TYPE OF AGGREGATE	TYPE OF TEST	RESULTS
14.	Coarse	[__ U]	[__ __ __.__ __ U]
15.	Coarse	[__ U]	[__ __ __.__ __ U]
16.	Coarse	[__ U]	[__ __ __.__ __ U]
17.	Coarse and Fine - Combined	[__ U]	[__ __ __.__ __ U]

18. POLISH VALUE OF COARSE AGGREGATES
SURFACE LAYER ONLY (AASHTO T279, ASTM D3319) __ U.

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 6 PLANT-MIXED ASPHALT BOUND LAYERS ASPHALT CEMENT PROPERTIES	* STATE CODE [3 0] * SPS PROJECT CODE [0 3] * TEST SECTION NO. [0 3] → 35

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

*2. ASPHALT GRADE (SEE ASPHALT CODE SHEET, TABLE A.16) [1 4]
(IF OTHER, SPECIFY) _____

*3. SOURCE (SEE SUPPLY CODE SHEET, TABLE A.14) [7 7]
(IF OTHER, SPECIFY) MRC Refinery

4. SPECIFIC GRAVITY OF ASPHALT CEMENT (AASHTO T228) [_._ _ U]

GENERAL ASPHALT CEMENT PROPERTIES (If available from supplier)

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

6. VISCOSITY OF ASPHALT AT 275°F (CENTISTOKES) (AASHTO T202) [_ _ _ _._ U]

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

ASPHALT MODIFIERS (SEE TYPE CODE, A.15)

		TYPE	QUANTITY (%)
8.	MODIFIER #1	[_ _]	[_ N.]
9.	MODIFIER #2 (IF OTHER, SPECIFY) _____	[_ _]	[_ N.]

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

11. DUCTILITY AT 39.2°F (CM) (AASHTO T51) [_ _ U.]

12. TEST RATE FOR DUCTILITY MEASUREMENT AT 39.2°f (CM/MIN) [_ _ U.]

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

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

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

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 7 PLANT-MIXED ASPHALT BOUND LAYERS MIXTURE PROPERTIES	* STATE CODE [30] * SPS PROJECT CODE [08] * TEST SECTION NO. [05]

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

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

*3. MAXIMUM SPECIFIC GRAVITY (NO AIR VOIDS) (AASHTO T209 OR ASTM D2041) [2.520] (Avg. of 12 tests)

BULK SPECIFIC GRAVITY (ASTM D1188) (Includes 2 lifts)

*4. MEAN [2.433] NUMBER OF TESTS [4.]

5. MINIMUM [2.418] MAXIMUM [2.449]

6. STD. DEV. [0.013]

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

*7. MEAN [__.__ __ N] NUMBER OF SAMPLES [__ N.]

8. MINIMUM [__.__ __ N] MAXIMUM [__.__ __ N]

9. STD. DEV. [__.__ __ N]

PERCENT AIR VOIDS (Includes 2 lifts)

*10. MEAN [3.375] NUMBER OF SAMPLES [__ 4.]

11. MINIMUM [2.3 __ __] MAXIMUM [4.4 __ __]

12. STD. DEV. [0.988]

*13. VOIDS IN MINERAL AGGREGATE (PERCENT) [14.4] Dec,

*14. EFFECTIVE ASPHALT CONTENT (PERCENT) [__ __.N]

*15. MARSHALL STABILITY (LBS) (AASHTO T245 OR ASTM D1559) 2704 [_____.]

*16. NUMBER OF BLOWS [75]

*17. MARSHALL FLOW (HUNDREDTHS OF AN INCH) (AASHTO T245 OR ASTM D1559) [___ 9.]

*18. HVEEM STABILITY (AASHTO T246 OR ASTM D1561) [__ N.]

*19. HVEEM COHESIOMETER VALUE (GRAMS/25 MM OF WIDTH) (AASHTO T246 OR ASTM 1561) [___ N.]

PREPARER Marcc Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 8 PLANT-MIXED ASPHALT BOUND LAYERS MIXTURE PROPERTIES (CONTINUED)	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 5]

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

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

*3. TYPE ASPHALT PLANT [2]

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

OTHER (SPECIFY)... 3 _____

*4. TYPE OF ANTISTRIPPING AGENT USED [1 7]
(SEE TYPE CODES, TABLE A.21)
OTHER (SPECIFY) _____

*5. AMOUNT OF ANTISTRIPPING AGENT USED LIQUID OR SOLID CODE [2]

*6. (If liquid, enter code 1, and amount as percent of asphalt cement weight. If solid, enter code 2 and amount as percent of aggregate weight.) [1.4]

PREPARER Mario Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 9 PLANT-MIXED ASPHALT BOUND LAYERS PLACEMENT DATA	* STATE CODE [30] * SPS PROJECT CODE [08] * TEST SECTION NO. [03] 5

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [06-27-95]

*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [06-29-95]

*3 ASPHALT CONCRETE PLANT AND HAUL

	Type	Name	Haul Distance (Mi)	Time (Min)	Layer Numbers
Plant 1	[2]	Barber Greene	[0.5] ≈ 1	[3]	[3] [ ] [ ]
Plant 2	[ ]		[ ]	[ ]	[ ] [ ] [ ]
Plant 3	[ ]		[ ]	[ ]	[ ] [ ] [ ]

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

4. MANUFACTURER OF ASPHALT CONCRETE PAVER Blaw Knox

5. MODEL DESIGNATION OF ASPHALT CONCRETE PAVER PF-200

6. SINGLE PASS LAYDOWN WIDTH (Feet) [15.0]

7. ATB PLACEMENT LIFTS
   - Layer Number [N]
   - Nominal First Lift Placement Thickness (Inches) [.N]
   - Nominal Second Lift Placement Thickness (Inches) [.N]
   - Nominal Third Lift Placement Thickness (Inches) [.N]
   - Nominal Fourth Lift Placement Thickness (Inches) [.N]

8. PATB PLACEMENT LIFTS
   - Layer Number [N]
   - Nominal First Lift Placement Thickness (Inches) [.N]
   - Nominal Second Lift Placement Thickness (Inches) [.N]

9. AC BINDER COURSE LIFT
   - Layer Number [N]
   - Nominal First Lift Placement Thickness (Inches) [.N]
   - Nominal Second Lift Placement Thickness (Inches) [.N]

10. AC SURFACE COURSE LIFT
    - Layer Number [3]
    - Nominal First Lift Placement Thickness (Inches) [2.8]
    - Nominal Second Lift Placement Thickness (Inches) [3.2]

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

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

13. LOCATION OF LONGITUDINAL SURFACE JOINT [1]
    Between lanes.. 1 Within lane.. 2
    (specify offset from O/S feet) [4.0]

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

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 10 PLANT-MIXED ASPHALT BOUND LAYERS COMPACTION DATA	* STATE CODE [30] * SPS PROJECT CODE [08] * TEST SECTION NO [05/37]

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [06-27-95]
*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [06-29-95]
*3. LAYER NUMBER Lifts 1 and 2 Combined [3]
*4. MIXING TEMPERATURE (°F) [290.]

5. LAYDOWN TEMPERATURES (°F)
Mean..... 270.
Minimum..... 261.
Standard Deviation... 4.2
Number of Tests ..... 31.
Maximum..... 277.

ROLLER DATA

	Roller Code #	Roller Description	Gross Wt (Tons)	Tire Press. (psi)	Frequency (Vibr./Min)	Amplitude (Inches)	Speed (mph)
6	A	Steel-Whl Tandem					
7	B	Steel-Whl Tandem					
8	C	Steel-Whl Tandem					
9	D	Steel-Whl Tandem					
10	E	Pneumatic-Tired					
11	F	Pneumatic-Tired					
12	G	Pneumatic-Tired					
13	H	Pneumatic-Tired					
14	I	Single-Drum Vibr.					
15	J	Single-Drum Vibr.					
16	K	Single-Drum Vibr.					
17	L	Single-Drum Vibr.					
18	M	Double-Drum Vibr.	11.7				2.7
19	N	Double-Drum Vibr.					
20	O	Double-Drum Vibr.					
21	P	Double-Drum Vibr.					
22	Q	Other D.D. Vibratory	11.7 – Same as M but Static Mode				

	COMPACTION DATA	First Lift	Second Lift	Third Lift	Fourth Lift
23	BREAKDOWN Roller Code (A-Q)	M	M		
24	Coverages	3.	3.		
25	INTERMEDIATE Roller Code (A-Q)	M	M		
26	Coverages	3.	3.		
27	FINAL Roller Code (A-Q)	Q	Q		
28	Coverages	4.	4		
29	Air Temperature (°F)	75.	75		
30	Compacted Thickness (In)	2.0	25		
31	Curing Period (Days)	0.5	05		

PREPARER Marcc Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 11 PLANT-MIXED ASPHALT BOUND LAYERS DENSITY AND PROFILE DATA	* STATE CODE [3 0] * SPS PROJECT CODE [0 3] * TEST SECTION NO. [0 5]

1. NUCLEAR DENSITY MEASUREMENTS

LAYER TYPE	ATB	Binder Course	Surface Course	Surface Friction Layer
Measurement Method (A, B, C)[1]			VI	
Number of Measurements				
Average (pcf)				
Maximum (pcf)				
Minimum (pcf)				
Standard Deviation (pcf)				
Layer Number				

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

2. MANUFACTURER OF NUCLEAR DENSITY GAUGE

3. NUCLEAR DENSITY GAUGE MODEL NUMBER

4. NUCLEAR DENSITY GAUGE IDENTIFICATION NUMBER

5. NUCLEAR GAUGE COUNT RATE FOR STANDARDIZATION

6. PROFILOGRAPH MEASUREMENTS

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

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

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

the north bound lane is the Construction Data Sheet for Guardrail (12 stations)

September 1992

SPS-8 CONSTRUCTION DATA SHEET 12 LAYER THICKNESS MEASUREMENTS	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 3]

SHEET ____ OF ____

STATION NUMBER	OFFSET (Inches) ±	LAYER THICKNESS MEASUREMENTS (Inches)			
		DENSE GRADED AGGREGATE BASE	PORTLAND CEMENT CONCRETE SURFACE	ASPHALT SURFACE AND BINDER	SURFACE FRICTION LAYER
0+00	144 108 072 036 000	10.1 08.5 07.6 07.0 06.2	___.___ ___.___ ___.___ ___.___ ___.___	03.7 04.1 04.6 04.8 05.2	___.___ ___.___ ___.___ ___.___ ___.___
0+50	144 108 072 036 000	10.0 07.8 06.7 06.1 06.0	___.___ ___.___ ___.___ ___.___ ___.___	04.3 04.4 04.6 04.9 05.3	___.___ ___.___ ___.___ ___.___ ___.___
1+00	144 108 072 036 000	07.1 07.2 07.6 07.6 07.6	___.___ ___.___ ___.___ ___.___ ___.___	04.1 04.3 04.6 04.8 04.9	___.___ ___.___ ___.___ ___.___ ___.___
1+50	144 108 072 036 000	06.2 05.6 06.0 06.2 07.0	___.___ ___.___ ___.___ ___.___ ___.___	04.0 04.7 04.7 04.8 04.9	___.___ ___.___ ___.___ ___.___ ___.___
2+00	144 108 072 036 000	07.2 06.4 06.2 06.7 07.2	___.___ ___.___ ___.___ ___.___ ___.___	04.0 04.8 04.8 04.6 04.9	___.___ ___.___ ___.___ ___.___ ___.___
2+50	144 108 072 036 000	06.2 06.4 06.7 07.4 07.7	___.___ ___.___ ___.___ ___.___ ___.___	03.8 04.3 04.6 04.6 04.7	___.___ ___.___ ___.___ ___.___ ___.___
3+00	144 108 072 036 000	05.2 07.3 07.1 07.2 07.5	___.___ ___.___ ___.___ ___.___ ___.___	03.7 04.6 04.6 04.4 04.8	___.___ ___.___ ___.___ ___.___ ___.___
LAYER NUMBER		02	___	03	___

PREPARER T. Sauer EMPLOYER RIST DATE 7/15/94

SPS-8 CONSTRUCTION DATA SHEET 12 LAYER THICKNESS MEASUREMENTS	* STATE CODE [30] * SPS PROJECT CODE [08] * TEST SECTION NO. [03]

SHEET ____ OF ____

STATION NUMBER	OFFSET (Inches)	LAYER THICKNESS MEASUREMENTS (Inches)			
		DENSE GRADED AGGREGATE BASE	PORTLAND CEMENT CONCRETE SURFACE	ASPHALT SURFACE AND BINDER	SURFACE FRICTION LAYER
3+50	144	9.7	___.___	3.5	___.___
	108	7.9	___.___	4.1	___.___
	72	7.5	___.___	4.3	___.___
	36	7.5	___.___	4.9	___.___
	00	7.5	___.___	4.9	___.___
4+00	144	7.2	___.___	4.1	___.___
	108	7.0	___.___	4.3	___.___
	72	7.0	___.___	4.4	___.___
	36	7.3	___.___	4.6	___.___
	00	7.1	___.___	4.8	___.___
4+50	144	7.3	___.___	3.7	___.___
	108	6.2	___.___	4.6	___.___
	72	6.1	___.___	4.7	___.___
	36	5.9	___.___	4.9	___.___
	00	6.4	___.___	5.0	___.___
5+00	144	6.6	___.___	4.0	___.___
	108	6.0	___.___	4.6	___.___
	72	5.9	___.___	4.4	___.___
	36	6.4	___.___	4.4	___.___
	00	6.7	___.___	4.6	___.___
5+50	144	6.7	___.___	4.3	___.___
	108	6.5	___.___	4.0	___.___
	72	6.5	___.___	3.7	___.___
	36	6.6	___.___	4.0	___.___
	00	6.5	___.___	4.3	___.___
6+00	144	8.2	___.___	4.0	___.___
	108	7.3	___.___	4.4	___.___
	72	7.6	___.___	4.3	___.___
	36	7.9	___.___	4.3	___.___
	00	7.9	___.___	4.9	___.___
___+___	___	___.___	___.___	___.___	___.___
	___	___.___	___.___	___.___	___.___
	___	___.___	___.___	___.___	___.___
	___	___.___	___.___	___.___	___.___
	___	___.___	___.___	___.___	___.___
LAYER NUMBER		02	____	03	____

PREPARER T. Sauer EMPLOYER NDT DATE 7/25/94

SPS-8 CONSTRUCTION DATA SHEET 13 UNBOUND AGGREGATE BASE MATERIAL PLACEMENT	* STATE CODE [30] * SPS PROJECT CODE [08] * TEST SECTION NO. [03]

5

*1. UNBOUND BASE MATERIAL PLACEMENT BEGAN (Month-Day-Year) [05-04-94]

*2. UNBOUND BASE MATERIAL PLACEMENT COMPLETED (Month-Day-Year) [05-04-94]

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

PRIMARY COMPACTION EQUIPMENT

*4. CODE TYPE [4]

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

*5. GROSS WEIGHT (TONS) [10.0] ?

*6. LIFT THICKNESSES
Nominal First Lift Placement Thickness (inches) [6]
Nominal Second Lift Placement Thickness (inches) [2]
Nominal Third Lift Placement Thickness (inches) [ ]
Nominal Fourth Lift Placement Thickness (inches) [ ]

DENSITY DATA IS RECORDED ON SAMPLING DATA SHEET 8-1

7. SIGNIFICANT EVENTS DURING CONSTRUCTION (DISRUPTIONS, RAIN, EQUIPMENT PROBLEMS, ETC.) No Dozer was used - Motor grader and water truck used for achieving moisture content

Cloudy skies. 50-60°F Breezy

Design: Avg of 2 proctors
Density - 137.5
Moisture - 7.2

PREPARER Tim Sauer EMPLOYER Montana DOT DATE 5/4/94

SPS-8 CONSTRUCTION DATA SHEET 14 SUBGRADE PREPARATION	* STATE CODE [30] * SPS PROJECT CODE [08] * TEST SECTION NO. [08]

*1. SUBGRADE PREPARATION BEGAN (Month-Day-Year) [04-06-94]

*2. SUBGRADE PREPARATION COMPLETED (Month-Day-Year) [04-20-94]

PRIMARY COMPACTION EQUIPMENT

*3. CODE TYPE [4]

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

*4. GROSS WEIGHT (TONS) [17.0]

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

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

*7. TYPICAL LIFT THICKNESS (INCHES) [12]
(For Fill Sections Only)

DENSITY DATA IS RECORDED ON SAMPLING DATA SHEET 8-1

8. SIGNIFICANT EVENTS DURING CONSTRUCTION (DISRUPTIONS, RAIN, EQUIPMENT PROBLEMS, ETC.) LARGE ROCKS IN FILL MATERIAL WARRANTED THICKER LIFT

PREPARER R. Scott EMPLOYER NCE DATE 4/20/94

SPS-1 CONSTRUCTION DATA SHEET 15 CUT-FILL SECTION LOCATIONS	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 5]

ORDER	*1 CUT-FILL[1]	REFERENCE PROJECT STATION NUMBER		*4 TEST SECTION NO
		*2 START	*3 END	
1	2	0 + 0 0	5 + 0 0	3 0 0 8 0 5
2	1	8 + 1 0	1 3 + 1 0	3 0 0 8 0 6
3		+	+	
4		+	+	
5		+	+	
6		+	+	
7		+	+	
8		+	+	
9		+	+	
10		+	+	
11		+	+	
12		+	+	
13		+	+	
14		+	+	
15		+	+	
16		+	+	
17		+	+	
18		+	+	
19		+	+	
20		+	+	
21		+	+	
22		+	+	
23		+	+	
24		+	+	
25		+	+	

NOTES:

1. Indicate the type of subgrade section with one of the following: Cut... 1 Fill... 2

2. A given Test Section No. will be repeated if both cut and fill sections exist within the test section.

PREPARER Marcofellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 16 SUBGRADE EXCAVATION AND BACKFILLING SKETCH	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 4] 35

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 17 MISCELLANEOUS CONSTRUCTION NOTES AND COMMENTS	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 3]

5

Provide any miscellaneous comments and notes concerning construction operations which may have an influence on the ultimate performance of the test sections or which may cause undesired performance differences to occur between test sections. Also include any quality control measurements or data for which space is not provided on other forms. Provide an indication of the basis for such measurements, such as an ASTM, AASHTO, or Agency standard test designation.

The prime coat of MC-70 oil was placed on the aggregate base on May 12th, 1994. By the time of paving on June 27, 1994, significant potholing had developed. The potholes were filled with an AC material and then compacted.

On June 28th the State had an out of specification test on Sieve No. 4, just prior to paving lift-2 on both SHRP sections.

On June 29th, visual bleeding was present from Station 14+50 to 20+10 within Section 300806. The State said that 5.4% AC was present in this area.

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-8 CONSTRUCTION DATA SHEET 2 GEOMETRIC, SHOULDER AND DRAINAGE INFORMATION	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 X]

(6)

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

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

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

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

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

PREPARER Marco Fellin EMPLOYER NCE DATE 2/1/95

SPS-1 CONSTRUCTION DATA SHEET 3 REFERENCE PROJECT STATION TABLE	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 6]

ORDER	*1 TEST SECTION ID NO	REFERENCE PROJECT STATION NUMBER		*4 CUT-FILL[1]	
		*2 START	*3 END	TYPE	STATION
1	300805	0+00	5+00	2	
2	300806	8+10	13+10	4	VARIES
3		+	+		
4		+	+		
5		+	+		
6		+	+		
7		+	+		
8		+	+		
9		+	+		
10		+	+		
11		+	+		
12		+	+		
13		+	+		
14		+	+		
15		+	+		
16		+	+		
17		+	+		
18		+	+		
19		+	+		
20		+	+		

*5 INTERSECTIONS BETWEEN TEST SECTION ON THE PROJECT ROUTE	PROJECT STATION NO.	RAMPS EXIT	RAMPS ENT	INTERSECTION STOP	INTERSECTION SIGNAL	INTERSECTION UNSIG
	+__					
	+__					
	+__					

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

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 4 LAYER DESCRIPTIONS	* STATE CODE [30] * SPS PROJECT CODE [08] * TEST SECTION NO. [0A]

6

*1 LAYER NUMBER	*2 LAYER DESCRIPTION	*3 MATERIAL TYPE CLASS	*4 LAYER THICKNESSES (Inches)			
			AVERAGE	MINIMUM	MAXIMUM	STD. DEV.
1	SUBGRADE(7)	[59]	[redacted]	[redacted]	[redacted]	[redacted]
2	[05]	[23]	[11.8]	10.7	13.6	0.8
3	[03]	[01]	[6.9]	6.2	7.7	0.3
4	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
5	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
6	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
7	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
8	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
9	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
10	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
11	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
12	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
13	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
14	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
15	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._

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

NOTES:

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

2. Layer description codes:

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

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

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

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 5 PLANT-MIXED ASPHALT BOUND LAYERS AGGREGATE PROPERTIES	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 4] 6

*1. LAYER NUMBER (FROM SHEET 4) [2]

		TYPE	PERCENT
	COMPOSITION OF COARSE AGGREGATE		
*2.	Crushed Stone... 1 Gravel... 2 Crushed Gravel... 3	[3]	[1 0 0.]
*3.	Crushed Slag... 4 Manufactured Lightweight... 5	[__]	[__ __ __.]
*4.	Other (Specify)... 6 _____	[__]	[__ __ __.]
	COMPOSITION OF FINE AGGREGATE	TYPE	PERCENT
*5.	Natural Sand... 1	[2]	[1 0 0.]
*6.	Crushed or Manufactured Sand (From Crushed Gravel or	[__]	[__ __ __.]
*7.	Stone... 2 Recycled Concrete... 3 Other (Specify)... 4 _____	[__]	[__ __ __.]

*8. TYPE OF MINERAL FILLER [2]
Stone Dust... 1 Hydrated Lime... 2 Portland Cement... 3
Fly Ash... 4
Other (Specify)... 5 _____

BULK SPECIFIC GRAVITIES:

*9. Coarse Aggregate (AASHTO T85 or ASTM C127) [2.6 6 4]

*10. Fine Aggregate (AASHTO T84 or ASTM C128) [2.7 1 7]

*11. Mineral Filler (AASHTO T100 or ASTM D854) [__.__ __ U]

*12. Aggregate Combination (Calculated) [2.6 9 4]

13. Effective Specific Gravity of Aggregate Combination (Calculated) [__.__ __ U]

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

	TYPE OF AGGREGATE	TYPE OF TEST	RESULTS
14.	Coarse	[__ U]	[__ __ __.__ __ U]
15.	Coarse	[__ /]	[__ __ __:__ __ /]
16.	Coarse	[__ .]	[__ __ __.__ __ \]
17.	Coarse and Fine - Combined	[__ ▽]	[__ __ __.__ __ |]

18. POLISH VALUE OF COARSE AGGREGATES
SURFACE LAYER ONLY (AASHTO T279, ASTM D3319) __▽.

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 6 PLANT-MIXED ASPHALT BOUND LAYERS ASPHALT CEMENT PROPERTIES	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 ~~2~~ 6]

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

*2. ASPHALT GRADE (SEE ASPHALT CODE SHEET, TABLE A.16) [1 4]
(IF OTHER, SPECIFY) _____

*3. SOURCE (SEE SUPPLY CODE SHEET, TABLE A.14) [7 7]
(IF OTHER, SPECIFY) MRC Refinery

4. SPECIFIC GRAVITY OF ASPHALT CEMENT (AASHTO T228) [_._ _ N]

GENERAL ASPHALT CEMENT PROPERTIES (If available from supplier)

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

6. VISCOSITY OF ASPHALT AT 275°F (CENTISTOKES) (AASHTO T202) [_ _ _ _._ _]

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

ASPHALT MODIFIERS (SEE TYPE CODE, A.15)

		TYPE	QUANTITY (%)
8.	MODIFIER #1	[_ _]	[_ N.]
9.	MODIFIER #2 (IF OTHER, SPECIFY) _____	[_ _]	[_ N.]

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

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

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

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

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

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

PREPARER Marcie Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 7 PLANT-MIXED ASPHALT BOUND LAYERS MIXTURE PROPERTIES	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 4] 6

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

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

*3. MAXIMUM SPECIFIC GRAVITY (NO AIR VOIDS) (AASHTO T209 OR ASTM D2041) [2.520] (Avg. of 12 tests

BULK SPECIFIC GRAVITY (ASTM D1188) (Includes 3 lifts)

*4. MEAN [2.430] NUMBER OF TESTS [6.]

5. MINIMUM [2.418] MAXIMUM [2.449]

6. STD. DEV. [0.012]

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

*7. MEAN [__.__ U] NUMBER OF SAMPLES [__ U.]

8. MINIMUM [__.__ U] MAXIMUM [__.__ U]

9. STD. DEV. [__.__ U]

PERCENT AIR VOIDS (Includes 3 lifts)

*10. MEAN [3.850] NUMBER OF SAMPLES [6.]

11. MINIMUM [2.3__] MAXIMUM [5.0__]

12. STD. DEV. [1.069]

*13. VOIDS IN MINERAL AGGREGATE (PERCENT) [14.4] De

*14. EFFECTIVE ASPHALT CONTENT (PERCENT) [__.U]

*15. MARSHALL STABILITY (LBS) (AASHTO T245 OR ASTM D1559) (2704) [2704]

*16. NUMBER OF BLOWS [75]

*17. MARSHALL FLOW (HUNDREDTHS OF AN INCH) (AASHTO T245 OR ASTM D1559) [___9.]

*18. HVEEM STABILITY (AASHTO T246 OR ASTM D1561) [__N.]

*19. HVEEM COHESIOMETER VALUE (GRAMS/25 MM OF WIDTH) (AASHTO T246 OR ASTM 1561) [___N.]

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 8 PLANT-MIXED ASPHALT BOUND LAYERS MIXTURE PROPERTIES (CONTINUED)	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 4] 6

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

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

*3. TYPE ASPHALT PLANT [2]

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

OTHER (SPECIFY)... 3 _____

*4. TYPE OF ANTISTRIPPING AGENT USED [1 7]
(SEE TYPE CODES, TABLE A.21)
OTHER (SPECIFY) _____

*5. AMOUNT OF ANTISTRIPPING AGENT USED LIQUID OR SOLID CODE [2]

*6. (If liquid, enter code 1, and amount as percent of asphalt cement weight. If solid, enter code 2 and amount as percent of aggregate weight.) [1.4]

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 9 PLANT-MIXED ASPHALT BOUND LAYERS PLACEMENT DATA	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 4]

6

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [06-27-95]

*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [06-29-95]

*3 ASPHALT CONCRETE PLANT AND HAUL

	Type	Name	Haul Distance (Mi)	Time (Min)	Layer Numbers
Plant 1	[2]	Barber Greene	[0.5]	[3]	[3] [ ] [ ]
Plant 2	[ ]		[ ]	[ ]	[ ] [ ] [ ]
Plant 3	[ ]		[ ]	[ ]	[ ] [ ] [ ]

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

4. MANUFACTURER OF ASPHALT CONCRETE PAVER Blaw Knox

5. MODEL DESIGNATION OF ASPHALT CONCRETE PAVER PF-200

6. SINGLE PASS LAYDOWN WIDTH (Feet) [15.0]

7. ATB PLACEMENT LIFTS
   - Layer Number [N]
   - Nominal First Lift Placement Thickness (Inches) [.]
   - Nominal Second Lift Placement Thickness (Inches) [.]
   - Nominal Third Lift Placement Thickness (Inches) [.]
   - Nominal Fourth Lift Placement Thickness (Inches) [.]

8. PATB PLACEMENT LIFTS
   - Layer Number [N]
   - Nominal First Lift Placement Thickness (Inches) [.]
   - Nominal Second Lift Placement Thickness (Inches) [.]

9. AC BINDER COURSE LIFT
   - Layer Number [3]
   - Nominal First Lift Placement Thickness (Inches) [3.0] Lif
   - Nominal Second Lift Placement Thickness (Inches) [.]

10. AC SURFACE COURSE LIFT
   - Layer Number [3]
   - Nominal First Lift Placement Thickness (Inches) [3.1] Lif
   - Nominal Second Lift Placement Thickness (Inches) [3.0] Lif.

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

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

13. LOCATION OF LONGITUDINAL SURFACE JOINT [1]
   Between lanes.. 1 Within lane.. 2
   (specify offset from O/S feet) [4.0]

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

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA
SHEET 10
PLANT-MIXED ASPHALT BOUND LAYERS
COMPACTION DATA

* STATE CODE [3 0]
* SPS PROJECT CODE [0 8]
* TEST SECTION NO. [0 4] 6

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [0 6-2 7-9 5]
*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [0 6-2 9-9 5]
*3. LAYER NUMBER Lifts 1,2,3 Combined [3]
*4. MIXING TEMPERATURE (°F) [2 9 0.]

5. LAYDOWN TEMPERATURES (°F)
Mean..... 2 6 7.
Minimum..... 2 5 2.
Standard Deviation... 6.9
Number of Tests ..... 4 6.
Maximum ..... 2 8 4.

ROLLER DATA

	Roller Code #	Roller Description	Gross Wt (Tons)	Tire Press. (psi)	Frequency (Vibr./Min)	Amplitude (Inches)	Speed (mph)
6	A	Steel-Whl Tandem					
7	B	Steel-Whl Tandem					
8	C	Steel-Whl Tandem					
9	D	Steel-Whl Tandem					
10	E	Pneumatic-Tired					
11	F	Pneumatic-Tired					
12	G	Pneumatic-Tired					
13	H	Pneumatic-Tired					
14	I	Single-Drum Vibr.					
15	J	Single-Drum Vibr.					
16	K	Single-Drum Vibr.					
17	L	Single-Drum Vibr.					
18	M	Double-Drum Vibr.	11.7				2.7
19	N	Double-Drum Vibr.					
20	O	Double-Drum Vibr.					
21	P	Double-Drum Vibr.					
22	Q	Other D.D Vibratory	11.7 - Same as M but Static mode				

	COMPACTION DATA	First Lift	Second Lift	Third Lift	Fourth Lift
	BREAKDOWN				
23	Roller Code (A-Q)	M	M	M	
24	Coverages	3.	3.	3.	.
	INTERMEDIATE				
25	Roller Code (A-Q)	M	M	M	
26	Coverages	3.	3.	3.	.
	FINAL				
27	Roller Code (A-Q)	Q	Q	Q	
28	Coverages	4.	4	4.	.
29	Air Temperature (°F)	75	75	75.	.
30	Compacted Thickness (In)	2.0	2 0	3 0	.
31	Curing Period (Days)	0.5	0 5	0 5	.

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 11 PLANT-MIXED ASPHALT BOUND LAYERS DENSITY AND PROFILE DATA	* STATE CODE [3 0] * SPS PROJECT CODE [0 3] * TEST SECTION NO. [0 4]

6

1. NUCLEAR DENSITY MEASUREMENTS

LAYER TYPE	ATB	Binder Course	Surface Course	Surface Friction Layer
Measurement Method (A, B, C)[1]	___	___	4	___
Number of Measurements	___ ___	___ ___	___ ___	___ ___
Average (pcf)	___ ___ ___.___	___ ___ ___.___	___ ___ ___.___	___ ___ ___.___
Maximum (pcf)	___ ___ ___.___	___ ___ ___.___	___ ___ ___.___	___ ___ ___.___
Minimum (pcf)	___ ___ ___.___	___ ___ ___.___	___ ___ ___.___	___ ___ ___.___
Standard Deviation (pcf)	___ ___ ___.___	___ ___ ___.___	___ ___ ___.___	___ ___ ___.___
Layer Number	___ ___	___ ___	___ ___	___ ___

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

2. MANUFACTURER OF NUCLEAR DENSITY GAUGE _____

3. NUCLEAR DENSITY GAUGE MODEL NUMBER _____

4. NUCLEAR DENSITY GAUGE IDENTIFICATION NUMBER _____

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

6. PROFILOGRAPH MEASUREMENTS

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

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

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-8 CONSTRUCTION DATA SHEET 12 LAYER THICKNESS MEASUREMENTS	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 4]

6

SHEET ____ OF ____

STATION NUMBER	OFFSET (Inches)	LAYER THICKNESS MEASUREMENTS (Inches)			
		DENSE GRADED AGGREGATE BASE	PORTLAND CEMENT CONCRETE SURFACE	ASPHALT SURFACE AND BINDER	SURFACE FRICTION LAYER
0+10	144	12.2	___.___	_6.5	___.___
	108	12.0	___.___	_6.5	___.___
	_72	12.5	___.___	_6.5	___.___
	_36	13.0	___.___	_6.4	___.___
	__0	12.8	___.___	_6.7	___.___
0+40	144	12.6	___.___	_7.2	___.___
	108	11.3	___.___	_7.4	___.___
	_72	12.0	___.___	_7.3	___.___
	_36	12.1	___.___	_7.4	___.___
	__0	11.5	___.___	_7.7	___.___
0+90	144	11.6	___.___	_7.2	___.___
	108	11.4	___.___	_7.1	___.___
	_72	11.6	___.___	_7.0	___.___
	_36	11.6	___.___	_7.2	___.___
	__0	11.5	___.___	_7.4	___.___
1+40	144	13.1	___.___	_6.2	___.___
	108	12.8	___.___	_6.6	___.___
	_72	13.2	___.___	_6.7	___.___
	_36	13.6	___.___	_7.1	___.___
	__0	13.1	___.___	_7.2	___.___
1+90	144	12.2	___.___	_6.5	___.___
	108	11.6	___.___	_6.7	___.___
	_72	11.8	___.___	_7.0	___.___
	_36	11.8	___.___	_7.2	___.___
	__0	11.8	___.___	_7.2	___.___
2+40	144	13.6	___.___	_6.4	___.___
	108	12.7	___.___	_6.8	___.___
	_72	12.0	___.___	_7.2	___.___
	_36	12.5	___.___	_7.1	___.___
	__0	12.0	___.___	_7.1	___.___
2+90	144	11.6	___.___	_7.0	___.___
	108	10.8	___.___	_7.0	___.___
	_72	10.7	___.___	_7.2	___.___
	_36	11.4	___.___	_7.1	___.___
	__0	11.3	___.___	_7.1	___.___
LAYER NUMBER		02	___ ___	03	___ ___

PREPARER T. Gauer EMPLOYER HRA DATE 7-- 94

SPS-8 CONSTRUCTION DATA SHEET 12 LAYER THICKNESS MEASUREMENTS	* STATE CODE [3-0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 4]

6

SHEET ____ OF ____

STATION NUMBER	OFFSET (Inches)	LAYER THICKNESS MEASUREMENTS (Inches)			
		DENSE GRADED AGGREGATE BASE	PORTLAND CEMENT CONCRETE SURFACE	ASPHALT SURFACE AND BINDER	SURFACE FRICTION LAYER
3+40	144	12.7	__.__	6.2	__.__
	108	11.9	__.__	6.6	__.__
	72	11.6	__.__	6.7	__.__
	36	11.6	__.__	6.7	__.__
	00	11.3	__.__	7.1	__.__
3+90	144	11.9	__.__	6.5	__.__
	108	11.3	__.__	6.6	__.__
	72	11.0	__.__	7.0	__.__
	36	11.0	__.__	6.8	__.__
	00	10.8	__.__	7.1	__.__
4+40	144	13.3	__.__	6.6	__.__
	108	12.5	__.__	6.6	__.__
	72	12.1	__.__	6.7	__.__
	36	11.8	__.__	7.3	__.__
	00	10.8	__.__	7.3	__.__
4+90	144	12.5	__.__	7.0	__.__
	108	12.0	__.__	6.7	__.__
	72	11.6	__.__	6.6	__.__
	36	11.3	__.__	6.7	__.__
	00	10.7	__.__	6.7	__.__
5+40	144	11.5	__.__	6.8	__.__
	108	11.2	__.__	7.2	__.__
	72	11.3	__.__	7.0	__.__
	36	11.8	__.__	7.0	__.__
	00	11.4	__.__	7.1	__.__
5+90	144	10.9	__.__	6.1	__.__
	108	10.7	__.__	6.7	__.__
	72	10.7	__.__	6.5	__.__
	36	11.0	__.__	6.5	__.__
	00	10.7	__.__	6.6	__.__
__+__	___	__.__	__.__	__.__	__.__
	___	__.__	__.__	__.__	__.__
	___	__.__	__.__	__.__	__.__
	___	__.__	__.__	__.__	__.__
	___	__.__	__.__	__.__	__.__
LAYER NUMBER		02	____	03	____

PREPARER T. Sauer EMPLOYER MDT DATE 7/25/91

SPS-8 CONSTRUCTION DATA SHEET 13 UNBOUND AGGREGATE BASE MATERIAL PLACEMENT	* STATE CODE [30] * SPS PROJECT CODE [08] * TEST SECTION NO. [04] 6

*1. UNBOUND BASE MATERIAL PLACEMENT BEGAN (Month-Day-Year) [05-04-94]

*2. UNBOUND BASE MATERIAL PLACEMENT COMPLETED (Month-Day-Year) [05-01-94]

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

PRIMARY COMPACTION EQUIPMENT

*4. CODE TYPE [4] 4

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

*5. GROSS WEIGHT (TONS) [1100.0] ?

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

DENSITY DATA IS RECORDED ON SAMPLING DATA SHEET 8-1

7. SIGNIFICANT EVENTS DURING CONSTRUCTION (DISRUPTIONS, RAIN, EQUIPMENT PROBLEMS, ETC.) No Equipment Problems, Cool, Breezy

PREPARER Tim Sauer EMPLOYER Montana DOT DATE 5/4/94

SPS-8 CONSTRUCTION DATA SHEET 14 SUBGRADE PREPARATION	* STATE CODE [30] * SPS PROJECT CODE [08] * TEST SECTION NO. [04]

(6)

*1. SUBGRADE PREPARATION BEGAN (Month-Day-Year) [04-06-94]

*2. SUBGRADE PREPARATION COMPLETED (Month-Day-Year) [04-20-94]

PRIMARY COMPACTION EQUIPMENT

*3. CODE TYPE [4]

COMPACTION EQUIPMENT TYPE CODES Ingersol Rand SD-150 D
Sheepsfoot... 1 Pneumatic Tired... 2 Steel Wheel Tandem... 3
Single Drum Vibr.... 4 Double Drum Vibr.... 5
Other (Specify)... 6 _____

*4. GROSS WEIGHT (TONS) [17.0]

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

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

*7. TYPICAL LIFT THICKNESS (INCHES) [12]
(For Fill Sections Only)

DENSITY DATA IS RECORDED ON SAMPLING DATA SHEET 8-1

8. SIGNIFICANT EVENTS DURING CONSTRUCTION (DISRUPTIONS, RAIN, EQUIPMENT PROBLEMS, ETC.) ORIGINAL PLANNED CUT AREA - HAD DIG OUT AREAS due to SOFTER SOILS. FILLED WITH LARGER ROCK MIX (MAX SIZE ~10") to depth of ABOUT 3 FEET.

PREPARER R. SZROT EMPLOYER NCE DATE 4/20/94

SPS-1 CONSTRUCTION DATA SHEET 15 CUT-FILL SECTION LOCATIONS	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 6]

ORDER	*1 CUT-FILL[1]	REFERENCE PROJECT STATION NUMBER		*4 TEST SECTION NO
		*2 START	*3 END	
1	2	0 + 0 0	5 + 0 0	3 0 0 8 0 5
2	1	8 + 1 0	1 3 + 1 0	3 0 0 8 0 6
3		+	+	
4		+	+	
5		+	+	
6		+	+	
7		+	+	
8		+	+	
9		+	+	
10		+	+	
11		+	+	
12		+	+	
13		+	+	
14		+	+	
15		+	+	
16		+	+	
17		+	+	
18		+	+	
19		+	+	
20		+	+	
21		+	+	
22		+	+	
23		+	+	
24		+	+	
25		+	+	

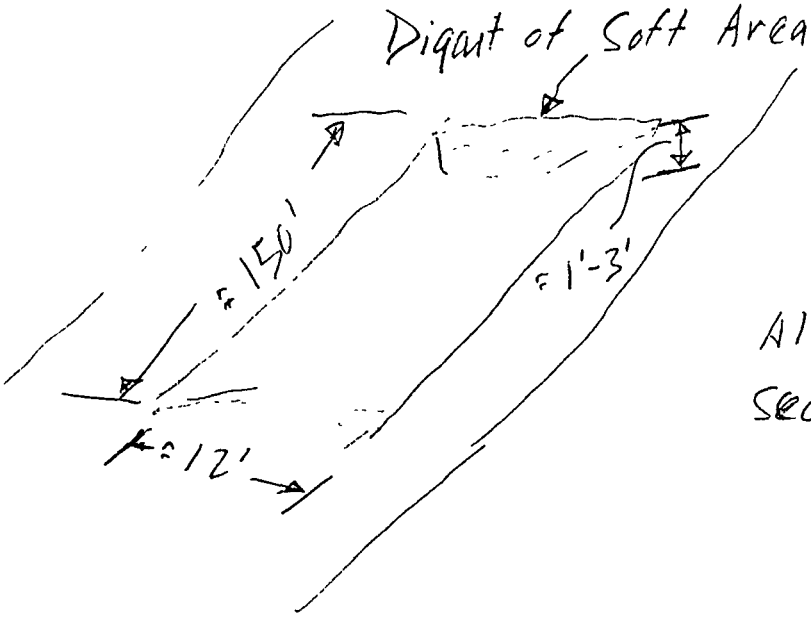
NOTES:

1. Indicate the type of subgrade section with one of the following:
   Cut... 1 Fill... 2

2. A given Test Section No. will be repeated if both cut and fill sections exist within the test section.

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 16 SUBGRADE EXCAVATION AND BACKFILLING SKETCH	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 3] → A



[Digout Locations]

20+00
22+50
25+00

All digouts located within section 30080.

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95

SPS-1 CONSTRUCTION DATA SHEET 17 MISCELLANEOUS CONSTRUCTION NOTES AND COMMENTS	* STATE CODE [3 0] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 4]

6

Provide any miscellaneous comments and notes concerning construction operations which may have an influence on the ultimate performance of the test sections or which may cause undesired performance differences to occur between test sections. Also include any quality control measurements or data for which space is not provided on other forms. Provide an indication of the basis for such measurements, such as an ASTM, AASHTO, or Agency standard test designation.

The prime coat of MC-70 oil was placed on the aggregate base on May 12th, 1994. By the time of paving on June 27, 199 significant potholing had developed. The potholes were filled with an AC material and then compacted.

On June 28th The State had an out of specification test on Sieve No. 4, just prior to paving lift 2 on both SHRP sections.

On June 29th, visual bleeding was present from Station 19+50 to 20+10 within Section 300804. The State said that 5.4% AC was present in this area.

PREPARER Marco Fellin EMPLOYER NCE DATE 2/7/95