FEDERAL HIGHWAY ADMINISTRATION
Long Term Pavement Performance (LTPP)
Specific Pavement Studies

WASHINGTON SPS-8 CONSTRUCTION REPORT

DRAFT

Prepared for:

Washington Department of Transportation

August 2001

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Page

ABSTRACT

Environmental conditions alone or interacting with pavement materials may generate major distresses in pavements. The impact of environmental conditions on long term performance of pavements has been difficult to quantify, as have the interactions between environmental stresses and load stresses. Under the Strategic Highway Research Program (SHRP) Specific Pavement Studies (SPS), experimental studies are carried out as part of the Long Term Pavement Performance (LTPP) Program across the nation. The SPS-8 experiment, "Strategic Study of Environmental Factors in the Absence of Heavy Loads," is a study designed to evaluate the effect of environmental factors on the performance of both rigid and flexible highway pavements. The Washington SPS-8 sections combine two PCC sections of varying surface course thicknesses in a low traffic environment. The environmental conditions will be continuously monitored with the weather station installed at this site. Over time, the effect of environment on the performance of these sections will be monitored.

Two rigid sections were constructed on the northbound lane of Smith Springs Road. Smith Springs Road is a low volume road in the rolling hills of Walla Walla County near Clyde, Washington. The automated weather station (AWS) at this site collects wind speed, ambient temperature, precipitation, and solar radiation data on a continuous basis. Construction of the test sections began in July 1999 and the paving operations were completed on June 2, 2000. The test sections were opened to traffic in June 2000. Details of construction are presented in this report, along with minor problems encountered during construction that may affect the pavement performance.

I. INTRODUCTION

The SHRP SPS-8 experiment was designed to more precisely determine the relative impact of environmental factors that influence the performance of flexible and rigid pavements in the absence of heavy traffic loads. Environmental conditions alone or interacting with pavement materials may generate major distresses in pavements. D-cracking, popouts, and scaling are common environmental and material related distresses that have little or no traffic related component.

This report covers the construction of the rigid SPS-8 sections on the northbound lane of Smith Springs Road, a county road in rural Walla Walla County near Clyde, Washington. This section briefly explains the organization of the report and topics covered under various sections. Section II of this report gives the project location, description and attributes, and the key organizations and the personnel that were involved. Section III covers the construction sequence and process, detailing the construction materials, sequence, problems, and deviations that were observed during the Western Region Coordination Office Contractor (WRCOC) LTPP monitoring for the SPS-8 construction. Construction of the test sections is summarized in section IV and finally the key observations are documented in section V. Appendix A presents the photographs of construction activities, appendix B the mix design, the sampling plan is presented in appendix C, and the construction data forms are enclosed in appendix D. The experimental design for the SPS-8 experiment is shown in figure 1.

SPS-8 PRODUCTS

The primary products of the SPS-8 experiment are the:

- Evaluation of existing environmental effects (damage) models.
- Determination of the effects of specific design features, thickness, and pavement type on pavement performance in the absence of heavy traffic loads.
- Development of a comprehensive database for use by state and provincial engineers and other researchers for evaluating environmental effects on pavement performance.

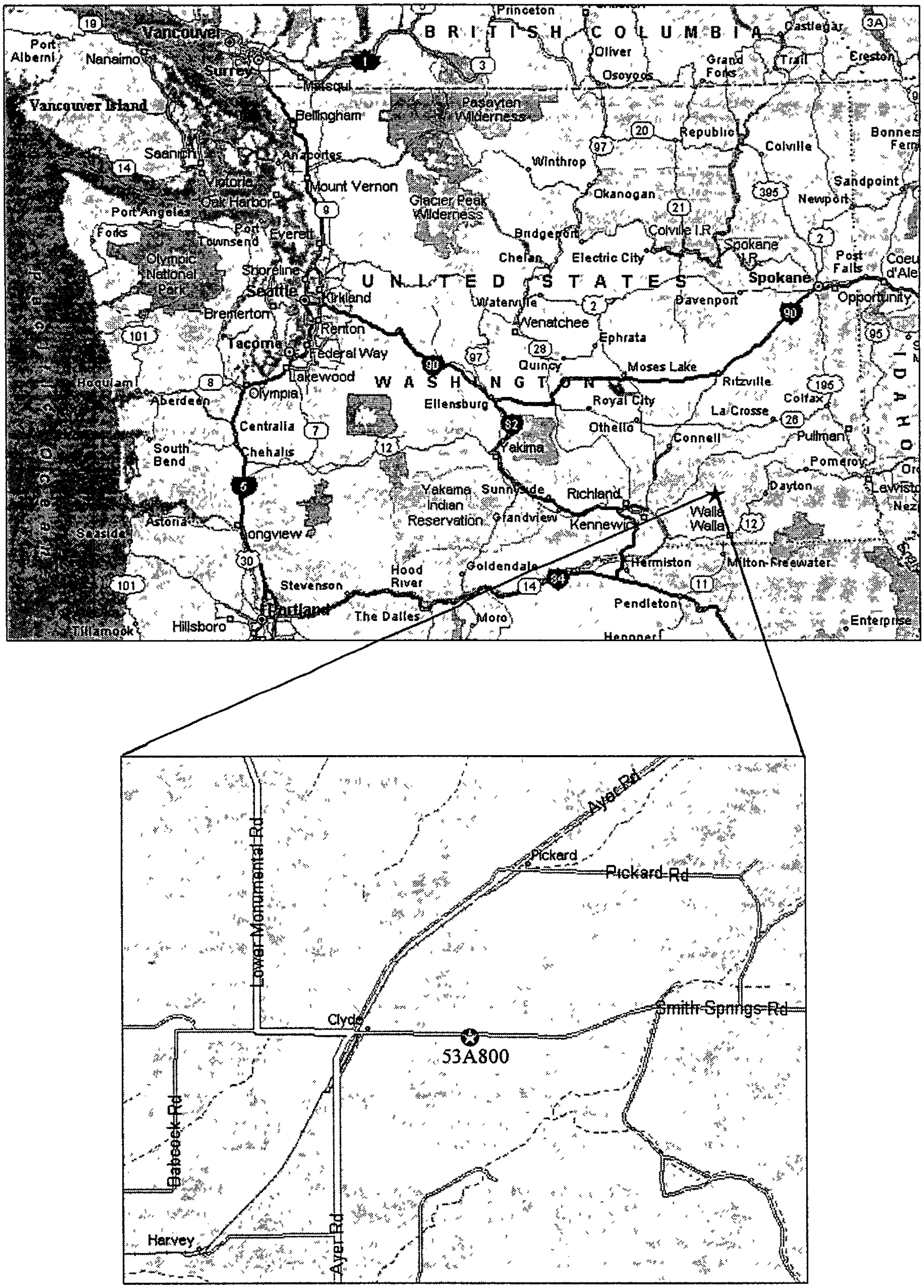


Figure 1. Site Location for 53A800

II. SPS-8 PROJECT DESCRIPTION

This section of the report describes in detail the geographical location, section layout, climatic zone, subgrade and structural attributes, and construction of individual sections.

LOCATION AND LAYOUT

This project is located on the northbound lane of Smith Springs Road, a county road near Clyde, Washington. Clyde is about 24 miles (40 km) north of Walla Walla, Washington. The GPS coordinates of the beginning of the project are 46° 24' 39" N latitude and 118° 25' 46" W longitude. The project is located at an elevation of 383m (1256'). Figure 1 presents the geographic location of the project. The project consisted of the construction of two 152.4m (500') long PCC (SPS-8) sections. Photograph 1 in appendix A shows Smith Springs Road prior to reconstruction.

The pavement design for section 53A809 was 205mm of PCC over 150mm of crushed aggregate base and for section 53A810 was 280mm of PCC over 150mm of crushed aggregate base. The layout, stationing, and structural attributes of individual sections are presented in figure 2 and table 1.

Table 1. Test section details for 53A800.

Section	Location	Construction Stationing	Test Section Stationing	Structural Details
53A809	Begin Transition	1+150	0-15.0	205mm PCC 150mm DGAB
	Begin Monitoring	1+170	0+00.0	
	End Monitoring	1+322.4	1+52.4	
	End Transition	1+337.4	1+67 4	
53A810	Begin Transition	1+367.4	0-15 0	280mm PCC 150mm DGAB
	Begin Monitoring	1+382.4	0+00.0	
	End Monitoring	1+534.8	1+52.4	
	End Transition	1+549.8	1+67.4	

CLIMATE

The project is located in the LTPP "Dry Freeze" climatic zone. The estimated average precipitation at the project location is 300 mm (11.8 in). The average maximum and minimum temperatures during the summer and winter seasons are enumerated below:

	Summer	Winter
Average Maximum Temperature	30.8 °C (87 °F)	1.8 °C (35 °F)
Average Minimum Temperature	12.1 °C (54 °F)	-2.6 °C (27.3 °F)

TRAFFIC

The estimated annual average daily traffic (AADT) in two directions for these sections is 60 vehicles with 15 percent trucks. Located in farmland, there is a seasonal loading associated with

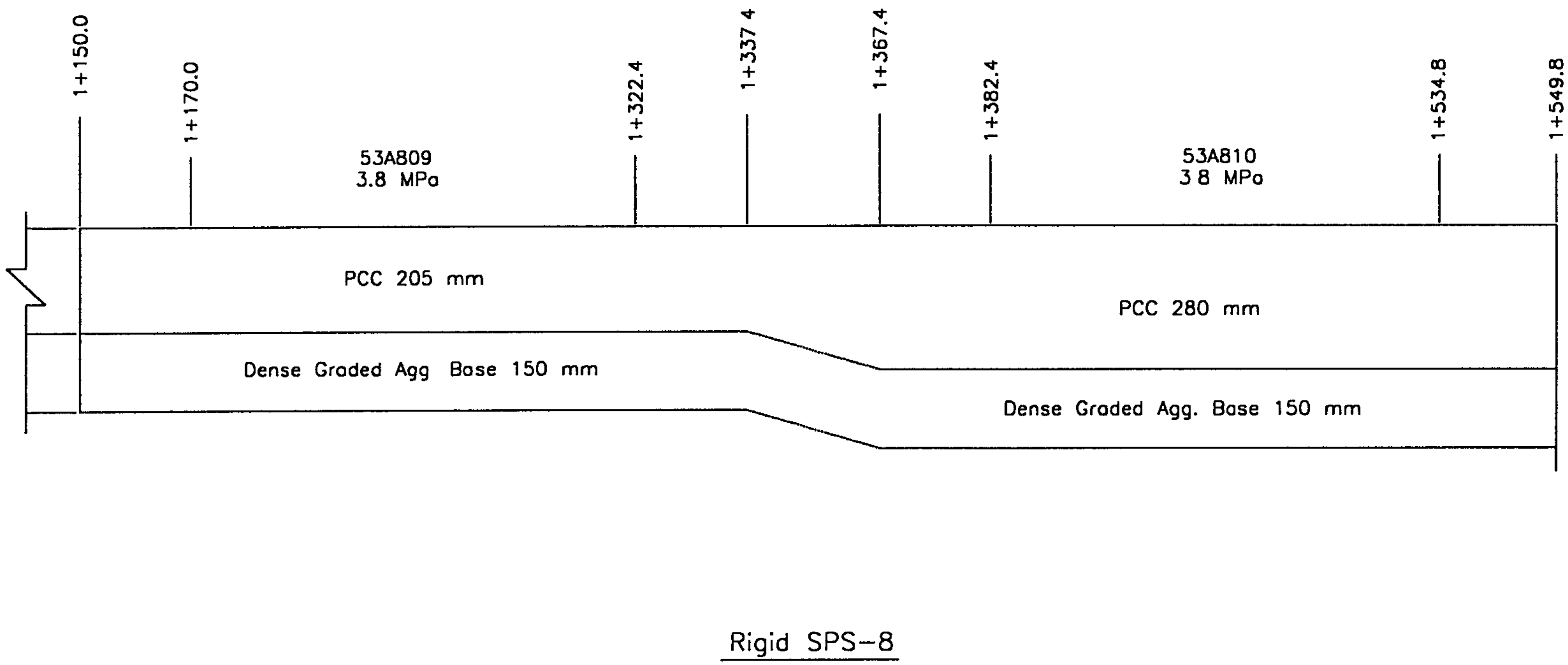


Figure 2. Layout of experimental test sections, Washington SPS-8 project
Smith Springs Road

the wheat harvest. For a design period of 25 years, the total design 18K ESALs is estimated at 182,500.

GEOMETRICS AND SUBGRADE

The SPS-8 test sections were constructed on a level tangent. Both sections were built on an existing road alignment but were complete new construction (the existing roadway was excavated to the subgrade). The subgrade underlying the test sections consisted of a sandy silt material that was nominated as having a low degree of frost heave activity.

AGENCIES AND PERSONNEL

This project was constructed as a tri-party agreement between Walla Walla County, the Washington State Department of Transportation (WSDOT) and the Federal Highway Administration (FHWA). The following personnel were involved in the project at various phases of construction.

Walla Walla County

As Smith Springs Road is a county road within the jurisdiction of Walla Walla County, the primary design and construction was performed under the overall supervision of Walla Walla County. Rob Weberg was the project engineer and John Dirr, Jack Fletcher, Roger Rowe, Gerald Mason, and David Eids were other Walla Walla County personnel involved in the planning, construction, and inspection of the project.

Washington State Department of Transportation

WSDOT played a supporting role in the construction phase of the project after being the champion in recruiting and nominating the project. WSDOT also performed significant portions of the field sampling and testing. Robyn Moore, Linda Pierce, and John Livingston were all significant contributors to the establishment and construction of this project.

Contractors

Steeleman-Duff, Inc. was the prime contractor and performed the subgrade through base course work. D. A. Zuluaga Construction was the paving contractor. Field sampling and testing services—in addition to those performed by WSDOT—were provided by Anderson-Perry and Associates.

Western Region Coordination Office Contractor (WRCOC)

WRCOC personnel were on-hand during all phases of construction for the test sections. Pete Pradere was present throughout the PCC construction and assistance during materials sampling was provided by Rick Smith, Mark Potter, and Kevin Senn.

WEATHER STATION

In order to assure that proper climatic data would be available during analysis, an automated weather station (AWS) was installed by the Western Regional Contractor. The AWS is located on-site. Nichols Consulting Engineers, Chtd. (NCE) personnel installed the AWS equipment on January 18, 2000. The installed equipment consists of a wind monitor that measures wind speed and direction, a probe to measure the temperature and humidity, a pyranometer to measure solar radiation, a rain gauge tipping bucket, a solar panel, and a datalogger. Photograph 2 in appendix A shows the AWS as installed. All equipment was provided by FHWA. A phone line was also installed so that the data could be downloaded and reviewed on a weekly basis.

III. CONSTRUCTION

This section of the report covers the actual construction operations, material sampling, and field testing performed during construction and any deviations that occurred during the construction process.

Smith Springs Road is a two lane county road that intersects Lyons Ferry Road at the town of Clyde, Washington. The SPS-8 sections were constructed as part of the reconstruction of Smith Springs Road, wherein the existing AC pavement was removed and replaced with a PCC pavement. Construction work began in June 1999. Initial work consisted of removing the existing roadway and regarding the new alignment.

EQUIPMENT

The following equipment was used in the material processing and construction work of subgrade and aggregate base layers on the test sections:

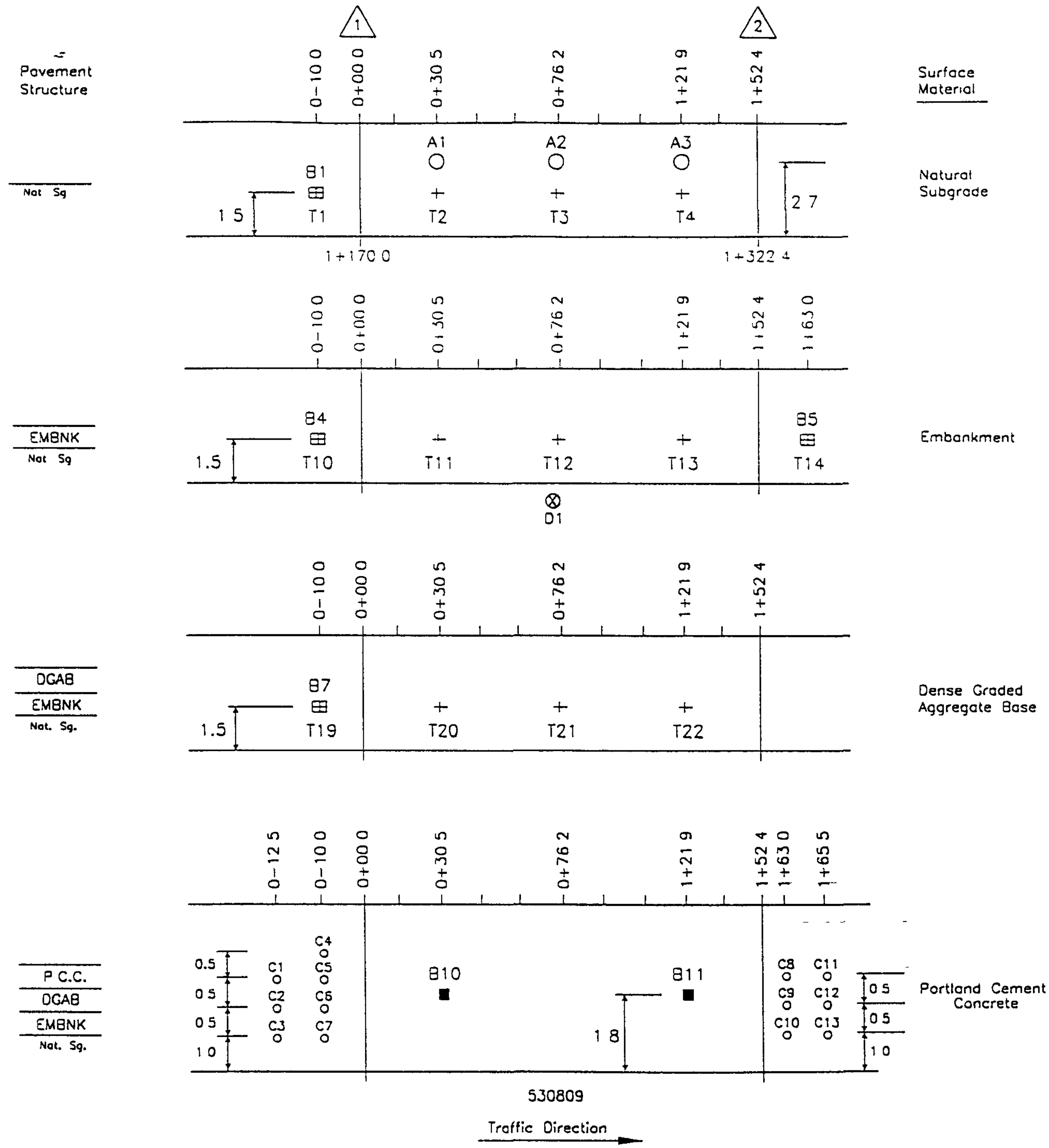
2 CAT 623F Scrapers
2 CAT 140H Motor Graders
2 Ingorsoll Rand 12 ton Steel Drum Vibratory Rollers
1 Ingorsoll Rand 8 ton Sheepsfoot Roller
1 CAT Excavator
1 CAT Backhoe
2 Front End Loaders
2 Belly Dump Trucks
1 Water Truck

SUBGRADE PREPARATION

Initial work on the subgrade began in July 1999. The existing pavement and base layers were removed and the vegetation was cleared and grubbed. Water trucks and steel rollers were used to attain the target compaction and moisture content.

Bulk Sampling

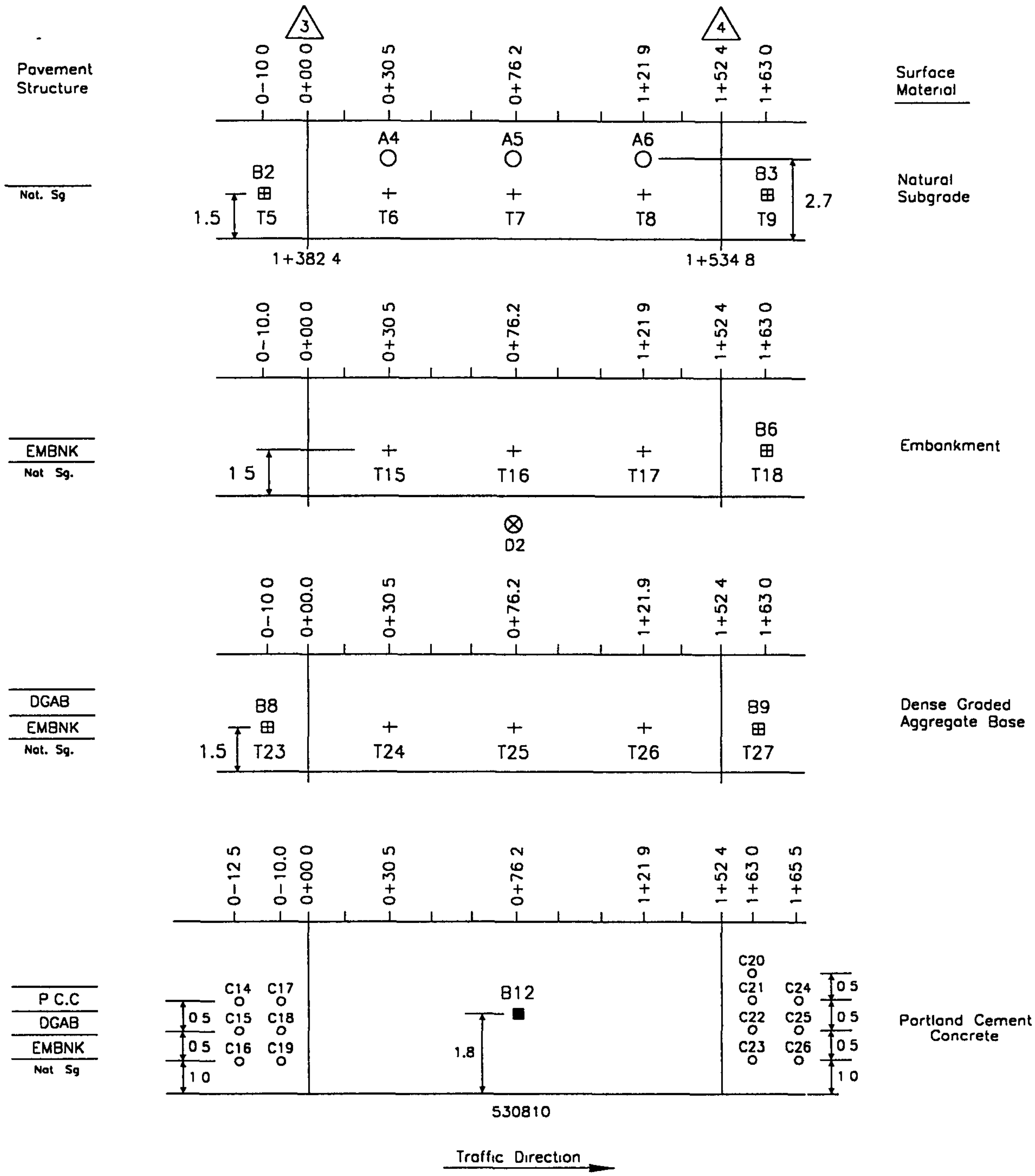
Bulk sampling of finished subgrade was performed on January 19, 2000 by excavating test pits. The bulk sampling pits were backfilled with similar subgrade material and compacted. A summary of subgrade bulk sample locations, stationing, and sample numbers are given in table 2. Figures 3 and 4 show the subgrade bulk sampling and Shelby tube sampling locations.



□ B1 – Bulk sampling of Natural Subgrade
\+ T1–T4 – Moisture–Density tests on Natural Subgrade
o A1–A3 – Thinwall (Shelby) Tube sampling to 1 2m below subgrade
⊗ D1 – 6 1m Shoulder Probe
□ B4–B5 – Bulk sampling of Embankment
\+ T10–T14 – Moisture–Density tests on Embankment
□ B7 – Bulk sampling of Dense Graded Agg. Base
\+ T19–T22 – Moisture–Density tests on DGAB
■ B10–B11 – Bulk sampling of Portland Cement Concrete
o C1–C13 – 102mm Cores of PCC surface

Note: Shoulder probe testing may be done at a later time

Figure 3 Overview of sampling, testing and coring plan for Portland Cement Concrete section 53A809, SPS–8, Washington



- □ B2–B3 – Bulk sampling of Natural Subgrade
- \+ T5–T9 – Moisture–Density tests on Natural Subgrade
- o A4–A6 – Thin wall (Shelby) Tube Sampling to 1 22m below subgrade
- ⊗ D2 – 6.1m Shoulder Probe
- □ B6 – Bulk sampling of Embankment
- \+ T15–T18 – Moisture–Density tests on Embankment
- □ B8–B9 – Bulk sampling of Dense Graded Agg. Base
- \+ T23–T27 – Moisture–Density tests on Dense Graded Agg. Base
- ■ B12 – Bulk sampling of Portland Cement Concrete
- o C14–C26 – 102mm Cores of PCC surface

Note: Shoulder probe testing may be done at a later time

Figure 4. Overview of sampling, testing and coring plan for Portland Cement Concrete Section 53A810, SPS-8, Washington.

Table 2. Subgrade bulk sample locations, 53A800.

Section No.	Bulk Sample No.	Section Station	Project Station	Offset Rt. of Centerline (m)
53A809	B1	0-10.0	1+160	2.2
53A810	B2	0-10.0	1+372	2.2
53A810	B3	1+63.0	1+545	2.2

The subgrade gradations are presented below in table 3. The material has been classified a sandy silt per SHRP/LTPP classification codes.

Table 3. Subgrade gradations, 53A800.

Sieve Size (mm)	Percent Passing		
	Section 53A809	Section 53A810	
	Sample B1	Sample B2	Sample B3
75.00	100	100	100
50.00	100	100	100
37.50	100	100	100
25.00	100	100	100
19.00	100	100	100
12.50	100	100	100
9.50	100	99	100
4.75	100	98	100
2.00	100	98	100
0.425	100	98	99
0.180	74	83	99
0.075	54.1	72.4	54.7

Inspection

The finished subgrade was visually inspected for problem areas and none were observed.

Field Density and Field Moisture Testing

Field density and field moisture tests were performed on the subgrade layer. However, this work was performed only in the locations described by the Walla Walla County QA plan and, in some instances, on an existing gravel layer. Therefore, only average values are being reported for this layer. These are:

Average in-situ density: 1.72 t/m^3
Average moisture: 11.15%

Auger Probes

Shoulder auger drilling to a depth of 5.6m was performed on September 21, 1999 to determine the existence of bedrock or any stiff underlying layer within 6m of pavement surface. Table 4 lists the section location and soil types encountered during the shoulder probe drilling for SPS-8 sections. No rock or stiff layer was encountered within the drilled depth in either section. The water table was not reached at either location. There were no significant changes in the soil types in case of both sections.

Table 4. Soil profiles and soil types for SPS-8, Washington.

Test No.	Section	Project Station	Section Station	Offset	Type of Equipment Used	Depth of Layer (m)	Material Description
S1	53A809	1+246	0+76	10m right of lane edge	CME 55	0 to 0 6	Sandy silt pale yellowish brown
						0.6 to 3.0	Silty sand pale yellowish brown
						3.0 to 4 6	Poorly graded sand pale yellowish brown
						4.6 to 5.6	Poorly graded sand pale yellowish brown
S2	53A810	1+448	0+76	6.4m right of lane edge	CME 55	0 to 0.6	Sandy silt pale yellowish brown
						0.6 to 1.2	Silty sand pale yellowish brown
						1.2 to 5.6	Poorly graded sand pale yellowish brown

Subgrade Surface Elevations

Baseline elevation surveys on the surface of prepared subgrade were performed. The purpose of the elevation surveys is to obtain a profile of prepared subgrade surface and to determine the thickness of subsequent layers. Unfortunately, the measurements were not taken at the specific points outlined in the Materials Sampling and Testing Plan (subsequent layers were tested according to plan).

FWD Testing

FWD testing of the subgrade was performed on January 19, 2000 (photograph 3 in appendix A) by the WRCOC in accordance with the procedures and guidelines outlined in Specific Pavement Studies Directive Number S-4, "Deflection Testing of Subgrade and Base Layers for SPS-1, -2 and -8 Experiments." The subgrade was extremely soft and despite the best efforts of the WRCOC staff, even at the smallest loads, the deflections measured were outside of the allowable range for the sensors.

EMBANKMENT PREPARATION

Initial work on the embankment began immediately following the FWD testing of January 19, 2000. The embankment material was essentially fill material from cuts on the same section of roadway but outside the project limits. The material has been classified as a sandy silt per SHRP/LTPP classification codes. Water trucks and steel rollers were used to attain the target compaction and moisture content.

Bulk Sampling

Bulk sampling of the embankment was performed on March 15, 2000 by excavating test pits (photograph 5, appendix A). The bulk sampling pits were backfilled with similar material and compacted. A summary of subgrade bulk sample locations, stationing, and sample numbers are given in table 5. Figures 3 and 4 show the subgrade bulk sampling locations.

Table 5. Embankment bulk sample locations, 53A800.

Section No.	Bulk Sample No.	Section Station	Project Station	Offset Rt. of Centerline
53A809	B4	0-10.0	1+160	2.2m
53A809	B5	1+63.0	1+322	2.2m
53A810	B6	1+63.0	1+544	2.2m

Inspection

The finished embankment was visually inspected for problem areas and none were observed.

Field Density and Field Moisture Testing

Field density and field moisture tests were performed on prepared subgrade layer on March 15, 2000. The density tests were carried out using nuclear gauge at locations shown in figures 4 and 5, in accordance with the procedures in AASHTO T239-97 (photograph 6, appendix A). The results of the density tests are tabulated in table 6.

Table 6. Field density and moisture test results.

Section	Project Station	Section Station	C/L Ref. (meters)	Average In-Situ Density (T/M^3)	In-Situ Moisture Content (%)
53A809	1+160.0	0-10.0	2.2	1.71	16.2
	1+200.5	0+30.5	2.2	1.67	15.5
	1+246.2	0+76.2	2.2	1.77	2.0
	1+291.95	1+21.95	2.2	1.78	11.6
53A810	1+412.9	0+30.5	2.2	1.76	11.5
	1+458.6	0+76.2	2.2	1.81	13.2
	1+504.4	1+21.95	2.2	1.85	12.1
	1+545.4	1+63.0	2.2	1.72	13.0

Embankment Surface Elevations

Baseline elevation surveys on the surface of the embankment layer were performed at the locations indicated in figure 5. Table 7 summarizes the embankment layer thicknesses for both test sections.

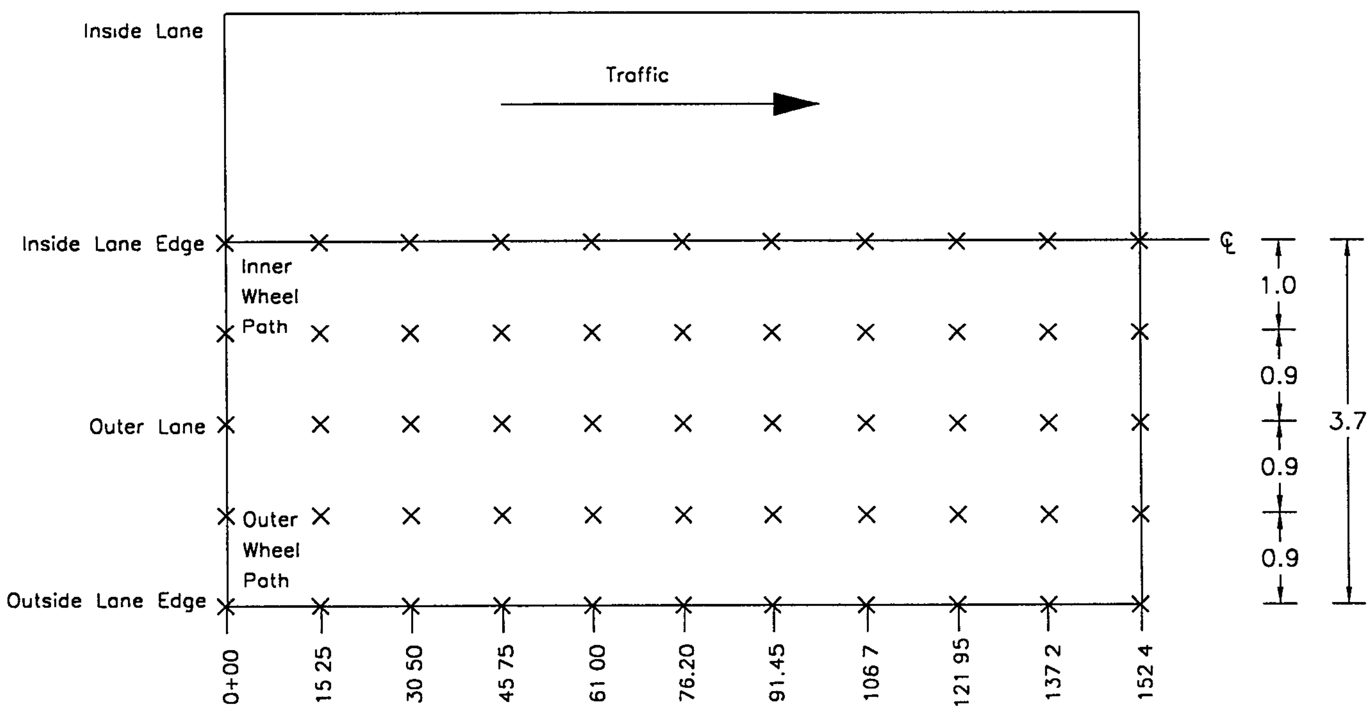


Figure 5. Test section elevation measurement locations for SPS-8 Washington

Table 7. Embankment layer thickness.

Section	Minimum Thickness (mm)	Maximum Thickness (mm)	Average Thickness (mm)	Standard Deviation (mm)
53A809	1207	3318	2305	1058
53A810	494	1466	908	502

As evidenced by the standard deviation values, there was a significant variation in the embankment layer thickness within the sections. Because this material was the same as the natural subgrade, this variation is not anticipated to have any effect on the ultimate performance of the sections.

Splitspoon Sampling

Splitspoon sampling was performed on September 21, 1999. Shelby Tube samples were also collected at the same locations as the splitspoon samples. This information is summarized in table 8.

FWD Testing

FWD testing of the embankment was performed on March 15, 2000 (photograph 4, appendix A) by the WRCOC in accordance with the procedures and guidelines outlined in Specific Pavement Studies Directive Number S-4, "Deflection Testing of Subgrade and Base Layers for SPS-1, -2 and -8 Experiments." The embankment deflection profiles of both sections are presented in figures 6 and 7. These profiles are not normalized and are plotted for an average loading of 400 kPa for section 53A809 and 420 kPa for section 53A810. The deflection profiles show that section 53A810 has a higher variability as compared to section 53A809. There were three locations in 53A810 where the FWD operator tested in almost the same location due to variability in the test measurements. These locations are apparent in figure 7.

DENSE GRADED AGGREGATE BASE (DGAB)

DGAB construction took place during May 2000. DGAB material was brought in by belly dump trucks. It was then windrowed and worked by the graders and blades to achieve the required grade and profile. Water trucks and two 12 ton Ingersoll Rand double drum vibratory rollers were employed to achieve target compaction and moisture. The design DGAB layer thickness for both sections was 150 mm (shown earlier in figure 2). The actual in-place thicknesses of DGAB layers determined from elevation surveys for both the SPS-8 sections are given in table 9.

Table 8. Splitspoon and Shelby Tube sampling.

Section	Station	Depth (mm)	Sample Number	No. Blows			Ref? Y/N	DLR (mm)	IOP	Material Description	Material Code
53A809	0+30	457	JS01	12	9	11	N	N/A	N/A	Silt (med. density), moderate brown	141
		1070	TS02	N/A	N/A	N/A	Y	1070	N/A	Shelby Tube bent, no sample recovered	N/A
		1520	TS03	N/A	N/A	N/A	N	N/A	N/A	Sandy silt, moderate brown	145
	0+76	457	JS01	9	8	10	N	N/A	N/A	Poorly graded sand, pale brown	202
		1070	TS03	N/A	N/A	N/A	N	N/A	N/A	Silty sand, moderate brown	214
		1520	JS03	1	1	1	N	N/A	N/A	Silty sand, moderate brown	214
	1+22	457	JS01	10	9	8	N	N/A	N/A	Silty sand stratified w/gravelly sand (pale brown)	214
		1070	TS05	N/A	N/A	N/A	N/A	N/A	N/A	Silty sand, pale brown	214
		1520	JS03	1	1	1	N/A	N/A	N/A	Silty sand, pale brown	214
53A810	0+30	457	JS01	8	9	5	N	N/A	N/A	Silty sand, pale brown	214
		1070	TS07	N/A	N/A	N/A	N	N/A	N/A	Silty sand, pale brown	214
		1520	JS03	2	2	2	N	N/A	N/A	Poorly graded sand, pale yellowish brown	202
	0+76	457	JS01	3	5	5	N	N/A	N/A	Sandy silt, pale brown	145
		1070	TS09	N/A	N/A	N/A	N	N/A	N/A	Silty sand, pale yellowish brown	214
		1520	JS03	1	3	4	N	N/A	N/A	Poorly graded sand, pale yellowish brown	202
	1+22	457	JS01	4	4	5	N	N/A	N/A	Silty sand, pale yellowish brown	214
		1070	TS11	N/A	N/A	N/S	N	N/A	N/A	Silty sand, pale yellowish brown	214
		JS03	JS032	2	2	3	N	N/A	N/A	Poorly graded sand, pale yellowish brown	202

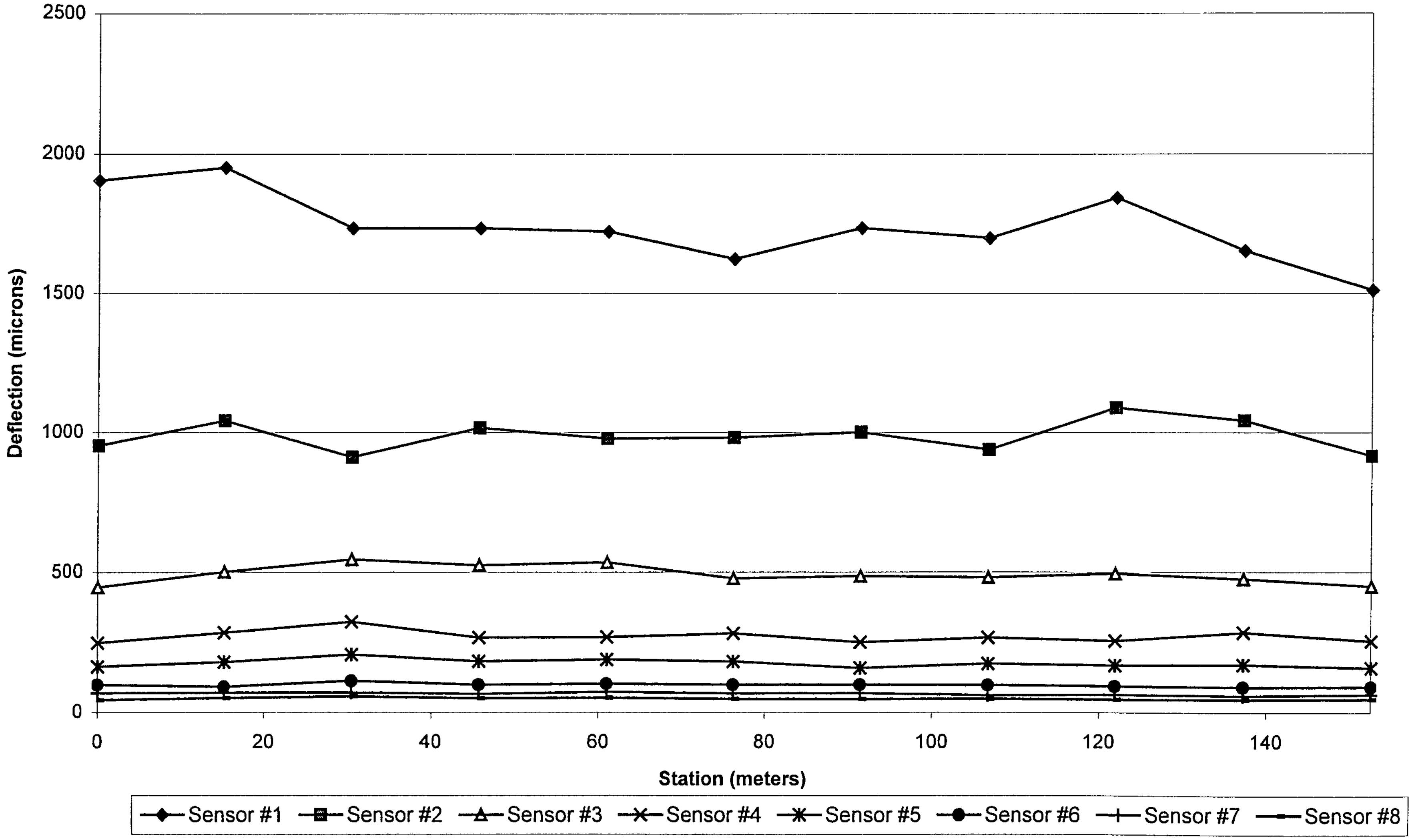


Figure 6. Embankment deflection profile, section 53A809.

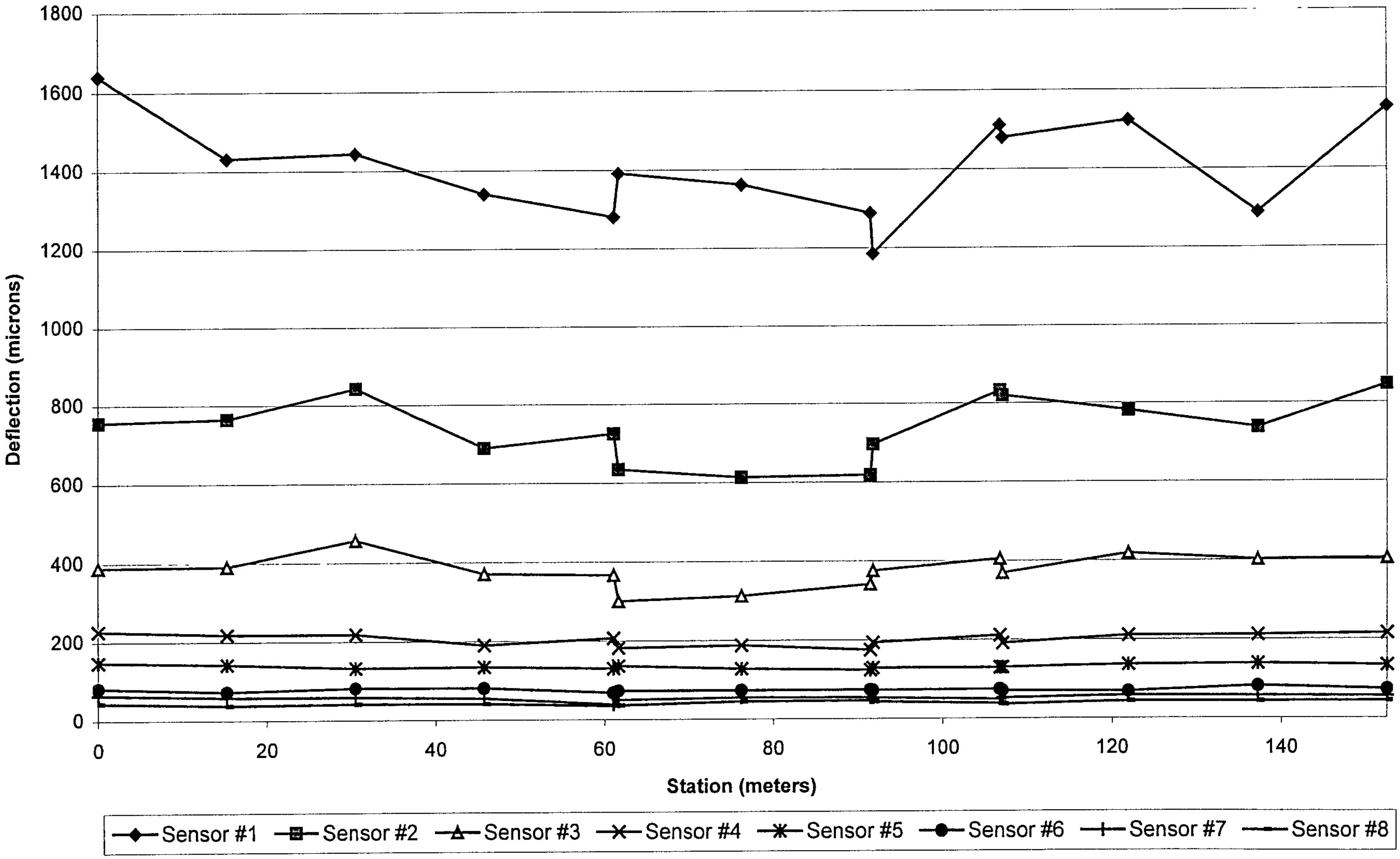


Figure 7. Embankment deflection profile, section 53A810.

Table 9. DGAB actual in-place layer thicknesses.

Section Station (m)	Mean Thickness (mm)	
	53A809	53A810
0+00	155	112
0+15 2	149	111
0+30.5	104	103
0+45.7	106	98
0+61.0	80	130
0+76.2	89	117
0+91.4	107	116
1+06.7	145	117
1+21.9	98	145
1+37.2	117	137
1+52.4	106	140

Inspection

The finished DGAB layer (photograph 7, appendix A) was visually inspected for problems and none were observed.

Bulk Sampling

Bulk sampling of DGAB material was performed on May 24, 2000 by excavating a test pit in the finished layer that would provide the required quantity of material. After the bulk sampling, the pits were backfilled with similar material and compacted to the target density. Bulk sample numbers, locations, sections, and stationing information is presented in figures 3 and 4, respectively, and tabulated in table 10. Gradations of DGAB are presented in table 11.

Table 10. DGAB bulk sample locations, 53A800.

Section No.	Bulk Sample No.	Section Station	Project Station	Offset Rt. of Centerline
53A809	B7	0-10.0	1+160	2.2m
53A810	B8	0-10.0	1+372	2.2m
53A810	B9	1+63.0	1+544	2.2m

Field Density and Field Moisture Tests

Field density and field moisture content tests were performed on the finished DGAB layer on May 13, 2000 in accordance with AASHTO T 238-97 and T239-97, respectively, at locations indicated in figures 3 and 4. The test results are tabulated in table 12.

Table 11. DGAB gradations, 53A800.

Sieve Size (mm)	Percent Passing		
	Section 53A809	Section 53A810	
	Sample B7	Sample B8	Sample B9
75.00	100	100	100
50.00	100	100	100
37.50	100	100	100
25.00	100	100	100
19.00	100	100	100
12.50	100	100	100
9.50	100	99	100
4.75	100	98	100
2.00	100	98	100
0.425	100	98	99
0.180	74	83	99
0.075	54.1	72.4	54.7

Table 12. DGAB field density and moisture test results.

Section	Project Station	Section Station	C/L Ref. (meters)	Average In-Situ Density (T/M^3)	In-Situ Moisture Content (%)
53A809	1+160.0	0-10.0	2.2	2.14	8.3
	1+200.5	0+30.5	2.2	2.04	7.6
	1+246.2	0+76.2	2 2	2.12	7.5
	1+291.9	1+21.9	2.2	2.09	8.4
53A810	1+372.4	0-10.0	2.2	2.12	6.8
	1+412.9	0+30.5	2.2	2.09	7.9
	1+458.6	0+76 2	2.2	2.05	7.1
	1+504.3	1+21.9	2.2	2.06	7.7
	1+545.0	1+62.9	2.2	2.09	6.8

Finished DGAB Surface Elevations

Elevation surveys on the surface of prepared DGAB surface were carried out at locations indicated in figure 5. The purpose of the elevation surveys is to obtain a profile of prepared DGAB surface and to determine the thickness of DGAB layers. The DGAB layer thickness information is summarized in table 13.

Table 13. DGAB layer thicknesses.

Section	Minimum Thickness (mm)	Maximum Thickness (mm)	Average Thickness (mm)	Design Thickness (mm)	Standard Deviation (mm)
53A809	55	168	114	150	27
53A810	73	149	121	150	16

As can be seen in table 13, the DGAB layer was constructed considerably thinner than the design thickness of 150 mm.

FWD Testing

FWD testing of the DGAB layer for sections 53A809 and 53A810 was performed on May 24, 2000, by the WRCOC. The testing was performed in accordance with the procedures and guidelines outlined in Specific Pavement Studies Directive Number S-4, "Deflection Testing of Subgrade and Base Layers for SPS-1, -2 and -8 Experiments." The results of the FWD testing are presented in figures 8 and 9. These profiles are not normalized and are plotted for an average loading of 360 kPa for both sections. For section 53A809, the deflections in the first half of the section were significantly higher than those in the second half of the section. This same disparity was present over a shorter length of the section for 53A810.

PORTLAND CEMENT CONCRETE (PCC) PAVEMENT

Construction of PCC layer began on June 2, 2000. Both sections 53A809 and 53A810 were completed on the same day. Paving was done in a south to north pass. Photograph 10 in appendix A presents an overview of PCC paving operations. PCC for this SPS-8 paving was supplied from a batch plant about 1.2 km from the beginning of the project's southern end. This was a brand new batch plant (photograph 9, appendix A) on its first job, and it was well-calibrated and performed flawlessly throughout the project. The concrete was hauled in 9 yard batches by end dump trucks, the total travel time from the plant to the grade was approximately two minutes. A GOMACO model 3500 concrete track paver with a GOMACO 9500 material transfer was used for PCC paving. End dumps placed the PCC into the transfer, and the transfer placed the material on top of the dowel baskets in front of the paver. The full width of roadway (7.3m) was built in a single pass. Tie bars were placed at centerline and dowel baskets were placed at all transverse joints (4.6 m spacing) manually throughout the test sections. Dowels were not utilized on the rest of the project. Screed level was maintained by wire line electronic control system. The paver was trailed at a distance of 15m to 30m by a finishing machine to achieve the burlap drag finish, longitudinal tining and spraying of curing compound (photograph 14, appendix A).

The design and construction specifications called for placement of dowel bars across the transverse joints of test sections. The transverse joint locations were marked beforehand using spray paint. Dowel baskets were used to maintain the proper spacing and proper depth of dowels. A typical dowel basket is shown in photograph 11, appendix A. Both the basket and dowels were epoxy coated and were sprayed with diesel fuel before placement on the grade to prevent any sort of bonding between the concrete and the dowels. The dowel diameters were 31.75 mm and 38.1 mm respectively for sections 53A809 and 53A810.

The PCC was placed directly on the DGAB. There were a few soft spots caused by the haul trucks (photograph 8, appendix A) that were repaired by the placement of additional base material and then rolling the area. The rolling was enough to set the new gravel but not so much as to add to the pumping problem. The soft spots were quite minor and it is not anticipated to have an adverse affect on the final product.

Finishing the fresh PCC was achieved by a float trailing the paver, and manual floating (photograph 13, appendix A). There were a few occasions when the curing compound applicator

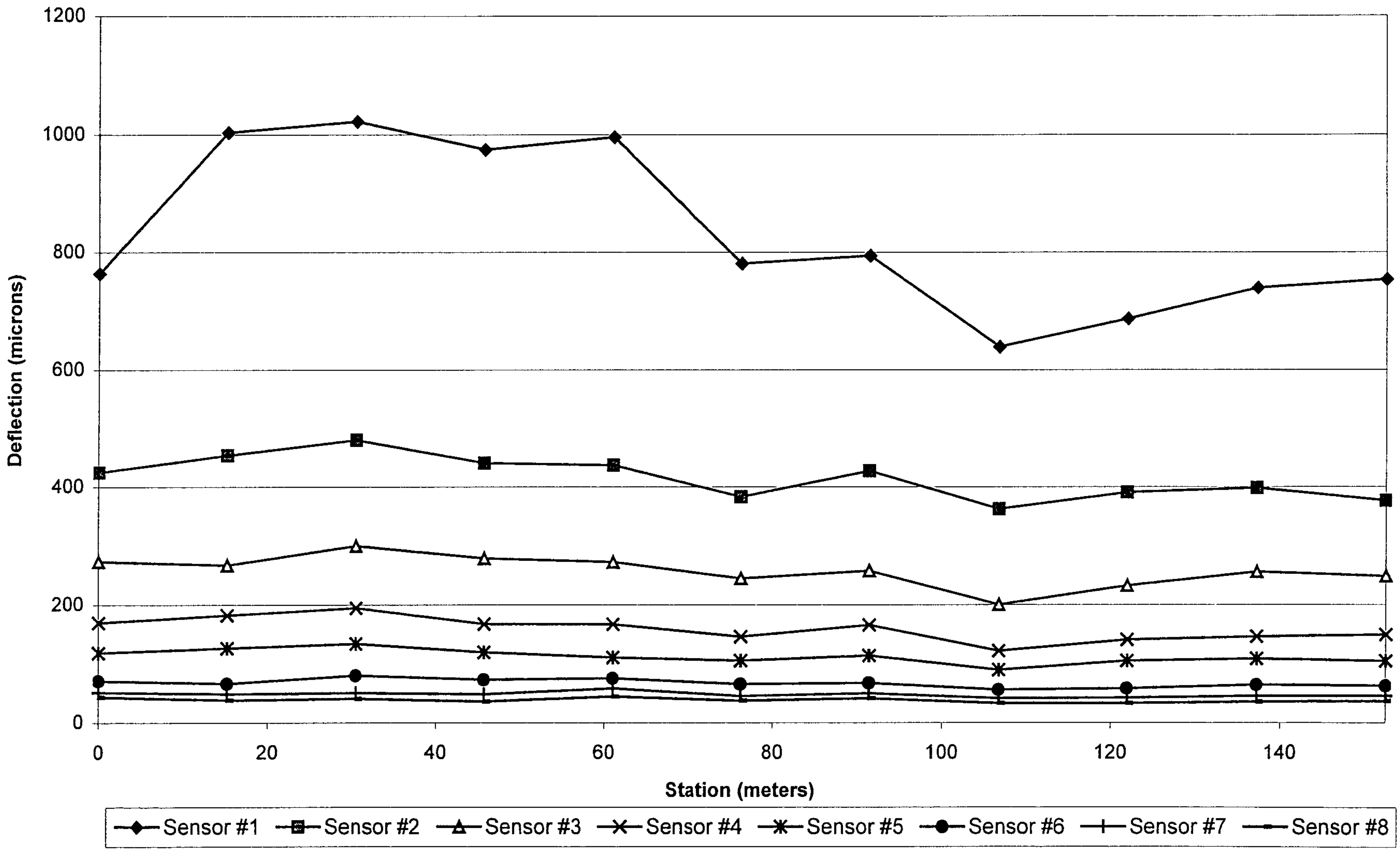


Figure 8. DGAB deflection profile, section 53A809.

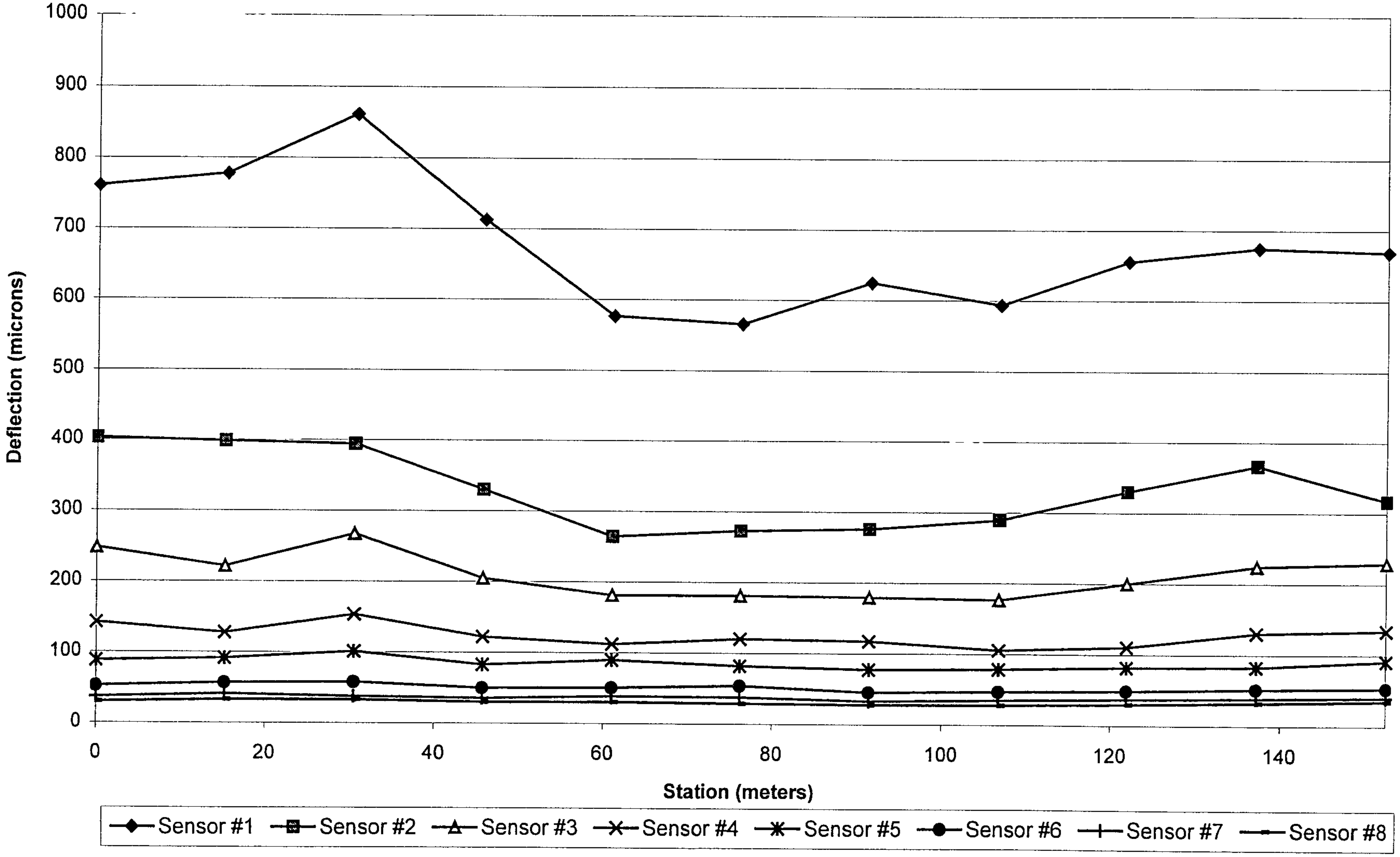


Figure 9. DGAB deflection profile, section 53A810.

would fail, and in these instances the areas were sprayed with a wand from the bridge of the application machine. An effort was made to apply the compound uniformly and the workmanship in these areas was good. Burlap finishing (photograph 12, appendix A) and tining of PCC was carried out with an approximate time lag of 1.5 hours. The sawing of joints took place about 9 hours later. The joints were sealed with an average transverse sealant reservoir 5mm in width and 50mm in depth and an average longitudinal sealant reservoir of 5mm in width and 68mm in depth. The shoulders for this project are AC and were paved shortly after the PCC construction was completed.

The construction crew on this project was extremely well-trained and the construction went smoothly.

Bulk Sampling of PCC

Bulk sampling of fresh PCC was performed on June 2, 2000. The sampling plan called for two bulk samples from section 53A809 and one sample from 53A810. This PCC was used to cast in-situ cylinder and beam samples of PCC to determine the properties of the as-delivered concrete. It appeared that the confusion was due to the north to south pass of paving rather than south to north. The station locations of changed sampling locations and corresponding section numbers were noted on the sampling forms by the sampling personnel. The actual locations of PCC bulk samples are tabulated in table 14.

Table 14. PCC bulk sample locations, 53A800.

Section No.	Bulk Sample No.	Section Station	Project Station	Source of Sample
53A809	B10	0+30.5	1+200.5	Truck
53A809	B11	1+21.9	1+291.9	Truck
53A810	B12	0+76.2	1+458.6	Truck

The detailed PCC mix design is appended in appendix B. A brief description of the mix design is presented in tables 15 and 16.

Table 15. Gradation of coarse and fine aggregates used in PCC.

Sieve Size (mm)	Coarse Aggregate Gradation	Fine Aggregate Gradation
75.00	100	100
50.00	100	100
37.50	100	100
25.00	85	100
19.00	54	100
12.50	28	100
9.50	21	100
4.75	3	95
2.36	--	77
1.18	--	53
0.60	--	32
0.30	--	16
0 150	--	4
0.075	--	1

Table 16. PCC mix design (batch weights for one cubic meter), 53A800.

Material	Type	Amount
Coarse Aggregate	Washed and Screened River Rock	1335 kg
Fine Aggregate	Natural Sand (50% Coarse and 50% Fine)	670 kg
Water	--	145.6 liters
Cement	Tilbury Type I	335 kg
Air Entrainer	Pave Air	491 ml
Water Reducer	Pave-N	327 ml

Property	Value
Water-Cement Ratio	0 434 (% by Weight of Cement
Slump	32 mm
Entrained Air	4.5%
Unit Weight	2479 Kg

Core Sampling of PCC

Coring of the PCC pavement was performed by WSDOT at the locations identified in figures 2 and 3. The 14 days, 28 days, and 1-year coring were all collected on schedule.

Finished PCC Surface Elevations

Elevation surveys on the surface of the PCC surface were carried at locations indicated in figure 5. The purpose of the elevation surveys is to obtain a profile of prepared PCC surface and to determine the thickness of PCC layers. The PCC layer thickness information is summarized in table 17. Figure 10 plots the layer thicknesses for both the DGAB and PCC layers.

Table 17. DGAB layer thicknesses.

Section	Minimum Thickness (mm)	Maximum Thickness (mm)	Average Thickness (mm)	Design Thickness (mm)	Standard Deviation (mm)
53A809	195	226	210	205	8
53A810	274	317	288	280	8

As opposed to the DGAB layer, the PCC layer was constructed very close to the design thickness for both sections.

FWD Testing

FWD testing of the PCC was performed on September 19, 2000 by the WRCOC in accordance with the procedures and guidelines outlined in Directive FWD-19 "Manual for FWD Testing in the Long Term Pavement Performance Study." The embankment deflection profiles of both sections are presented in figures 11 and 12. These profiles are not normalized and are plotted for an average loading of 580 kPa for section 53A809 and 570 kPa for section 53A810. The deflection basin for both sections are much more uniform that they were for the DGAB layer.

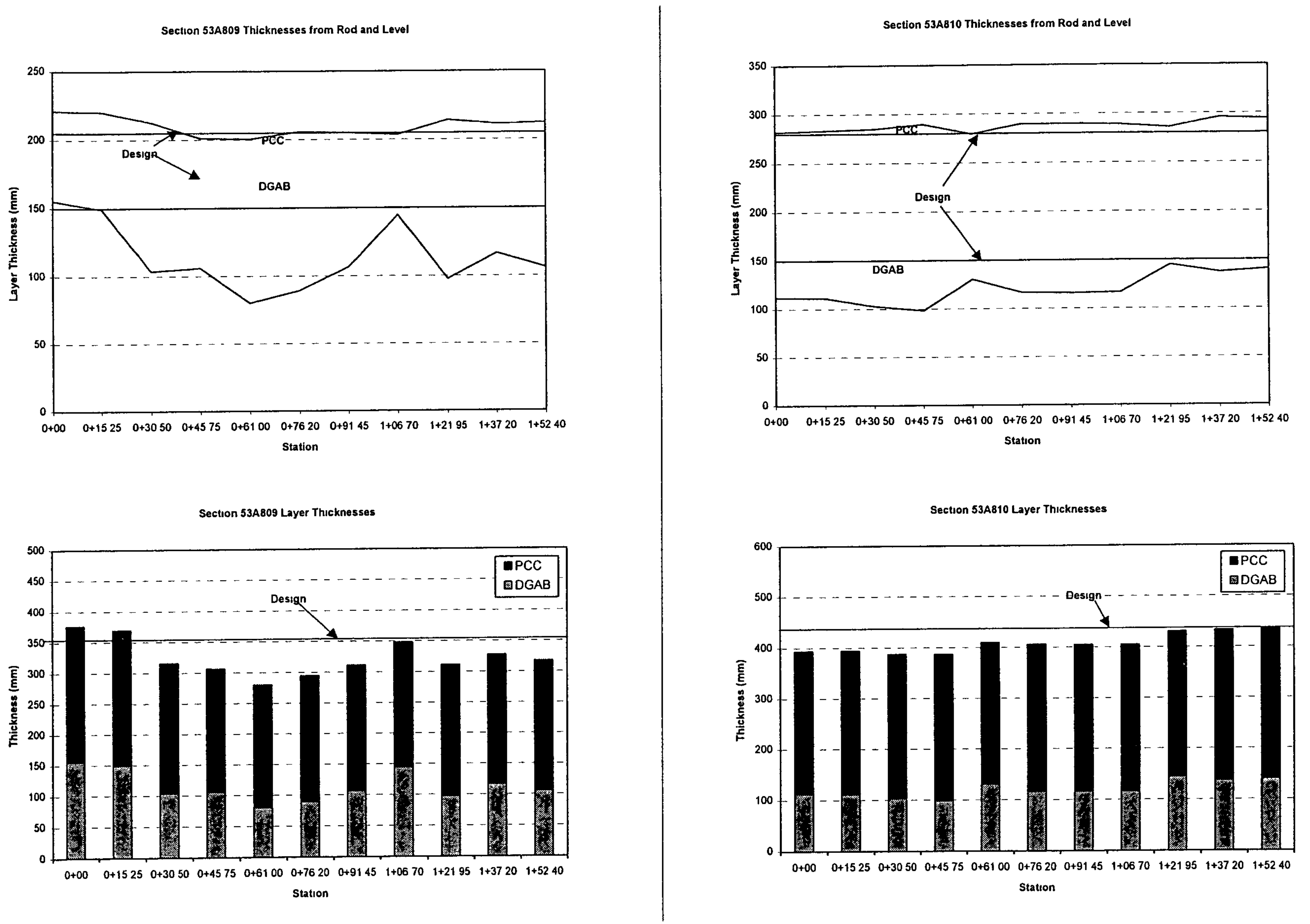


Figure 10. Layer thicknesses.

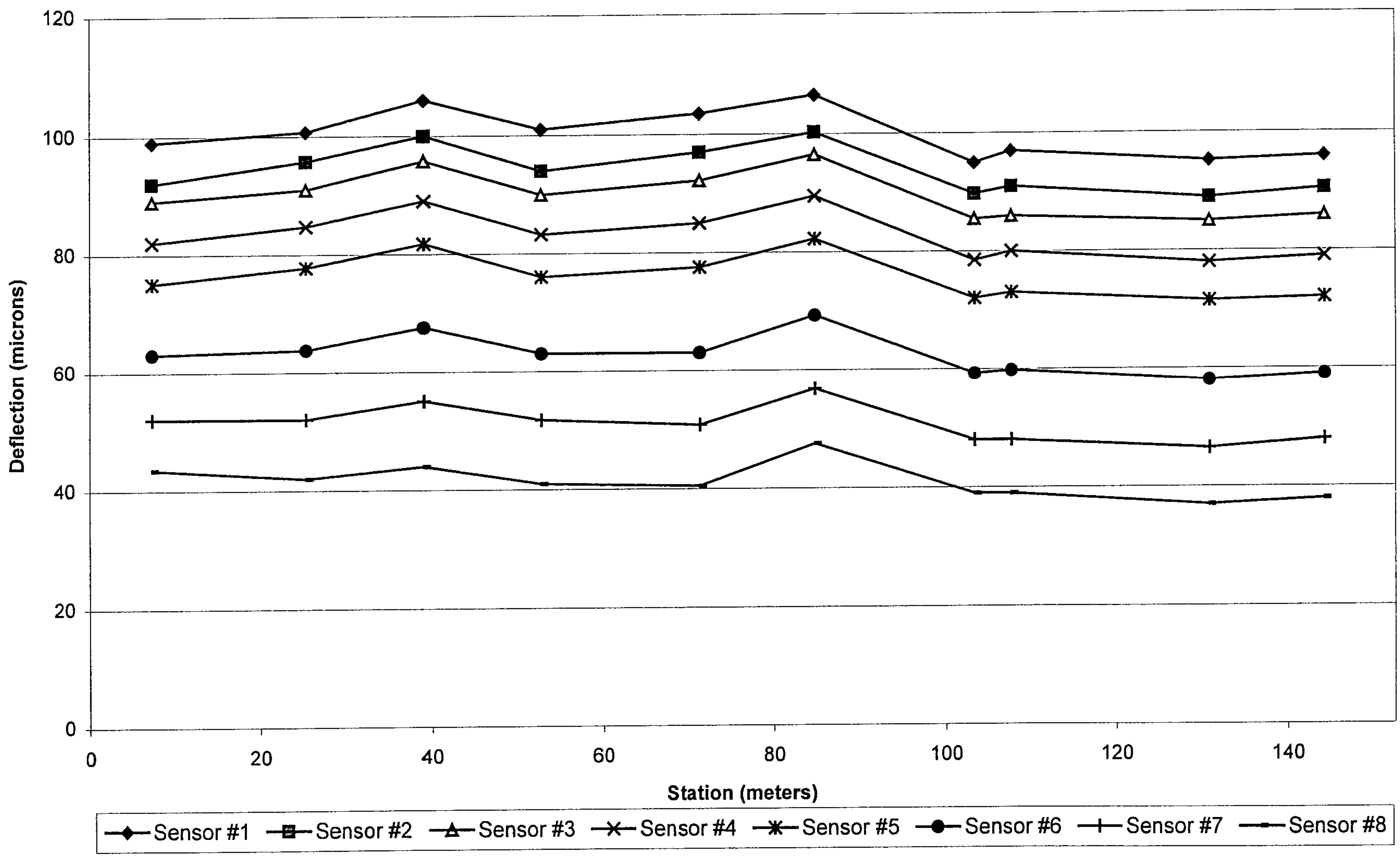


Figure 11. PCC deflection profile, section 53A809.

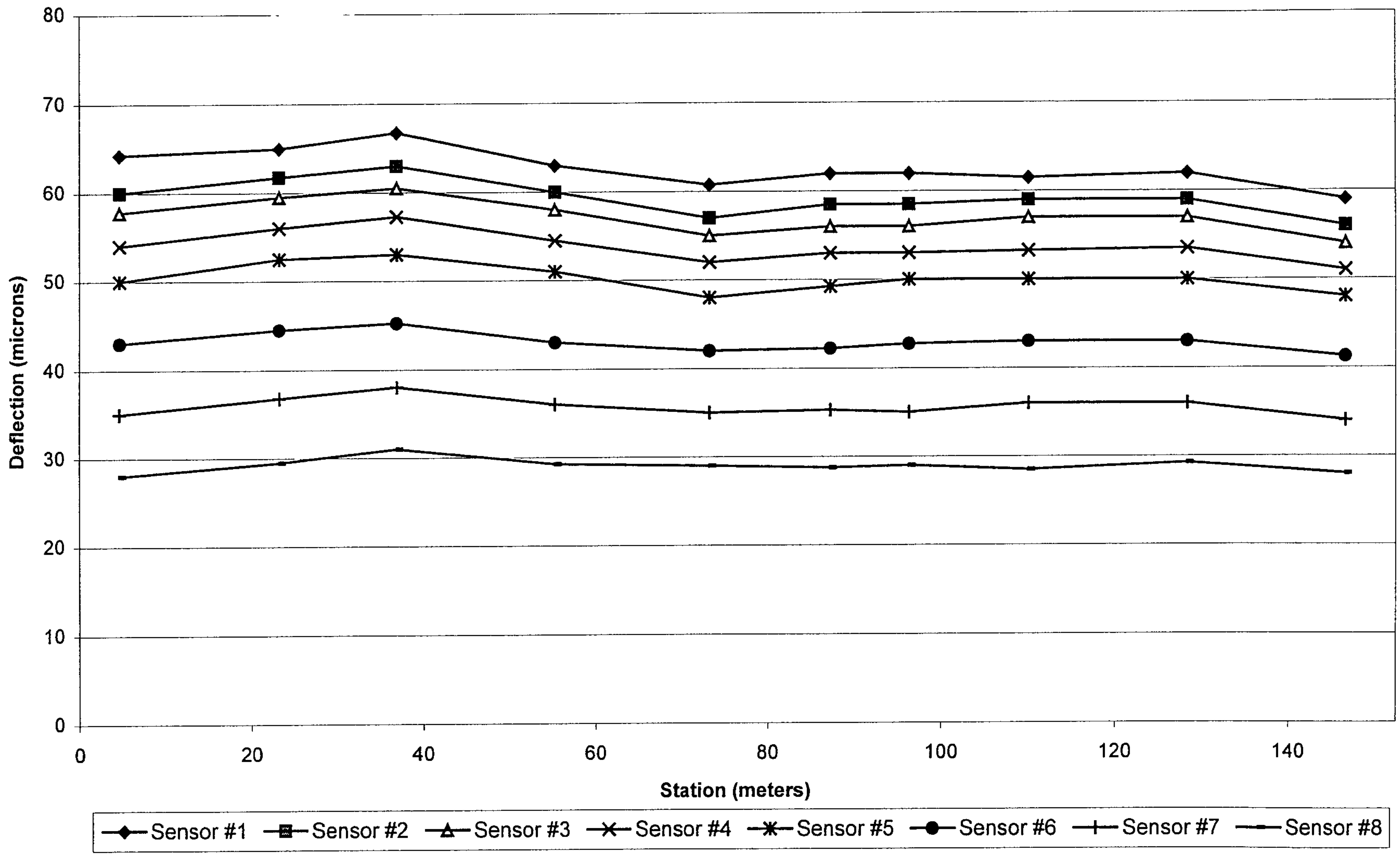


Figure 12. PCC deflection profile, section 53A810.

IV. SUMMARY

Two SPS-8 test sections (53A809 and 53A810) were constructed on the northbound lane of Smith Springs Road, a county road near Clyde, Washington. The sections were constructed under a tri-party agreement between Walla Walla County, WSDOT, and the FHWA. This project involved the removal of the existing AC pavement and a significant amount of cut and fill (the test sections were all on fill) prior to placing the base and PCC layers.

The SPS-8 sections were both PCC constructed on the same base course material. Prepared subgrade construction work began in June 1999 and was completed in January 2000. Embankment work began in January 2000 and was completed in March 2000. Dense graded aggregate base construction work began in May 2000. PCC paving operations were completed on June 2, 2000. The sections were opened to traffic in June 2000.

Overall, there were no major problems during any phase of construction of this project. Some minor problems/deviations that were observed and may affect pavement performance are recorded in section V.

V. KEY OBSERVATIONS

Key observations within each layer are discussed in this section.

SUBGRADE

The subgrade material was a sandy silt that was nominated as having a low degree of frost heave. The existing roadway was completely removed down to the native material. Elevation surveys were performed at a few points within the test sections but not at all of the points defined in figure 5. When attempting to perform FWD testing on the subgrade material, the deflections were outside of the allowable range for the sensors.

EMBANKMENT

The embankment material was simply subgrade material from the cut portions of the project. All specified sampling and testing was performed on this layer (including complete elevation surveys and FWD testing). After this layer was completed, an uncompacted layer of gravel was placed on the section to protect the layer during extremely wet weather.

DENSE GRADED AGGREGATE BASE (DGAB)

Construction of the DGAB layer went very smoothly with no deviations. All appropriate sampling and testing was performed. There were a few soft spots caused by the haul trucks during PCC paving that were repaired by the placement of additional base material and then rolling the area. The rolling was enough to set the new gravel but no so much as to add to the pumping problem. The soft spots were quite minor and it is not anticipated to have an adverse affect on the final product.

PORTLAND CEMENT CONCRETE (PCC)

Overall, the PCC paving went particularly well. However, there were two minor problems that are worth mentioning. The first was the soft spots in the DGAB mentioned above. The other problem was that there were a few occasions when the curing compound applicator would fail, and in these instances the areas were sprayed with a wand from the bridge of the application machine. An effort was made to apply the compound uniformly and the workmanship in these areas was good. All parties involved in this project were extremely conscientious regarding the construction of and documentation for the test sections.

APPENDIX A

CONSTRUCTION PHOTOS

APPENDIX A - WASHINGTON SPS-8 CONSTRUCTION PHOTOS

Appendix A consists of the following construction photos:

Photo 1. Smith Springs Road (prior to reconstruction).
Photo 2. Automated weather station (AWS).
Photo 3. FWD testing on subgrade.
Photo 4. FWD testing on embankment.
Photo 5. Embankment sampling.
Photo 6. Density testing on embankment.
Photo 7. DGAB.
Photo 8. Soft spot in DGAB.
Photo 9. PCC plant in Clyde.
Photo 10. PCC paving train.
Photo 11. Checking dowel bar placement and PCC pickup.
Photo 12. Burlap finishing.
Photo 13. Manual finishing and finishing train.
Photo 14. Curing compound on PCC.

Photo 1. Smith Springs Road (prior to reconstruction).

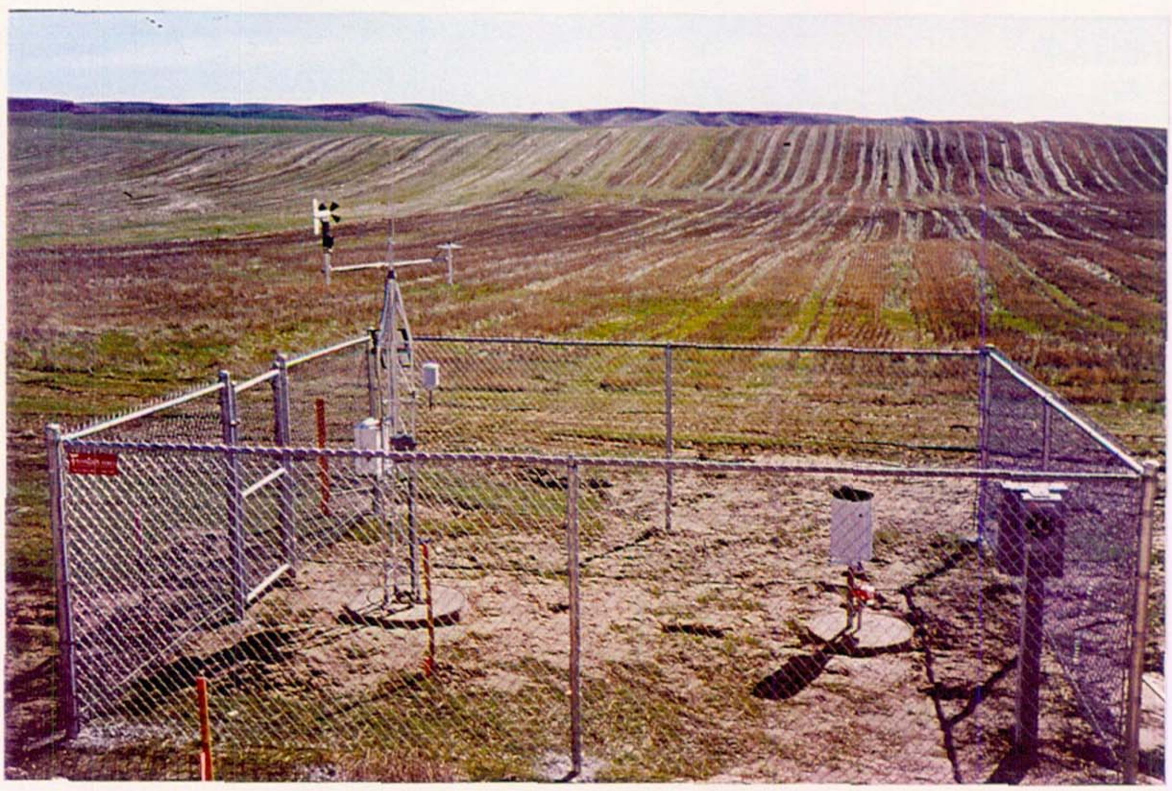


Photo 2. Automated weather station (AWS).

Photo 3. FWD testing on subgrade.

Photo 4. FWD testing on embankment.

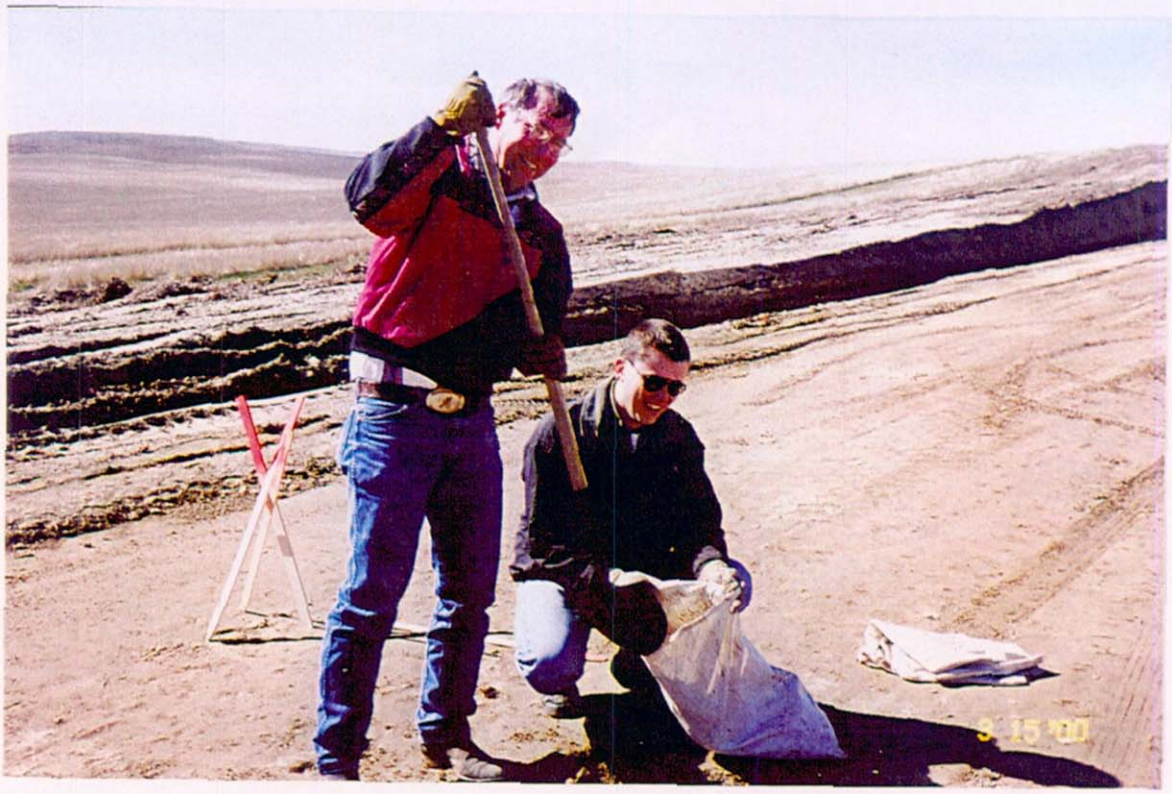


Photo 5. Embankment sampling.

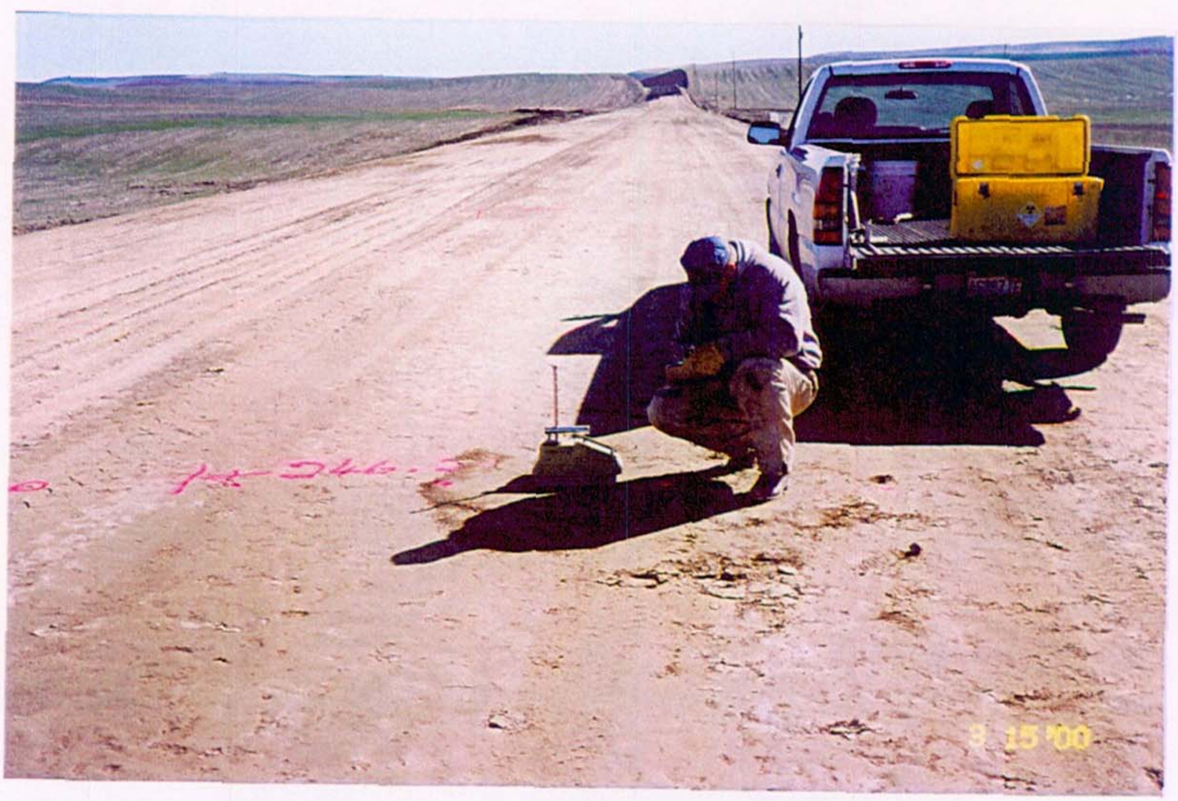


Photo 6. Density testing on embankment.

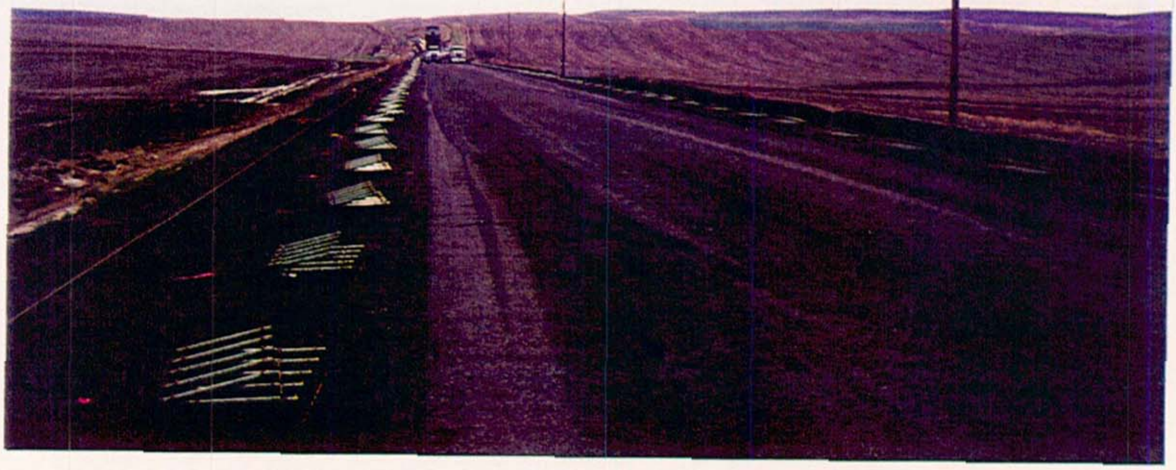


Photo 7. DGAB.

Photo 8. Soft spot in DGAB.

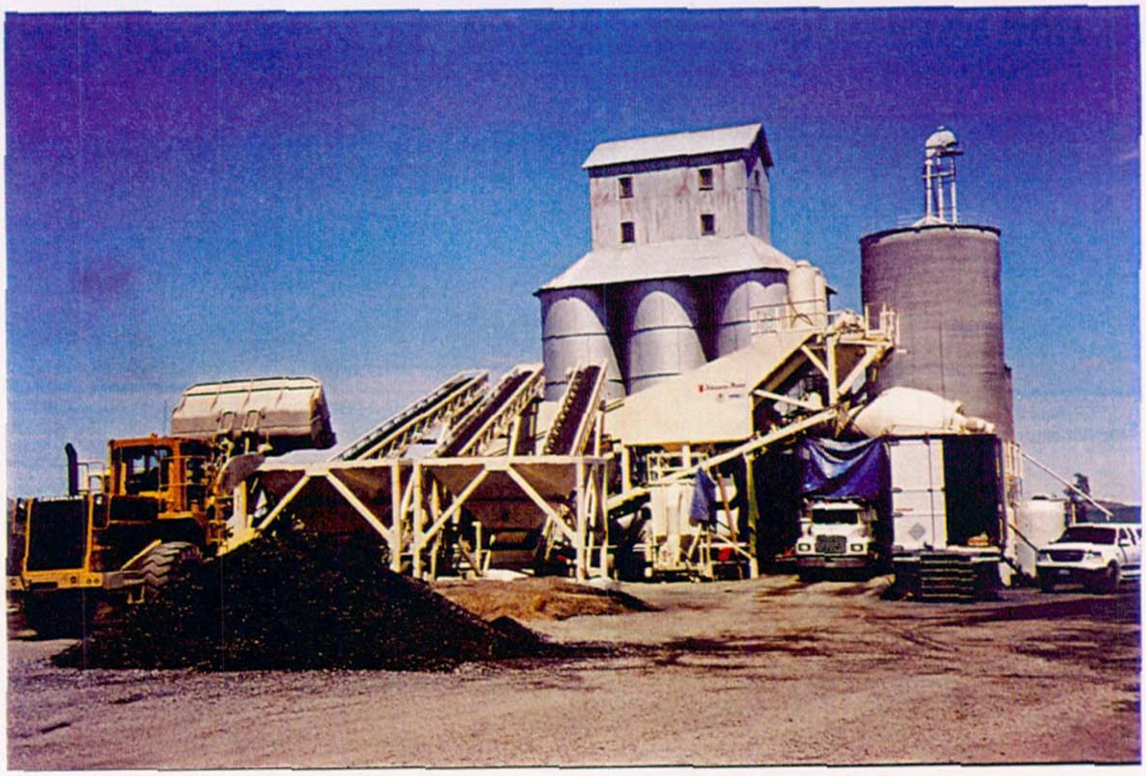


Photo 9. PCC plant in Clyde.

Photo 10. PCC paving train.

Photo 11. Checking dowel bar placement and PCC pickup.

Photo 12. Burlap finishing.

Photo 13. Manual finishing and finishing train.

Photo 14. Curing compound on PCC.

APPENDIX B

MIX DESIGN

CASCADE TESTING LABORATORY, INC.
TESTING & INSPECTION / ENGINEERS
12919 N E 126TH PLACE
KIRKLAND WASHINGTON 98034
KIRKLAND (425) 823-9800
FAX (425) 823-2203
SEATTLE (206) 523-3700
EVERETT (425) 259-0800

MAR 15 2000

March 5, 2000
Cert No 0003-11

Zuluaga Construction
652 SW 143rd
Seattle, Washington 98166

Attention. Bob Pipinich

Reference. Smith Springs Road Project
Flexural Strength Concrete
Trial Mix Design

Gentlemen;

The following represents the results of the Flexural Strength Concrete Trial Mix Design as run on materials supplied by you to our Kirkland, Washington laboratory facility.

The material utilized in the mixes consisted of the following;

Fine Aggregate:	Coarse Sand	Connell Sand & Gravel	FN64
	Fine Sand	Connell Sand & Gravel	FN65
Coarse Aggregate:	1 1/2" to #4"	Connell Sand & Gravel	FN64
Cement:	Tilbury Type I		
Air Entrainment:	Master Builders	Pave-Air	
Water Reducer:	Master Builders	Pave-N	

The results from the mix and related tests may be seen on the attached sheets.

We hope this information will answer any questions you may have, if any should arise or we can be of further assistance please do not hesitate to give us a call.

Respectfully;

CASCADE TESTING LABORATORY, INC.

Kenneth B Foot
Vice President

CASCADE TESTING LABORATORY, INC
TESTING & INSPECTION / ENGINEERS

TRIAL PROOF MIX
BATCH WEIGHTS FOR ONE (1) CUBIC YARD
Trial Mix No 1

CEMENT (Tilbury)(Type I)	564	lbs
FINE AGGREGATE (Coarse Sand)(SSD Wt.)	565	lbs
(Fine Sand)(SSD Wt.	565	lbs
COARSE AGGREGATE (1 1/2" - #4)(SSD Wt.)	2250	lbs
AIR ENTRAINMENT (Pave Air)(2.25 oz./100# Cement)	12.69	oz.
WATER REDUCER (Pave-N)(1.5 oz/100# Cement)	8.46	oz.
WATER	245	lbs
WATER-CEMENT RATIO (% by wt. of Cement)	.434	
SLUMP (measured)	1 25	inches
ENTRAINED AIR (measured)	4 5	percent
UNIT WEIGHT (measured)	154 67	lbs.cu.ft.
YIELD	27.1	cu. ft.
TEMPERATURE (measured)	55 2	deg. F

ASTM C-78 — FLEXURAL STRENGTH - P S I

ASTM C-39 — COMPRESSIVE STRENGTH - P S I — 14 - Days

	14 - Day	Set 1	Set 2	Set 3	Set 4	Set 5
	785	4910	4860	4930	5140	5110
	795	5180	4800	4730	5220	4930
	790	4670	4960	4790	5230	4850
	770	4790	4850	4640	5060	4900
	800	5030	4870	4850	4770	4870
Avg.	790	4920	4870	4790	5080	4930

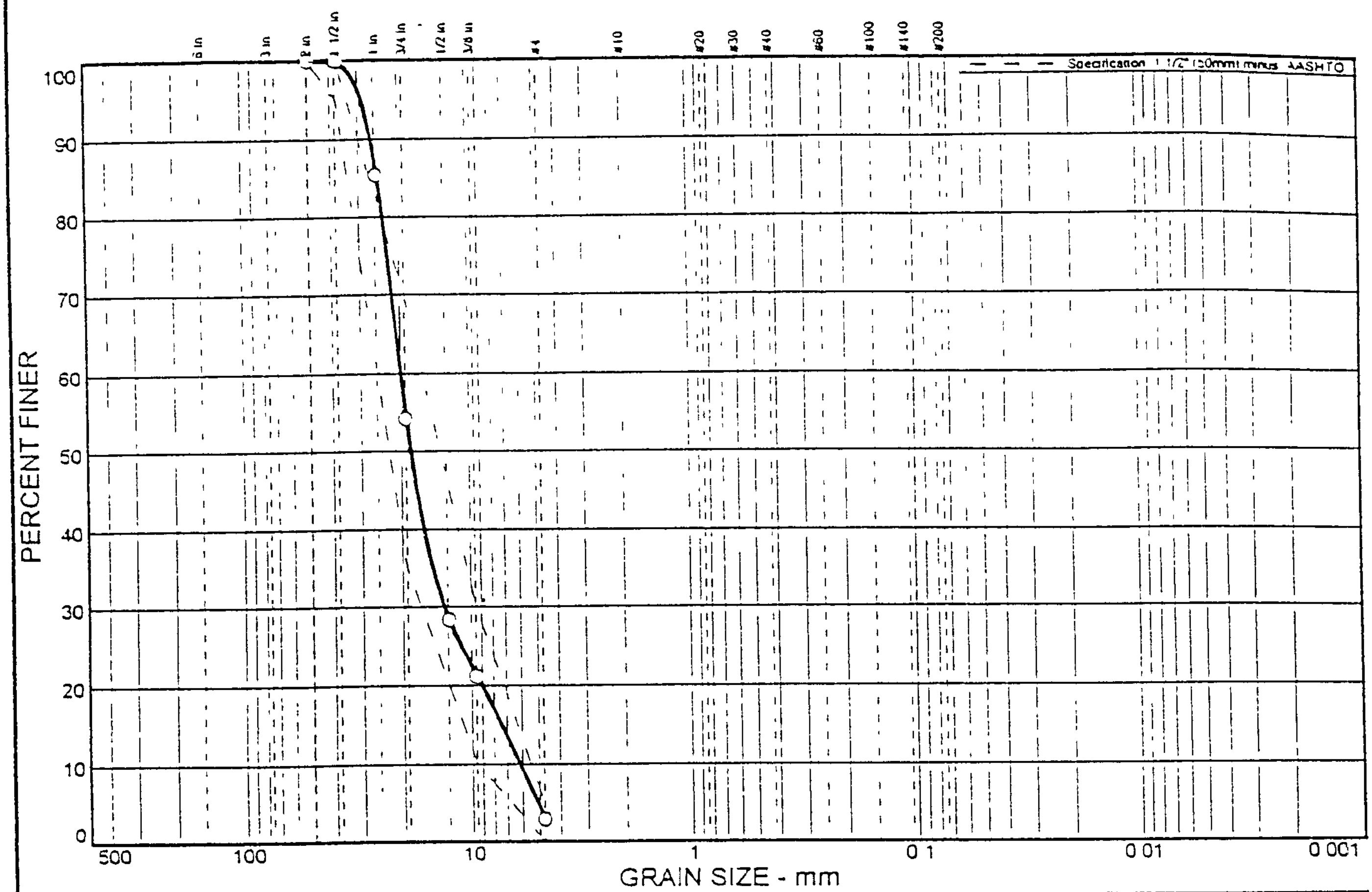
CASCADE TESTING LABORATORY, INC
TESTING & INSPECTION / ENGINEERS

TRIAL PROOF MIX
BATCH WEIGHTS FOR ONE (1) CUBIC METER
Trial Mix No 1

CEMENT (Tilbury)(Type I)	335	Kg
FINE AGGREGATE (Coarse Sand)(SSD Wt.)	335	Kg
(Fine Sand)(SSD Wt.	335	Kg
COARSE AGGREGATE (1 1/2" - #4)(SSD Wt.)	1335	Kg
AIR ENTRAINMENT (Pave Air)	491	ml
WATER REDUCER (Pave-N)	327	ml
WATER	145 6	liters
WATER-CEMENT RATIO (% by wt. of Cement)	.434	
SLUMP (measured)	32	mm
ENTRAINED AIR (measured)	4.5	percent
UNIT WEIGHT (measured)	2479	Kg/Cu m
YIELD	.997	Cu m
TEMPERATURE (measured)	12.9	deg. C

	ASTM C-78 FLEXURAL STRENGTH - Mpa	ASTM C-39 COMPRESSIVE STRENGTH - Mpa 14 - Days				
	14 - Day	Set 1	Set 2	Set 3	Set 4	Set 5
	5 41	33 85	33 51	33 99	35 44	35.23
	5 48	35.72	33.10	32.61	35.99	33 99
	5 45	32 20	34.20	33 03	36.06	33.44
	5 31	33.02	33.44	31 99	34 89	33 79
	5 52	34 68	33.58	33 44	32.89	33 58
Avg.	5.43	33.89	33.57	33.01	35.05	34.01

Particle Size Distribution Report



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0 0	45 6	51 5				2 9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
50	100 0	100 0 - 100 0	
37 5	100 0	95 0 - 100 0	
25	85 3		
19	54 1	35 0 - 70 0	
12 5	28 3		
9 5	21 1	10 0 - 30 0	
4 75	2 9	0 0 - 5 0	
Size in mm			

Soil Description

Coarse Aggregate - Connell Sand and Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 24 9 D_{60}= 20 0 D_{50}= 18 2

D_{30}= 13 1 D_{15}= 7 45 D_{10}= 6 16

C_u= 3 25 C_c= 1 40

Classification

USCS= AASHTO=

Remarks

* 1 1/2" (50mm) minus AASHTO

Sample No.: 50mm minus Aggrega Source of Sample: Date: 2-15-2000

Location: Elev./Depth:

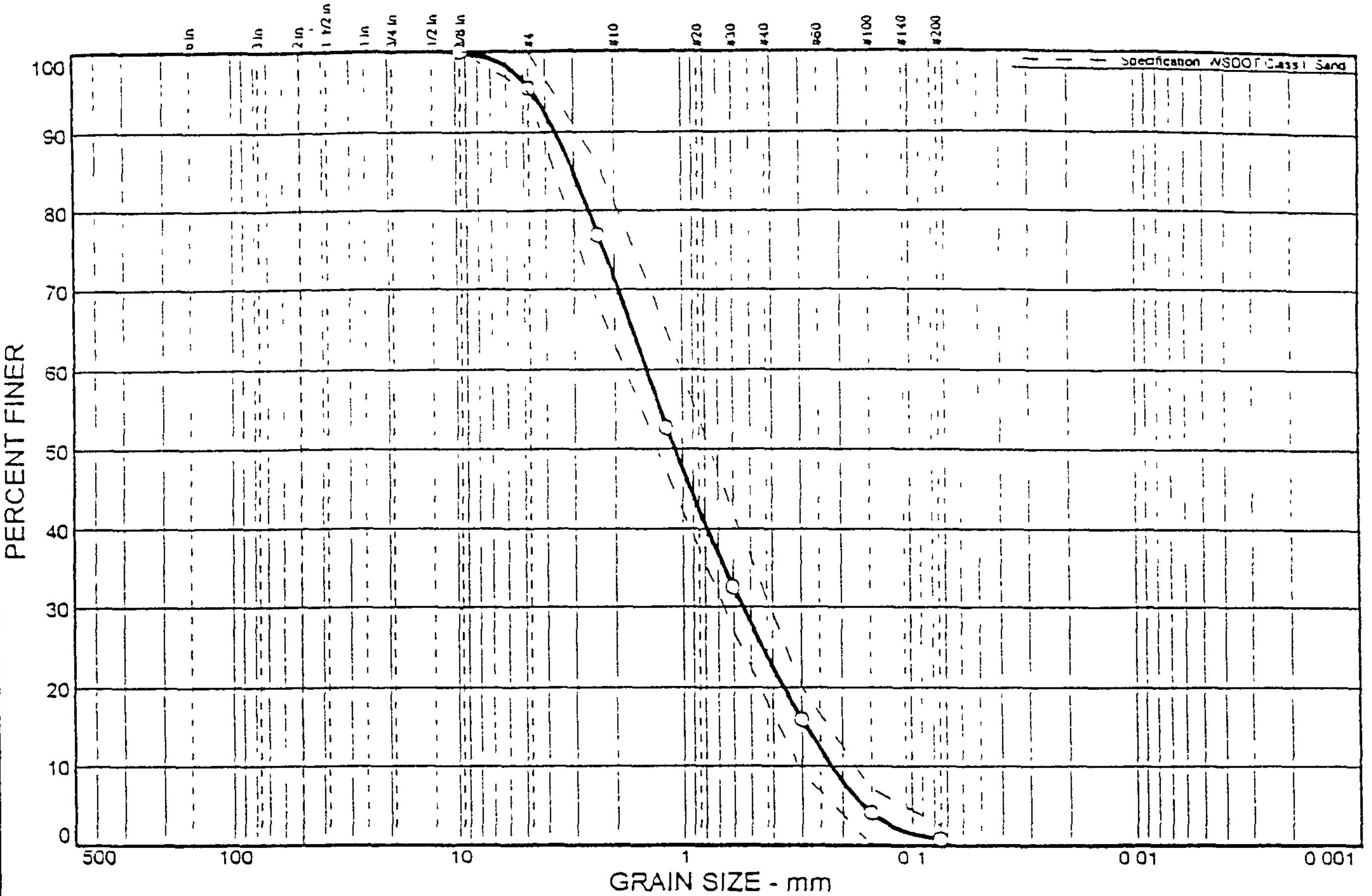
CASCADE TESTING LABORATORY INC
TESTING & INSPECTION / ENGINEERS
12919 N E 126TH PLACE
KIRKLAND WASHINGTON 98034 (206) 823-4600

Client: Zuluaga Construction

Project: Trial Mix Designs Smith Springs Road Project

Project No: 0003-11

Particle Size Distribution Report



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0 0	0 0	4 6	24 3	47 4	22 9	0 8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9 5	100 0	100 - 100	
4 75	95 4	95 - 100	
2 36	76 8	68 - 86	
1 18	52 6	47 - 65	
0 6	32 4	27 - 42	
0 30	15 8	9 - 20	
0 15	4 1	0 - 7	
0 075	0 8	0 - 2 5	
Size in mm			

* WSDOT Class I Sand

Soil Description

50 % Coarse Sand Material
50 % Fine Sand Material

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 3 05 D_{60}= 1 46 D_{50}= 1 09
D_{30}= 0 548 D_{15}= 0 289 D_{10}= 0 225
C_u= 6 51 C_c= 0 91

Classification

USCS= AASHTO=

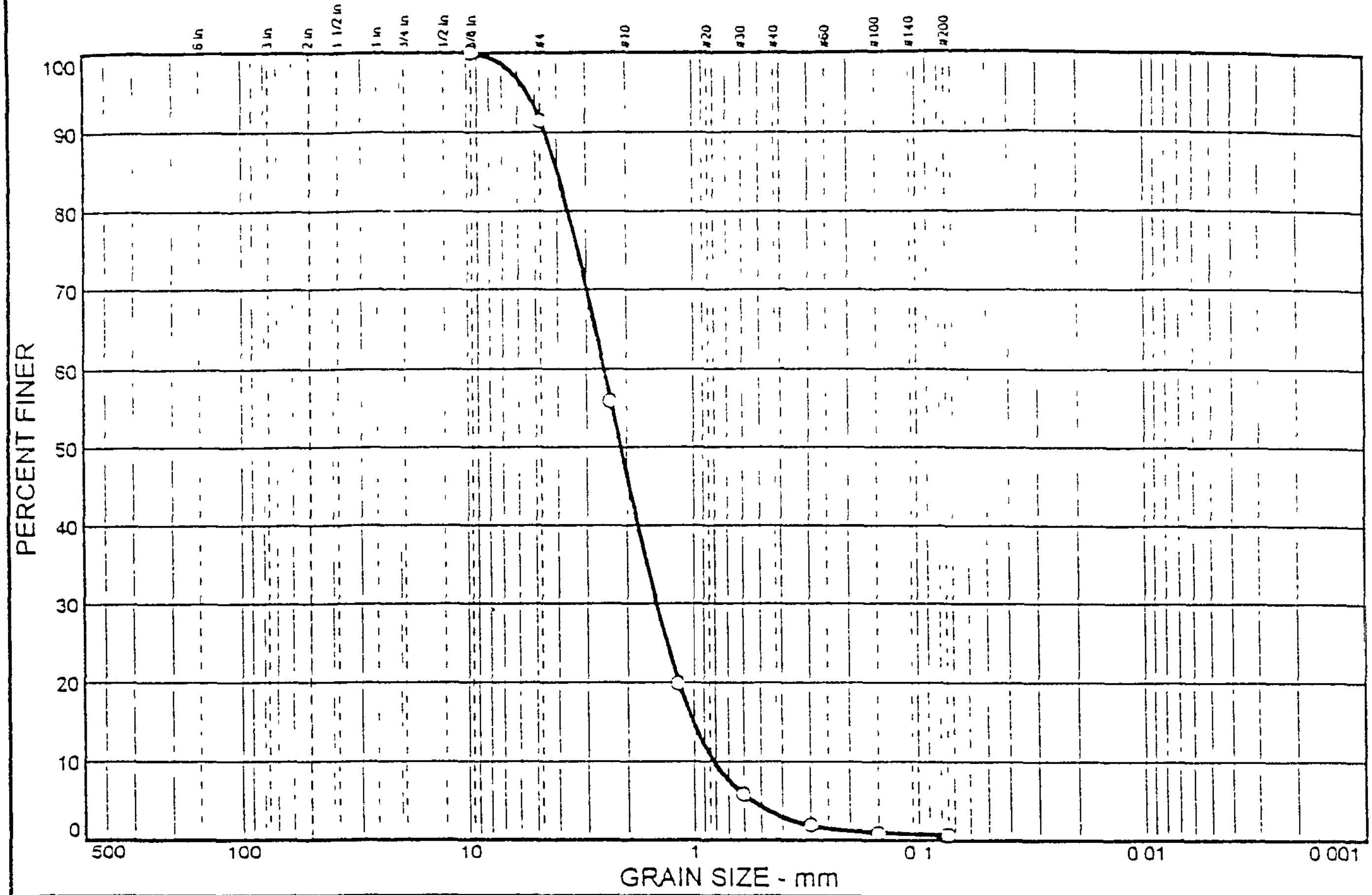
Remarks

Sample No.: Blended Fine Aggregate Source of Sample: Date: 2-15-2000
Location: Elev./Depth:

CASCADE TESTING LABORATORY INC
TESTING & INSPECTION / ENGINEERS
12919 N E 126TH PLACE
KIRKLAND WASHINGTON 98034 (206) 823-9803

Client: Zuluaga Construction
Project: Trial Mix Designs Smith Springs Road Project
Project No: 0003-11

Particle Size Distribution Report



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0 0	0 0	8 7	45 2	42 9	2 5	0 7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9 5	100 0		
4 75	91 3		
2 36	55 9		
1 18	19 8		
0 600	5 8		
0 300	1 9		
0 150	1 0		
0 075	0 7		
Size in mm			

* (no specification provided)

Soil Description

Coarse Sand Connell Sand and Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 4 02 D_{60}= 2 53 D_{50}= 2 14
D_{30}= 1 49 D_{15}= 1 02 D_{10}= 0 819
C_u= 3 09 C_c= 1 07

Classification

USCS= AASHTO=

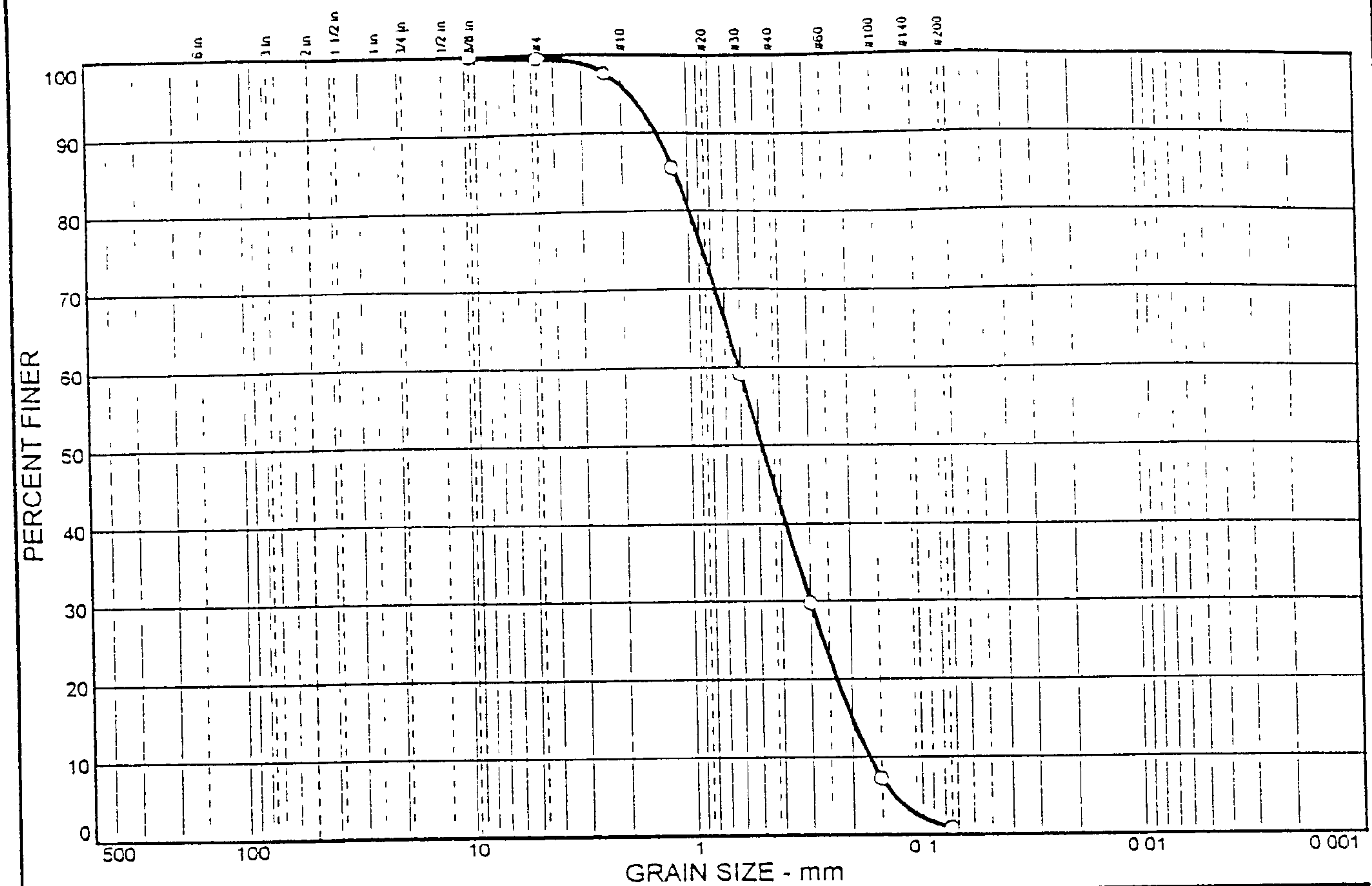
Remarks

Sample No.: Coarse Sand Material **Source of Sample:** Date: 2-15-2000
Location: Elev./Depth:

CASCADE TESTING LABORATORY INC
TESTING & INSPECTION / ENGINEERS
12919 NE 126TH PLACE
KIRKLAND WASHINGTON 98034 (206) 823-98CC

Client: Zuluaga Construction
Project: Trial Mix Designs Smith Springs Road Project
Project No: 0003-11

Particle Size Distribution Report



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0 0	0 0	0 5	3 5	51 9	43 2	0 9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9 5	100 0		
4 75	99 5		
2 36	97 6		
1 18	85 4		
0 600	59 0		
0 300	29 7		
0 150	7 1		
0 075	0 9		
Size in mm			

* (no specification provided)

Soil Description

Fine Sand - Connell Sand and Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 1 16 D_{60}= 0 614 D_{50}= 0 487
D_{30}= 0 302 D_{15}= 0 202 D_{10}= 0 170
C_u= 3 61 C_c= 0 88

Classification

USCS= AASHTO=

Remarks

Sample No.: Fine Sand Material Source of Sample: Date: 2-15-2000
Location: Elev /Depth:

CASCADE TESTING LABORATORY INC
TESTING & INSPECTION / ENGINEERS
12919 N E 126TH PLACE
KIRKLAND WASHINGTON 98034 (206) 823-9800

Client: Zuluaga Construction
Project: Trial Mix Designs Smith Springs Road Project
Project No: 0003-11

TILBURY

Tilbury Cement Limited
7777 Ross Road
Delta British Columbia
Tel: (604) 946-0411
Fax: (604) 946-2420

Mailing Address:
P O. Box 950
Delta, British Columbia
V4K 3S6

AVERAGE CHEMICAL AND PHYSICAL CHARACTERISTICS OF
ASTM TYPE I/II, AASHTO TYPE I CEMENT
PRODUCED AT TILBURY CEMENT, BELLINGHAM, WA

Certificate No.	2001031		2001032	
Dates Produced	Jan 01 2000 Jan 31 2000		Feb 01 2000 Feb 29 2000	
SiO2 (%)	21.1		21.4	
Al2O3 (%)	4.8		4 7	
Fe2O3 (%)	3.4		3.3	
CaO (%)	65.0		64 5	
MgO (%)	0.8		0.9	
SO3 (%)	2.60		2.82	
Na2O (%)	0.31		0.29	
K2O (%)	0.29		0.29	
TiO2 (%)	0.28		0.30	
C3S (%)	60		55	
C2S (%)	15		20	
C3A (%)	7 0		7 0	
C4AF (%)	10.4		10.0	
Total Alkalis (%)	0.50		0.49	
Loss on Ignition (%)	1.19		1.51	
Insoluble Residue (%)	0.24		0.22	
Free Calcium Oxide (%)	0.65		0.33	
Blaine (m2/kg)	379		380	
+325 mesh (%)	1.8		1.5	
Vicat Setting Time				
Initial (min)	124		141	
Final (min)	232		252	
Air Content (%)	7.4		7.0	
Soundness (Expansion) (%)	-0.02		-0.04	
Compressive Strength	MPa	psi	MPa	psi
3 Day	26.2	3800	32.8	4760
7 Day	34.7	5040	40.9	5930
28 Days	42.1	6100		

This will certify that the above described cement meets ASTM Specification C-150 for Type I and Type II Portland Cements and AASHTO Specification M-85 for Type I Portland Cement.

Plant Chemist: Jasper van de Wetering 10-Mar-2000

Report/Version rMCertMain/10Mar00

A LEHIGH COMPANY

Master Builders, Inc.
Suite 104
16285 SW 85th Avenue
Tigard, Oregon 97224
Phone 503/624-7911

Master Builders Technologies

March 22, 2000

Certificate of Conformance
Pave-Air
Master Builders Air-Entraining Admixture for Concrete

D A. Zuluaga
Job: Smith Springs Rd
Walla Walla County

TO WHOM IT MAY CONCERN:

I, Alice McFarland, Manager, Quality Assurance for Master Builders, Inc., Cleveland, Ohio, certify:

That Pave-Air is Master Builders air-entraining admixture for concrete; and

That Pave-Air is an aqueous solution of Vinsol resin that has been neutralized with sodium hydroxide, the ratio of sodium hydroxide to Vinsol resin is one part to six parts, with a nominal 13 percent by weight residue when dried at 105°C; and

That no calcium chloride or chloride based ingredient is used in the manufacture of Pave-Air; and

That Pave-Air, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.000068 percent (0.68 ppm) chloride ions by weight of the cement when used at the rate of 65 ml per 100 kg (1 fluid ounce per 100 pounds) of cement; and

That Pave-Air meets the requirements of ASTM C 260-95, Corps of Engineers' CRD-C 13-94, and AASHTO M154-89, the Standard Specifications for Air-Entraining Admixtures for Concrete.

Alice McFarland

Alice McFarland

Manager, Quality Assurance
Research and Development

Master Builders, Inc.
Suite 104
16285 SW 85th Avenue
Tigard, Oregon 97224
Phone: 503/624-7911

March 22, 2000

Certificate of Conformance
Masterpave N
Master Builders Admixture for Concrete

D A Zuluaga
Job Smith Springs Rd
Walla Walla County

TO WHOM IT MAY CONCERN:

I, Alice McFarland, Manager, Quality Assurance for Master Builders, Inc., Cleveland, Ohio, certify:

That no calcium chloride or chloride based ingredient is used in the manufacture of Masterpave N; and

That Masterpave N, based on the chlorides originating from all the ingredients used in its manufacture, contribute less than 0.00015 percent (1.5 ppm) chloride ions by weight of the cement when used at the rate of 65 ml per 100 kg (1 fluid ounce per 100 pounds) of cement; and

That Masterpave N meets the requirements for a Type A, Water-Reducing Admixture specified in ASTM C 494-92 and Corps of Engineers' CRD-C 87-93, and AASHTO M194-87, the Standard Specifications for Chemical Admixtures for Concrete.

Alice McFarland

Alice McFarland

Manager, Quality Assurance
Research and Development

06/14/93 11:45 WSDOT MATERIALS LAB 001

Schmidt/Jim D.

P.O. Box 167 Olympia, WA 98504

TRANSMITTAL

0000021488 116905

DATE 2-26-92	ORG NO 454710	CONTRACT/JOB NO. XL 0210	PIT NO PS-FN-64	HQ. LAB NO. P5250
IDENTIFICATION SAMPLE NO 1	OF 32 SACKS	INTENDED USE CONCRETE PAVEMENT & STRUCTURES		
PA NO.	PLACE CONNELL	S.R. NO. 395	SEC. (MESA - CONNELL) DISTRICT WIDE 2. FO QUARRY SITES	

NATURAL DEPOSIT LOCATION (COUNTY) FRANKLIN NW ¼, SW ¼, SEC. 6 T. 13 N. R. 33 E. OR W.W.M. ACCESS @ STA. NO. —

DEPOSIT TYPE	AVG. STRIPPING DEPTH	AVG. DEPTH OTHER STRIPPING	EST. DEPTH	KNOWN DEPTH
GRAVELS	4	— FT OF —	50	

EST. AREA	EST. QUANTITY (CU. YDS.)	THIS SAMPLE IS CONSIDERED TRULY REPRESENTATIVE OF
X		> CU. YDS

SAMPLE TAKEN AS FOLLOWS: TWO PLACES ON FACE OF PIT

WATER AVAILABLE: ☒ YES ☐ NO

IF LEDGE, WILL IT SHOOT: ☐ LARGE ☐ SMALL

SUITABLE PLANT SITE NEARBY? ☒ YES ☐ NO

ARE OTHER SAMPLES FROM SAME DEPOSIT INCLUDED IN SHIPMENT? ☐ YES ☒ NO

GRADING SATISFACTORY FOR INTENDED USE? ☐ YES ☐ NO (WHY?)

LOCATION OF SUPPLEMENTAL MATERIAL FOR SHORTAGE

OTHER KNOWN DEPOSITS AVAILABLE? ☐ YES ☐ NO

REFERENCE

CHARACTERISTICS NOT APPARENT IN SAMPLE: COBBLES & BOULDERS

IF WORKED PREVIOUSLY, WHEN AND BY WHOM? CONNELL SAND & GRAVEL (PIT)

NAME AND ADDRESS OF OWNER: CONNELL SAND & GRAVEL - CONNELL WASH (ALLEN HILL) 509-234-3221

DOES SKETCH ATTACHED SHOW RELATIONSHIP TO DEPOSIT AS A WHOLE? HQ LAB FEB 28 '92

REMARKS: BLEND SAND FROM (FN-13-?) UNCL PIT INCLUDED IN SH...

PROJECT ENGINEER'S SIGNATURE AND PHONE NO. [signature] 5??-??

DOT FORM 350-025 REVISED 8/82 Distribution: White—With Sample Canary—Project Files

TEST OF P.C.C. (Steilacoom Comparison)

Lab. No. P-5254

Coarse Agg		Fine Agg	
Pit No.	PS FN 64	Pit No.	PS FN 65
Sp G	2.84	Sp G	2.75
Abs	1.86	Abs	3.36

Mortar Strength, % Ottawa ———

Cylinder Compressive Strength % Steilacoom 85%

Beam Flexure Strength % Steilacoom 93 %   BEAMS AVERAGE 862 PS

LA 16 % Deg. = 85

Project Engineer's Off. was notified

Material: Aggregate Source Approved for Cement Concrete Pavement Only.

		Labor Codes	Date APR 8 1992 By LGF
M't'ls File X	Gen File X	T46D	RODNEY G. FINKLE, P.E MATERIALS ENGINEER
Proc. Testing X	QC		BY: Ingo Muller
Chem. Lab.	Dist. Admin 5		
Project Eng. Koryuta			
~. M't'ls Eng. 5			

INTERMOUNTAIN MATERIALS TESTING, INC.
7448 Lemhi St., Boise, Idaho 83709
1718 West A St., Pasco, Washington 99301
(208) 376-8203
(509) 547-1121
Materials Engineering and Testing Construction Inspection Project Consultation

REPORT TO: Connell Sand & Gravel
200 W. Date
Connell, WA 99326

DATE: 2-15-91
FILE NUMBER: 91-09
SHEET: 1 of 3
INVOICE: T910016

PROJECT: Corps of Engineers

Sample Identification

On January 29, 1991, your personnel delivered to our laboratory samples of aggregate and sand reported to be from your pit in Connell, WA.

At your request, we performed standard specification tests for concrete aggregate in accordance with ASTM C-33.

The test results are summarized as follows:

Test Results

Sample Number: 910496
1 1/2" Stockpile

Sieve Analysis, ASTM C136

Screen or Sieve Size	Percent Passing	Spec. Limits ASTM C-33, Size 4
2	100	100
1 1/2"	100	90-100
1"	48	20-55
3/4"	2	0-15
1/2"	<1	--
3/8"	<1	0-5
No. 4	0.1	--

Los Angeles Abrasion Test, ASTM C131

Wear, %	14.8	50 max

Unit Weight Determination, ASTM C29

Rodded unit weight, pcf	113.9	---

Clay Lumps and Friable Particles, ASTM C142

Clay & Friable, %	0.0	5 max

Light Weight Particles, ASTM C123

Light particles, %	0.0	0.5 max

Material Finer than No. 200, ASTM C117

Finer than No. 200, %	0.24	1 max

Sodium Soundness of Aggregate, ASTM C88

Loss, %	1.73	18 max

Connell Sand & Gravel
February 15, 1991
Sheet 2 of 3

Test Results continued

Sample Number: 910497
3/4" Stockpile

Sieve Analysis, ASTM C136

Screen or Sieve Size	Percent Passing	Spec. Limits ASTM C-33, Size 57
1 1/2"	100	100
1"	100	95-100
3/4"	92	--
1/2"	50	25-60
3/8"	27	--
No. 4	3	0-10
No. 8	1.0	0-5

Los Angeles Abrasion Test, ASTM C131

Wear, %	14.8	50 max

Unit Weight Determination, ASTM C29

Rodded unit weight, pcf	113.8	---

Clay Lumps, Friable Particles, ASTM C142

Clay & Friable, %	0.0	5 max

Lightweight Particles, ASTM C123

Light particles, %	0.0	0.5 max

Material Finer than No. 200 Sieve, ASTM C117

Finer than No. 200, %	0.66	1 max

Sodium Soundness of Aggregate, ASTM C88

Loss, %	1.73	18 max

Connell Sand & Gravel
February 15, 1991
Sheet 3 of 3

Test Results continued

Sample Number: 910498
Concrete Sand

Sieve Analysis, ASTM C136

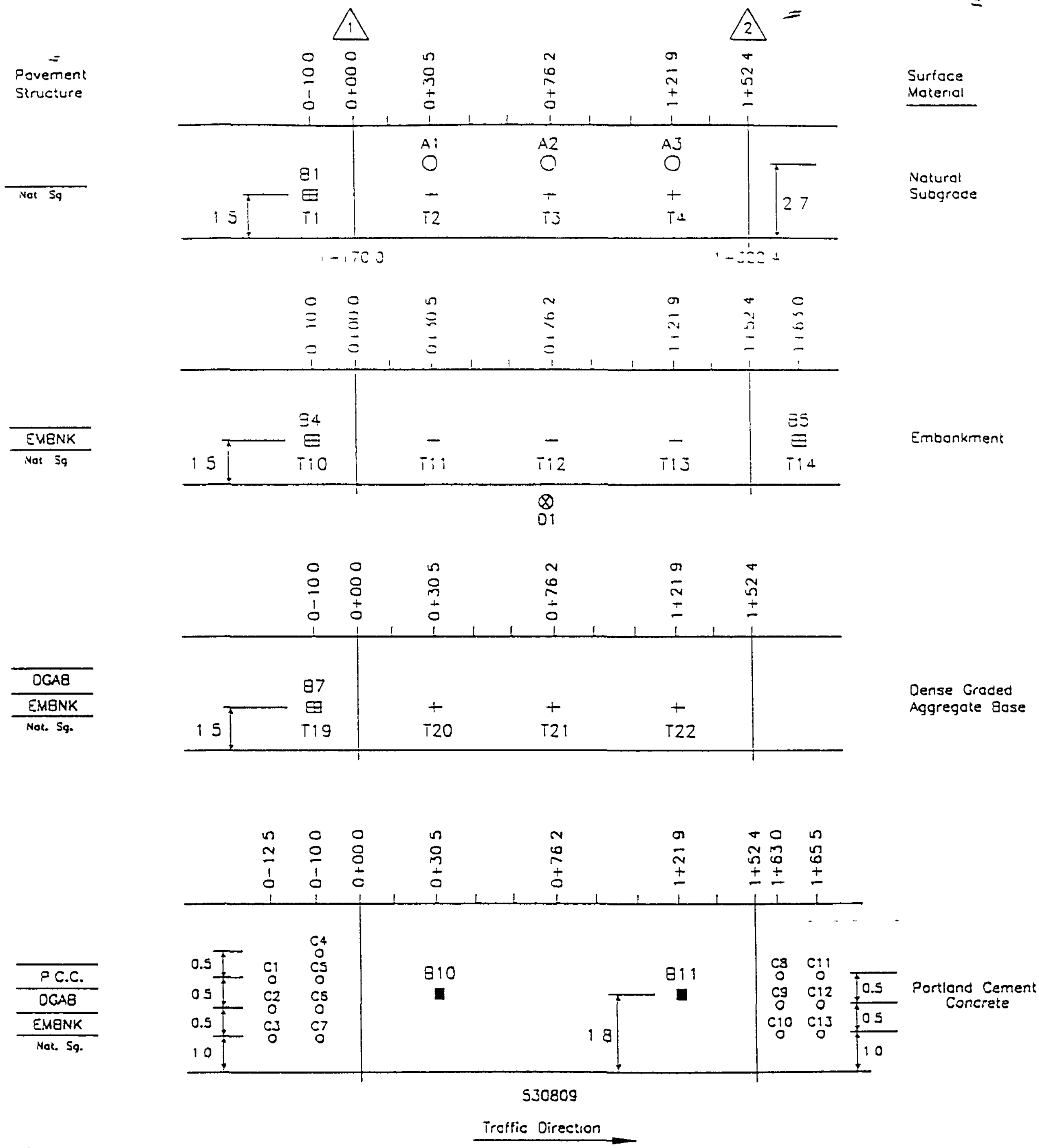
Screen or Sieve Size	Percent Passing	Spec. Limits ASTM C33
3/8"	100	100
No. 4	99	95-100
No. 8	82	80-100
No. 16	62	50-85
No. 30	38	25-60
No. 50	13	10-30
No. 100	5	2-10
No. 200	2.1	0-3
Fineness Modulas	2.3	2.3-3.1

Organic Impurities, ASTM C40		
Organic Plate, No.	2	Less than 3
Clay Lumps, and Friable Particles, ASTM C142		
Clay & Friable, %	Trace	5 max
Light Weight Particles, ASTM C123		
Light particles, %	0.05	0.5 max
Sodium Soundness, ASTM C88		
Loss, %	5.66	10 max

Reviewed by Lew A. Beck

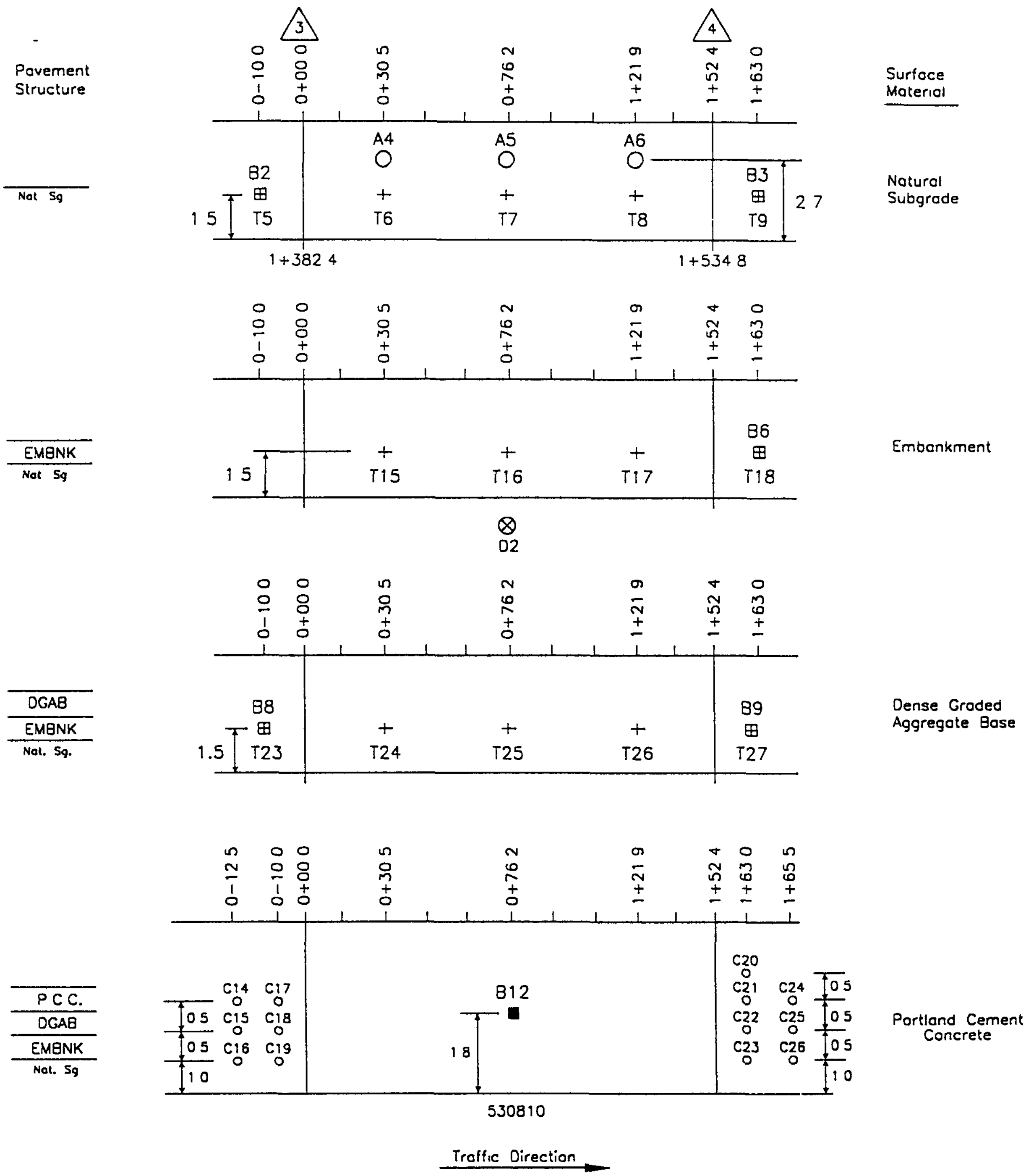
APPENDIX C

MATERIALS SAMPLING PLAN



□ B1 – Bulk sampling of Natural Subgrade
\+ T1–T4 – Moisture-Density tests on Natural Subgrade
o A1–A3 – Thinwall (Shelby) Tube sampling to 1 2m below subgrade
⊗ D1 – 6 1m Shoulder Probe
□ B4–B5 – Bulk sampling of Embankment
\+ T10–T14 – Moisture-Density tests on Embankment
□ B7 – Bulk sampling of Dense Graded Agg. Base
\+ T19–T22 – Moisture-Density tests on DGAB
■ B10–B11 – Bulk sampling of Portland Cement Concrete
o C1–C13 – 102mm Cores of PCC surface
Note Shoulder probe testing may be done at a later time

Figure 2 Overview of sampling, testing, and coring plan for Portland Cement Concrete, section 53A809, SPS-8 Washington



- ◻ B2–B3 – Bulk sampling of Natural Subgrade
- \+ T5–T9 – Moisture–Density tests on Natural Subgrade
- o A4–A6 – Thin wall (Shelby) Tube Sampling to 1 22m below subgrade
- ⊗ D2 – 6.1m Shoulder Probe
- ◻ B6 – Bulk sampling of Embankment
- \+ T15–T18 – Moisture–Density tests on Embankment
- ◻ B8–B9 – Bulk sampling of Dense Graded Agg Base
- \+ T23–T27 – Moisture–Density tests on Dense Graded Agg. Base
- ■ B12 – Bulk sampling of Portland Cement Concrete
- o C14–C26 – 102mm Cores of PCC surface

Note. Shoulder probe testing may be done at a later time

Figure 3 Overview of sampling, testing, and coring plan for Portland Cement Concrete, section 53A8109, SPS-8 Washington

Table 4. Field and laboratory test plan for **Natural Subgrade** materials, SPS-8, Washington.

Test Name	SHRP Test Designation	SHRP Protocol	No. of Tests	Material Source/ Test Location
Sieve Analysis	SS01	Ship to FHWA Lab[1]	3	B1-B3
Hydrometer to 0 01mm	SS02	Ship to FHWA Lab[1]	3	B1-B3
Atterberg Limits	SS03	Ship to FHWA Lab[1]	3	B1-B3
Classification & Type of Subgrade*	SS04	Ship to FHWA Lab	6	A1,A3,A5,B1-B3
Classification & Type of Subgrade*	SS04	P52	3	A2,A4,A6
Moisture-Density Relations	SS05	Ship to FHWA Lab[1]	2	B1-B3
Resilient Modulus	SS07	Ship to FHWA Lab[1]	2	B1-B3
Unit Weight	SS08	P56	2	A4,A6
Unconfined Compressive Strength	SS10	P54	2	A2-A4
Natural Moisture Content	SS09	Ship to FHWA Lab[1]	2	B1-B3
Permeability	SS11/UG09	P48	1	B2 or A2
In-Place Density		SHRP-LTPP Method	9	T1-T9

[1]Ship to FHWA lab after splitting and quartering a 45 kg sample for the state testing.

Table 8. Field and laboratory test plan for **Prepared Embankment** materials, SPS-8, Washington.

Test Name	SHRP Test Designation	SHRP Protocol	No. of Tests	Material Source/ Test Location
Sieve Analysis	SS01	Ship to FHWA Lab[1]	3	B4-B6
Hydrometer to 0.01mm	SS02	Ship to FHWA Lab[1]	3	B4-B6
Atterberg Limits	SS03	Ship to FHWA Lab[1]	3	B4-B6
Classification & Type of Subgrade	SS04	Ship to FHWA Lab[1]	3	B4-B6
Moisture-Density Relations	SS05	Ship to FHWA Lab[1]	3	B4-B6
Resilient Modulus	SS07	Ship to FHWA Lab[1]	3	B4-B6
Natural Moisture Content	SS09	Ship to FHWA Lab[1]	3	B4-B6
Permeability	UG09	P48	1	B5
In-Place Density		LTPP Method	9	T10-T18
Depth to Rigid Layer		LTPP Method	4	D1-D2
Expansion Index	SS12	P60	20	D1-D2

[1]Ship to FHWA lab after splitting and quartering a 45 kg sample for the state testing.

Table 12. Field and laboratory test plan for **Dense Graded Aggregate Base** materials, SPS-8 Washington.

Test Name	SHRP Test Designation	SHRP Protocol	No. of Tests	Material Source/ Test Location
Particle Size Analysis	UG01	Ship to FHWA lab[1]	3	B7-B9
Sieve Analysis (washed)	UG02	Ship to FHWA lab[1]	3	B7-B9
Atterberg Limits	UG04	Ship to FHWA lab[1]	3	B7-B9
Moisture-Density Relations	UG05	Ship to FHWA lab[1]	3	B7-B9
Resilient Modulus	UG07	Ship to FHWA lab[1]	3	B7-B9
Classification	UG08	Ship to FHWA lab[1]	3	B7-B9
Permeability	UG09	P48	1	B8
Natural Moisture Content	UG10	Ship to FHWA lab[1]	3	B7-B9
In-Place Density		SHRP-LTPP Method	9	T19-T27

[1]Ship to FHWA lab after splitting and quartering a 45 kg sample for the state testing.

Table 15. Field and laboratory test plan for as delivered **PCC** materials, SPS-8 Washington.

Test Name	SHRP Test Designation	SHRP Protocol	No. of Tests	Material Source/ Test Location
Portland Cement Concrete - As Delivered				
Compressive Strength	PC01	P61		
14 Day			3	B10-B12[1]
28 Day			3	
1 Year			3	
Splitting Tensile Strength	PC02	P62		
14 Day			3	B10-B12
28 Day			3	
1 Year			3	
Flexural Strength	PC09	P69		
14 Day			3	B10-B12
28 Day			3	
1 Year			3	
Air Content	ASTM C231	LTPP Method	3	B10-B12
Slump	ASTM C143	LTPP Method	3	B10-B12
Temperature	ASTM C1064	LTPP Method	3	B10-B12

[1]A total of 6 cylinder specimens and 3 beam specimens are molded from each PCC bulk sample.

Table 16. Bulk samples and molded specimens from PCC mix on SPS-8 Washington.

Sample Number	Test Age After Molding	Specimen Number			Test Section
		152x305mm Cylinder Compression Test	152x305mm Cylinder Indirect Tensile	152x152x508mm Beam Flexural Strength	
B10	14 days	GX01	GX04	FX01	530809
	28 days	GY02	GY05	FY02	
	1 year	GZ03	GZ06	FZ03	
B11	14 days	GX07	GX10	FX04	530809
	28 days	GY08	GY11	FY05	
	1 year	GZ09	GZ12	FZ06	
B12	14 days	GX13	GX16	FX07	530810
	28 days	GY14	GY17	FY08	
	1 year	GZ15	GZ18	FZ09	

Table 17. Field and laboratory test plan for as-placed **PCC** materials, SPS-8 Washington.

Test Name	SHRP Test Designation	SHRP Protocol	No. of Tests	Material Source/ Test Location
Portland Cement Concrete - As Placed				
Compressive Strength	PC01	P61		
14 Day			3	C1,C10,C20
28 Day			3	C2,C11,C19
1 Year			3	C4,C13,C22
Splitting Tensile Strength	PC02	P62		
14 Day			3	C5,C14,C23
28 Day			3	C6,C15,C24
1 Year			3	C8,C17,C26
PCC Unit Weight	PC05	P65	9	All compressive strength cores
Static Modulus of Elasticity	PC04	PC64		
28 Day			3	C3,C12,C21
1 Year			3	C7,C16,C25
Air Content @ 28 Days	PC08	PC68	1	C9
PCC Thermal Coefficient		Ship to FHWA	1	C18
Core Examination	PC06	P66	26	All cores

APPENDIX D

CONSTRUCTION DATA FORMS

SPS-8 CONSTRUCTION DATA SHEET 1 PROJECT IDENTIFICATION	* STATE CODE [5 3] * SPS PROJECT CODE A[0 8] * TEST SECTION NO. [0 1]

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

*2 STATE HIGHWAY AGENCY (SHA) DISTRICT NUMBER [_ 5]

*3. COUNTY OR PARISH [_ 7 1]

4. FUNCTIONAL CLASS (SEE TABLE A 2, APPENDIX A) [0 9]

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

*6. ROUTE NUMBER 9425001 [_ _ _ _ _]

7. TYPE OF PAVEMENT (01 for Granular Base, 02 for Treated Base) [~~01~~] 17

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

*9. DATE OF CONSTRUCTION COMPLETION (Month/Year) [06/00]

*10. DATE OPENED TO TRAFFIC (Month/Year) [06/00]

11. CONSTRUCTION COSTS PER LANE MILE (In $1000) [_ _ 3 6 4]

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

PROJECT STARTING POINT LOCATION

*13. MILEPOINT [_ _ 7.8 0]

*14. ELEVATION [_ 1 2 5 6]

*15. LATITUDE [4 6° 2 4' 3 9 . 0 0"]

*16. LONGITUDE [1 1 8° 2 5' 4 6 . 0 0"]

17. ADDITIONAL LOCATION INFORMATION (SIGNIFICANT LANDMARKS): [_______________
_______________]

18. HPMS SAMPLE NUMBER (HPMS ITEM 28) [_ _ _ _ _ _ _ _ _ _ _ N]

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

ENT'D FEB 23 2001

PREPARED T. Pu...ll EMPLOYER ALK ... DATE 02-20-01

SPS-8 CONSTRUCTION DATA SHEET 1 PROJECT IDENTIFICATION	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO [1 0]

*1 DATE OF DATA COLLECTION OR UPDATE (Month/Year) [__ __/__ __]

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

*3 COUNTY OR PARISH [__ 7 1.]

4. FUNCTIONAL CLASS (SEE TABLE A.2, APPENDIX A) [__ 9]

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

*6. ROUTE NUMBER [9425001.]

7. TYPE OF PAVEMENT (01 for Granular Base, 02 for Treated Base) [~~01~~] 17

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

*9. DATE OF CONSTRUCTION COMPLETION (Month/Year) [0 6/0 0]

*10. DATE OPENED TO TRAFFIC (Month/Year) [0 6/0 0]

11. CONSTRUCTION COSTS PER LANE MILE (In $1000) [__ __ 3 6 4.]

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

PROJECT STARTING POINT LOCATION

*13. MILEPOINT [__ __ 7.8 0]

*14. ELEVATION [1 2 5 6 __]

*15. LATITUDE [4 6° 2 4' 3 9 . 0 0"]

*16. LONGITUDE [1 1 8° 2 5' 4 6 . 0 0"]

17. ADDITIONAL LOCATION INFORMATION (SIGNIFICANT LANDMARKS): [________________
____]

18 HPMS SAMPLE NUMBER (HPMS ITEM 28) [__ __ __ __ __ __ __ __ __ __ __ __ N]

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

PREPARED BY Jason Russell EMPLOYER NCE DATE 02-20-01

SPS-8 CONSTRUCTION DATA
SHEET 3
REFERENCE PROJECT STATION TABLE

* STATE CODE (5 3)
* SPS PROJECT CODE (A 8)
* TEST SECTION NO (0 0)

ORDER	*1 TEST SECTION ID NO	REFERENCE PROJECT STATION NUMBER *2 START	REFERENCE PROJECT STATION NUMBER *3 END	*4 CUT-FILL[1] TYPE
1	53A809	0 + 00	1 + 52	2
2	53A810	2 + 12	3 + 65	2
3		+	+	
4		+	+	
5		+	+	
6		+	+	
7		+	+	
8		+	+	
9		+	+	
10		+	+	
11		+	+	
12		+	+	
13		+	+	
14		+	+	
15		+	+	
16		+	+	
17		+	+	
18		+	+	
19		+	+	
20		+	+	

ENT'D FEB 23 2001

*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 construction the test section is located on
Cut... 1 Fill. . 2 At-Grade. 3 Cut, Fill, and At-Grade Combo .. 4

If a section contains any combination of cut, fill and at-grade portions (code 4 above), enter the specific details of the cut, fill and at-grade locations on SPS-8 Construction Data Sheet 15.

PREPARER Jason Piccinelli EMPLOYER NCE DATE 02-20-01

SPS-8 CONSTRUCTION DATA SHEET 2 GEOMETRIC, SHOULDER AND DRAINAGE INFORMATION	* STATE CODE [5 3] * SPS PROJECT CODE A[0 8] * TEST SECTION NO [2 9]

*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.]	[K.] 3
*6 TOTAL WIDTH (FEET)	[_ N.]	[_ 6.]
*7. PAVED WIDTH (FEET)	[_ N]	[_ 6.]
8. SHOULDER BASE TYPE (CODES-TABLE A.6)	[_ N.]	[2 3.]
9. SURFACE THICKNESS (INCHES)	[_ _. N]	[_ 2. 0]
10. SHOULDER BASE THICKNESS (INCHES)	[_ _. N]	[1 5. 0]
11. DIAMETER OF LONGITUDINAL DRAINPIPES (INCHES)		[_. N]
12. SPACING OF LATERALS (FEET)		[_ _ N.]

ENT'D FEB 23 2001

SPS-8 CONSTRUCTION DATA SHEET 4 LAYER DESCRIPTIONS	* STATE CODE [5 3] * SPS PROJECT CODE A[0 8] * TEST SECTION NO. [0 9]

*1 LAYER NUMBER	*2 LAYER DESCRIPTION	*3 MATERIAL TYPE CLASS	*4 LAYER THICKNESSES (Inches)			
			AVERAGE	MINIMUM	MAXIMUM	STD. DEV.
1	SUBGRADE(7)	[5 9] 55	[redacted]	[redacted]	[redacted]	[redacted]
2	[1 1]	[5 9] 55	[_ 9 0.8]	_ 47.5	130 6	_ 41.6
3	[0 5]	[2 3]	[_ _ 4.5]	_ _ 2.2	_ _ 6 6	_ _ 1.1
4	[0 3]	[0 4]	[_ _ 8.3]	_ _ 7.7	_ _ 8.9	_ _ 0.3
5	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
6	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
7	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
8	[_ _]	[_ _]	[_ _ _ _]	_ _ _._	_ _ _._	_ _ _._
9	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
10	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
11	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _ _
12	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
13	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
14	[_ _]	[_ _]	[_ _ _ _]	_ _ _ _	_ _ _._	_ _ _._
15	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._

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

ENT'D FEB 23 2001

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.

JDS 3/1/01

SPS-8 CONSTRUCTION DATA SHEET 12 LAYER THICKNESS MEASUREMENTS	* STATE CODE [53] * SPS PROJECT CODE A[08] * TEST SECTION NO. [09]

SHEET 1 OF 2

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	0	5.9	8.5		
	36	5.8	8.8		
	72	6.4	8.8		
	108	6.5	8.8		
	144				
0+50	0	5.8	8.4		
	36	5.8	8.6		
	72	5.9	8.9		
	108	6.1	8.8		
	144				
1+00	0	4.3	8.2		
	36	3.0	8.4		
	72	4.3	8.5		
	108	4.7	8.4		
	144				
1+50	0	4.1	7.8		
	36	4.0	7.9		
	72	4.2	8.0		
	108	4.4	7.9		
	144				
2+00	0	2.2	7.8		
	36	2.8	8.0		
	72	3.5	7.9		
	108	4.2	7.8		
	144				
2+50	0	3.5	7.9		
	36	3.6	8.2		
	72	3.6	8.2		
	108	3.0	8.2		
	144				
3+00	0	3.7	7.7		
	36	3.4	8.4		
	72	4.4	8.0		
	108	5.3	8.2		
	144				
LAYER NUMBER		03	04		

ENT'D FEB 23 2001

PREPARER Jason Puccinelli EMPLOYER NCE DATE 02-20-01

SPS-8 CONSTRUCTION DATA
SHEET 12
LAYER THICKNESS MEASUREMENTS

* STATE CODE [5 3]
* SPS PROJECT CODE A [[illegible] 8]
* TEST SECTION NO. [0 9]

SHEET 1 OF 2

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	0	5.3	7.7	.	.
	36	5.3	8.0	.	.
	72	5.6	8.2	.	.
	108	6.6	8.2	.	.
	144	.	.	.	.
4+00	0	3.5	8.3	.	.
	36	3.5	8.4	.	.
	72	3.8	8.6	.	.
	108	4.6	8.4	.	.
	144	.	.	.	.
4+50	0	4.1	7.9	.	.
	36	4.3	8.4	.	.
	72	4.7	8.5	.	.
	108	5.3	8.4	.	.
	144	.	.	.	.
5+00	0	3.8	8.2	.	.
	36	3.8	8.5	.	.
	72	4.2	8.4	.	.
	108	4.8	8.3	.	.
	144	.	.	.	.
+		.	.	.	.
+		.	.	.	.
+		.	.	.	.
LAYER NUMBER		03	04		

ENT'D FEB 23 2001

PREPARER Jason Puccinelli EMPLOYER NCE DATE 02-20-01

SPS-8 CONSTRUCTION DATA SHEET 13 UNBOUND AGGREGATE BASE MATERIAL PLACEMENT	* STATE CODE [5 3] * SPS PROJECT CODE A[0 8] * TEST SECTION NO [2 9]

*1. UNBOUND BASE MATERIAL PLACEMENT BEGAN (Month-Day-Year) [05-10-00]

*2. UNBOUND BASE MATERIAL PLACEMENT COMPLETED (Month-Day-Year) [05-15-00]

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

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) [12.0]

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

ENT'D FEB 23 2001

PREPARER Jason Aiken(?) EMPLOYER AK(?) DATE 02-20-00

SPS-8 CONSTRUCTION DATA SHEET 14 SUBGRADE PREPARATION	* STATE CODE [5 3] * SPS PROJECT CODE A [0 8] * TEST SECTION NO [0 4]

*1. SUBGRADE PREPARATION BEGAN (Month-Day-Year) [07-15-99]

*2. SUBGRADE PREPARATION COMPLETED (Month-Day-Year) [03-15-00]

PRIMARY COMPACTION EQUIPMENT

*3. CODE TYPE [5]

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

*4. GROSS WEIGHT (TONS) [1 2.0]

	TYPE	PERCENT
*5. STABILIZING AGENT 1	[N]	[_ _.N]
*6. STABILIZING AGENT 2	[N]	[_ _.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) [_ 6]
(For Fill Sections Only)

DENSITY DATA IS RECORDED ON SAMPLING DATA SHEET 8-1

8. SIGNIFICANT EVENTS DURING CONSTRUCTION (DISRUPTIONS, RAIN, EQUIPMENT PROBLEMS, ETC.) ____________________

ENT'D FEB 23 2001

PREPARER Jason Pinciroli EMPLOYER NCE DATE 02-20-01

SPS-8 CONSTRUCTION DATA SHEET 17 PORTLAND CEMENT CONCRETE LAYERS-JOINT DATA	* STATE CODE [5 3] * SPS PROJECT CODE A [0 8] * TEST SECTION NO [0 9]

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

* 2. AVERAGE CONTRACTION JOINT SPACING (Feet) [_ 1 5 . 0]

3. (RANDOM JOINT SPACING, IF ANY: ______________________________)

* 4. SKEWNESS OF JOINTS (ft/lane) [0 0]

* 5 TRANSVERSE CONTRACTION JOINT LOAD TRANSFER SYSTEM [1]
   Round Dowels.......................... 1
   Aggregate Interlock.................... 2
   Other (Specify) ______________________ 3

* 6. ROUND DOWEL DIAMETER (Inches) [1 . 2 5]

* 7. DOWEL SPACING (Inches) [~~3 0~~ 1 2]

8. DISTANCE OF NEAREST DOWEL FROM OUTSIDE LANE-SHOULDER EDGE (Inches) [1 0 . 0]

9. DOWEL LENGTH (Inches) [~~3 0~~ 1 8 .]

10. DOWEL COATING [5]
   Paint and/or Grease.................... 1
   Plastic................................ 2
   Monel.................................. 3
   Stainless Steel........................ 4
   Epoxy.................................. 5
   Other (Specify) ______________________ 6

11. METHOD USED TO INSTALL MECHANICAL LOAD TRANSFER DEVICES [1]
   Preplaced on Baskets................... 1
   Mechanically Installed................. 2
   Other (Specify) ______________________ 3

12. DOWEL ALIGNMENT CHECKED BEFORE PLACEMENT (Y/N) [Y]

13. DOWEL ALIGNMENT CHECKED AFTER PLACEMENT (Y/N) [N]

If Yes, describe method used ______________________________
(e.g. Pachometer, Ground Penetrating Radar)

FEB 23 2001

Jason Puccinelli NCE

SPS-8 CONSTRUCTION DATA SHEET 18 PORTLAND CEMENT CONCRETE LAYERS-JOINT DATA (CONTINUED)	* STATE CODE [5 3] * SPS PROJECT CODE A [0 8] * TEST SECTION NO [0 9]

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

* 2. METHOD USED TO FORM TRANSVERSE JOINTS [1]
- Sawed...................... 1 Metal Insert.... 3
- Plastic Insert 2
- Other (Specify) ______________________ 4

* 3 TYPE OF LONGITUDINAL JOINT (BETWEEN LANES) [2]
- Butt....... .. .. 1 Insert Weakened Plane. ... 3
- Sawed Weakened Plane...... 2
- Other (Specify) ______________________ 4

* 4. TYPE OF SHOULDER-TRAFFIC LANE JOINT [1]
- Butt...... .... 1 Insert Weakened Plane. ... 3
- Sawed Weakened Plane...... 2
- Other (Specify) ______________________ 4

*5. AVERAGE DEPTH OF SAWCUT, FROM MEASUREMENTS (Inches).............. [2.0 0]

6. TIME INTERVAL BETWEEN CONCRETE PLACEMENT AND SAWCUT (HOURS)....... [_ _ _._] 8-10 hrs

7. TRANSVERSE JOINT SEALANT TYPE (AS BUILT) [3]
- Preformed (Open Web)...... 1 Rubberized Asphalt 3
- Asphalt................... 2 Low-Modulus Silicone...... 4
- Other (Specify) ______________________ 5

TRANSVERSE JOINT SEALANT RESERVOIR (AS BUILT)

8. WIDTH, (Inches).. [0.2 0]

9. DEPTH, (Inches).. [2.0 0]

LONGITUDINAL JOINT SEALANT RESERVOIR (AS BUILT)

10 WIDTH, (Inches) .. .. [0 2 0]

11. DEPTH, (Inches)............ . ... [2 6 7]

12. BETWEEN LANE TIE BAR DIAMETER (Inches) [0 6 3]

ENT'D FEB 23 2001

13. BETWEEN LANE TIE BAR LENGTH (Inches) [3 0.]

14. BETWEEN LANE TIE BAR SPACING (Inches) [3 0 0]

SHOULDER-TRAFFIC LANE JOINT SEALANT RESERVOIR (AS BUILT)

15. WIDTH, (Inches). . ... [_._ N]

16. DEPTH, (Inches) . . .. [_ _ N]

Jason Purcell [illegible]

SPS-8 CONSTRUCTION DATA SHEET 19 PORTLAND CEMENT CONCRETE LAYERS - MIXTURE DATA	* STATE CODE [5 3] * SPS PROJECT CODE [4 8] * TEST SECTION NO. [c 1]

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

MIX DESIGN (OVEN DRIED WEIGHT - PER CUBIC YARD)

*2. Coarse Aggregate (Pounds) .... [2 2 5 0.]

*3. Fine Aggregate (Pounds) .... [1 1 3 0.]

*4. Cement (Pounds) .... [_ 5 6 4.]

*5. Water (Pounds) .... [_ 2 4 5.]

*6. TYPE CEMENT USED (See Cement Type Codes, Table A.11) [4 1]
(If Other, Specify Tilbury Type I) -

*7. ALKALI CONTENT OF CEMENT, (PERCENT BY WEIGHT OF CEMENT) [_ 0.5]

ADMIXTURES (PERCENT BY WEIGHT OF CEMENT)

		TYPE CODE		AMOUNT
*8.	ADMIXTURE #1 Air	[0 8]	132 oz	[0 0.2]
*9.	ADMIXTURE #2 Water Reducer	[0 4]	76 oz	[0 0.1]
*10.	ADMIXTURE #3	[_ _]		[_ _._]

(See Cement Admixture Codes, Table A.12)
(If Other, Specify) ______________________________)

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

	TYPE OF AGGREGATE	TYPE OF TEST	RESULTS
11.	Coarse	[0 1]	[_ 1 3 0]
12	Coarse	[_ _]	[_ _ _ _]
13.	Coarse	[_ _]	[_ _ _._]
14.	Coarse and Fine	[_ _]	[_ _ _._]

ENT'D FEB 23 2001

Jason Puccinelli AICE 02-20-01

SPS-8 CONSTRUCTION DATA SHEET 20 PORTLAND CEMENT CONCRETE LAYERS MIXTURE DATA (CONTINUED)	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO [0 9]

* 1 LAYER NUMBER (FROM CONSTRUCTION DATA SHEET 4) [4]

COMPOSITION OF COARSE AGGREGATE

	TYPE	PERCENT
* 2.	[7]	[1 0 0.]
* 3.	[_]	[_ _ _]
* 4.	[_]	[_ _ _]

Crushed Stone ... 1 Manufactured gravel...... 2 Crushed Gravel.... 3
Crushed Slag..... 4 Lightweight.............. 5 Recycled Concrete... 6
Other (Specify) Washed River Rock (screened)

* 5 GEOLOGIC CLASSIFICATION OF COARSE AGGREGATE (SEE GEOLOGIC CLASSIFICATION CODES, TABLE A.9) [_ _.]

COMPOSITION OF FINE AGGREGATE

	TYPE	PERCENT
* 6	[1]	[1 0 0.]
* 7.	[_]	[_ _ _.]
* 8.	[_]	[_ _ _.]

ENT'D FEB 23 2001

Natural Sand... 1
Crushed, Manufactured Sand (From Crushed Gravel or Stone)...2
Recycled Concrete... 3 Other (Specify)____

9. INSOLUBLE RESIDUE, PERCENT (ASTM D3042) [_ _ _.] < 0.5 rounded to 9

10. GRADATION OF COARSE AGGREGATE

Sieve Size	% Passing
2"........	___
1 1/2"	100
1" ...	85
7/8".. .	___
3/4" .	54
5/8" . .	___
1/2".. .	28
3/8"......	21
No. 4. . .	3

2.8?

11. GRADATION OF FINE AGGREGATE

Sieve Size	% Passing
No. 8.....	77
No. 10 ...	___
No 16 .	53
No. 30. ..	32
No 40	___
No 50	16
No 80 ..	___
No 100.	4
No 200	1

BULK SPECIFIC GRAVITIES:

12. Coarse Aggregate (AASHTO T85 or ASTM C127) [~~2 2 8 3~~] 2.830

13. Fine Aggregate (AASHTO T84 or ASTM C128) [2 7 1 0]

Jason Puccinelli NCE 02-20-01

September 1992

SPS-8 CONSTRUCTION DATA SHEET 21 PORTLAND CEMENT CONCRETE LAYERS PLACEMENT DATA	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO [0 9]

*1 DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [06-02-00]

*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [06-02-00]

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

*4. CONCRETE MIX PLANT AND HAUL

	Name	Haul Distance (Mi)	Time (Min)
Plant 1	Clyde	[_ _ 1]	[_ _ 2]
Plant 2		[_ _ _]	[_ _ _]
Plant 3		[_ _ _]	[_ _ _]

*5. PAVER TYPE [1]
Slip Form Paver.... 1 Side Form... 2
Other (Specify) ______________ 3

6. PAVER MANUFACTURER AND MODEL NUMBER Gomaco GP 3500 (1987)

7. SPREADER TYPE (if applicable) Gomaco with augers, vibrators and screed

8. SPREADER MANUFACTURER AND MODEL NUMBER ______________

9. WIDTH PAVED IN ONE PASS (Feet) [24.0]

10. DOWEL PLACEMENT METHOD [2]
Dowel Bar Inserter (DBI). ... 1 Dowel Basket. ... 2

11. NUMBER OF VIBRATORS [16]

12. VIBRATOR SPACING (Inches) [~~18~~ 15]

13. DEPTH OF VIBRATORS BELOW SURFACE (Inches) [~~18~~ 15.0]

14. ADDITIONAL VIBRATION APPLIED ______________

ENT'D FEB 23 2001

Jason Puccinelli NCE 02-20-01

SPS-8 CONSTRUCTION DATA SHEET 22 PORTLAND CEMENT CONCRETE LAYERS PLACEMENT DATA (CONTINUED)	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO [0 9]

1. CONSOLIDATION OF MATERIALS [1]
   Internal Vibrators... 1   Vibrating Screeds .. 2   Troweling. . 3
   Rolling .. 4   Tamping... 5
   Other (Specify)... 6 ____

2 FINISHING [4]
   Screeding... 1   Hand-Troweling .. 2   Machine-Troweling.. 3
   Other (Specify)... 4 Hand & Machine Troweling

3. CURING [1]
   Membrane Curing Compound...... 1   Burlap-Polyethylene Blanket... 5
   Burlap Curing Blankets........ 2   Cotton Mat Curing............ 6
   Waterproof Paper Blankets..... 3   Hay.......................... 7
   White Polyethylene Sheeting... 4
   Other (Specify) ____ 8

4. TEXTURING [1]
   Tine......................... 1   Grooved Float................. 4
   Broom........................ 2   Astro Turf.................... 5
   Burlap Drag.................. 3   None.......................... 6
   Other (Specify) ____ 7

ENT'D FEB 23 2001

Jason Puccinelli   NCE   02-20-01

September 1992

SPS-8 CONSTRUCTION DATA SHEET 23 PORTLAND CEMENT CONCRETE SURFACE LAYER PROFILE DATA	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO. [0 9]

1 DATE PROFILE MEASURED (Month-Day-Year) [0 6 - 2 1 - 0 0]

2 PROFILOGRAPH TYPE California.. 1 Rainhart... 2 [1]

3. PROFILE INDEX (Inches/Mile) [0 7]

4. INTERPRETATION METHOD Manual . 1 Mechanical . 2 Computer. 3 [3]

5 HEIGHT OF BLANKING BAND (Inches) [0.2 0]

6 CUTOFF HEIGHT (Inches) [0.3 0]

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

8. WAS SURFACE PROFILE CORRECTED BY DIAMOND GRINDING? (YES, NO) [N]

IF YES COMPLETE THE FOLLOWING:

9. DATE DIAMOND GRINDING OPERATIONS BEGAN (Month-Day-Year) [__ __-__ __-__ __]

DATE DIAMOND GRINDING OPERATIONS COMPLETED (Month-Day-Year) [__ __-__ __-__ __]

*11. REASON FOR GRINDING [__]
Elimination of Faulting... 1 Elimination of Slab Warping... 2
Improve Skid Resistance... 3
Restoration of Transverse Drainage Slope... 4
Correction of Construction Deficiencies...5
Other (Specify)... 6 ____________________

12. AVERAGE DEPTH OF CUT (Inches) [__ .__ __]

13 CUTTING HEAD WIDTH (Inches) [__ __ __ .__ __]

14. AVERAGE GROOVE WIDTH (Inches) [__ .__]

15 AVERAGE SPACING BETWEEN BLADES (Inches) [__.__]

ENT'D FEB 23 2001

Jason Puccinelli NCE 02-20-01

SPS-8 CONSTRUCTION DATA SHEET 28 MISCELLANEOUS CONSTRUCTION NOTES AND COMMENTS	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO. [0 9]

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.

Jason Puccinell NCS 02-20-01

SPS-8 CONSTRUCTION DATA SHEET 2 GEOMETRIC, SHOULDER AND DRAINAGE INFORMATION	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO [1 0]

*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 [N] 3
Continuous Along Test Section . 1 Intermittent.. 2 None... 3

*4. SUBSURFACE DRAINAGE TYPE [N] 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)	[_ N.]	[_ 6.]
*7.	PAVED WIDTH (FEET)	[_ N.]	[_ 6.]
8.	SHOULDER BASE TYPE (CODES-TABLE A.6)	[_ N]	[2 3.]
9.	SURFACE THICKNESS (INCHES)	[_ _. N]	[_ 2. 0]
10.	SHOULDER BASE THICKNESS (INCHES)	[_ _. N]	[1 5. 0]
11.	DIAMETER OF LONGITUDINAL DRAINPIPES (INCHES)		[_. N]
12	SPACING OF LATERALS (FEET)		[_ _ N.]

ENT'D FEB 23 2001

SPS-8 CONSTRUCTION DATA SHEET 4 LAYER DESCRIPTIONS	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO [1 0]

*1 LAYER NUMBER	*2 LAYER DESCRIPTION	*3 MATERIAL TYPE CLASS	*4 LAYER THICKNESSES (Inches)			
			AVERAGE	MINIMUM	MAXIMUM	STD. DEV.
1	SUBGRADE(7)	[5 9] 55	[redacted]	[redacted]	[redacted]	[redacted]
2	[1 1]	[5 9] 55	[35.8]	19.4	57.7	19.7
3	[0 5]	[2 3]	[4.7]	2.9	5.9	0.6
4	[0 3]	[0 4]	[11.3]	10.8	12.5	0.3
5	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
6	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
7	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
8	[_ _]	[_ _]	[_ _ _ _]	_ _ _._	_ _ _._	_ _ _._
9	[_ _]	[_ _]	[_ _ _ _]	_ _ _._	_ _ _._	_ _ _._
10	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _ _	_ _ _._
11	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
12	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _ _
13	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._
14	[_ _]	[_ _]	[_ _ _ _]	_ _ _._	_ _ _._	_ _ _._
15	[_ _]	[_ _]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._

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

ENT'D FEB 23 2001

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.

VdS 3/1/01

SPS-8 CONSTRUCTION DATA SHEET 12 LAYER THICKNESS MEASUREMENTS	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO. [1 0]

SHEET 1 OF 2

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	0	4.4	10.8	__ __ . __	__ __ . __
	36	4.0	11.2	__ __ . __	__ __ . __
	72	4.6	11.3	__ __ . __	__ __ . __
	108	4.7	11.2	__ __ . __	__ __ . __
	__ __ __	__ __ . __	__ __ . __	__ __ . __	__ __ . __
0+50	0	4.4	11.2	__ __ . __	__ __ . __
	36	4.1	11.0	__ __ . __	__ __ . __
	72	4.3	11.3	__ __ . __	__ __ . __
	108	4.7	11.2	__ __ . __	__ __ . __
	__ __ __	__ __ . __	__ __ . __	__ __ . __	__ __ . __
1+00	0	4.1	11.0	__ __ . __	__ __ . __
	36	3.8	11.3	__ __ . __	__ __ . __
	72	4.0	11.4	__ __ . __	__ __ . __
	108	4.3	11.2	__ __ . __	__ __ . __
	__ __ __	__ __ . __	__ __ . __	__ __ . __	__ __ . __
1+50	0	4.3	10.9	__ __ . __	__ __ . __
	36	4.0	11.0	__ __ . __	__ __ . __
	72	2.9	12.5	__ __ . __	__ __ . __
	108	4.3	11.2	__ __ . __	__ __ . __
	__ __ __	__ __ . __	__ __ . __	__ __ . __	__ __ . __
2+00	0	5.4	10.8	__ __ . __	__ __ . __
	36	4.9	11.2	__ __ . __	__ __ . __
	72	5.2	11.2	__ __ . __	__ __ . __
	108	5.0	10.9	__ __ . __	__ __ . __
	__ __ __	__ __ . __	__ __ . __	__ __ . __	__ __ . __
2+50	0	4.8	11.2	__ __ . __	__ __ . __
	36	4.7	11.4	__ __ . __	__ __ . __
	72	4.4	11.5	__ __ . __	__ __ . __
	108	4.4	11.5	__ __ . __	__ __ . __
	__ __ __	__ __ . __	__ __ . __	__ __ . __	__ __ . __
3+00	0	4.7	11.2	__ __ . __	__ __ . __
	36	4.7	11.4	__ __ . __	__ __ . __
	72	4.3	11.6	__ __ . __	__ __ . __
	108	4.6	11.4	__ __ . __	__ __ . __
	__ __ __	__ __ . __	__ __ . __	__ __ . __	__ __ . __
LAYER NUMBER		03	04	__ __	__ __

ENT'D FEB 23 2001

PREPARER Jason Pucciarelli EMPLOYER NCE DATE 02-20-01

SPS-8 CONSTRUCTION DATA SHEET 12 LAYER THICKNESS MEASUREMENTS	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO [1 0]

SHEET 2 OF 2

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	0	4.7	11.2		
	36	4.7	11.4		
	72	4.3	11.5		
	108	4.7	11.4		
4+00	0	5.9	11.2		
	36	5.6	11.2		
	72	5.6	11.4		
	108	5.6	11.3		
4+50	0	5.5	11.4		
	36	5.3	11.8		
	72	5.5	11.8		
	108	5.3	11.6		
5+00	0	5.9	11.4		
	36	5.3	11.8		
	72	5.5	11.6		
	108	5.4	11.5		
__+__ __					
__+__ __					
__+__ __					
LAYER NUMBER		03	04		

ENT'D FEB 23 2001

PREPARER Jason Puccinelli EMPLOYER NCE DATE 02-20-01

SPS-8 CONSTRUCTION DATA SHEET 13 UNBOUND AGGREGATE BASE MATERIAL PLACEMENT	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO [1 0]

*1 UNBOUND BASE MATERIAL PLACEMENT BEGAN (Month-Day-Year) [05-10-00]

*2 UNBOUND BASE MATERIAL PLACEMENT COMPLETED (Month-Day-Year) [05-15-00]

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

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) [12.0]

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

ENT'D FEB 23 2001

PREPARER Jason Puccinelli EMPLOYER NCE DATE 02-20-01

SPS-8 CONSTRUCTION DATA SHEET 14 SUBGRADE PREPARATION	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO. [4 0]

*1 SUBGRADE PREPARATION BEGAN (Month-Day-Year) [07-15-99]

*2 SUBGRADE PREPARATION COMPLETED (Month-Day-Year) [03-15-00]

PRIMARY COMPACTION EQUIPMENT

*3 CODE TYPE [5]

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

*4. GROSS WEIGHT (TONS) [12.0]

		TYPE	PERCENT
*5.	STABILIZING AGENT 1	[N]	[__ __.N]
*6.	STABILIZING AGENT 2	[N]	[__ __.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) [_ 6]
(For Fill Sections Only)

DENSITY DATA IS RECORDED ON SAMPLING DATA SHEET 8-1

8. SIGNIFICANT EVENTS DURING CONSTRUCTION (DISRUPTIONS, RAIN, EQUIPMENT PROBLEMS, ETC.) ______

ENT'D FEB 23 2001

PREPARER Jason Aucoin[?]ll EMPLOYER NCIS DATE 02-20-01

September 1992

SPS-8 CONSTRUCTION DATA SHEET 17 PORTLAND CEMENT CONCRETE LAYERS-JOINT DATA	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO [1 0]

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

* 2. AVERAGE CONTRACTION JOINT SPACING (Feet) [_ 1 5 . 0]

3. (RANDOM JOINT SPACING, IF ANY: ____________________)

* 4. SKEWNESS OF JOINTS (ft/lane) [0 . 0]

* 5 TRANSVERSE CONTRACTION JOINT LOAD TRANSFER SYSTEM [1]
   - Round Dowels.......................... 1
   - Aggregate Interlock.................... 2
   - Other (Specify) ____________________ 3

* 6. ROUND DOWEL DIAMETER (Inches) [1 . 5 0]

* 7. DOWEL SPACING (Inches) [~~3 0~~ 12]

8. DISTANCE OF NEAREST DOWEL FROM OUTSIDE LANE-SHOULDER EDGE (Inches) [1 0 . 0]

9. DOWEL LENGTH (Inches) [~~3 0~~ 18 .]

10. DOWEL COATING [5]
    - Paint and/or Grease.................... 1
    - Plastic................................ 2
    - Monel.................................. 3
    - Stainless Steel........................ 4
    - Epoxy.................................. 5
    - Other (Specify) ____________________ 6

11. METHOD USED TO INSTALL MECHANICAL LOAD TRANSFER DEVICES [1]
    - Preplaced on Baskets................... 1
    - Mechanically Installed................. 2
    - Other (Specify) ____________________ 3

12. DOWEL ALIGNMENT CHECKED BEFORE PLACEMENT (Y/N) [Y]

13. DOWEL ALIGNMENT CHECKED AFTER PLACEMENT (Y/N) [N]

If Yes, describe method used ____________________
(e g. Pachometer, Ground Penetrating Radar)

ENT'D FEB 23 2001

SPS-8 CONSTRUCTION DATA SHEET 18 PORTLAND CEMENT CONCRETE LAYERS-JOINT DATA (CONTINUED)	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO. [1 0]

* 1 LAYER NUMBER (FROM CONSTRUCTION DATA SHEET 4) [4]

2. METHOD USED TO FORM TRANSVERSE JOINTS [1]
   - Sawed.............. ..... 1 Metal Insert.........3
   - Plastic Insert........... 2
   - Other (Specify) ______________________ 4

* 3. TYPE OF LONGITUDINAL JOINT (BETWEEN LANES) [2]
   - Butt..................... 1 Insert Weakened Plane 3
   - Sawed Weakened Plane...... 2
   - Other (Specify) ______________________ 4

4. TYPE OF SHOULDER-TRAFFIC LANE JOINT [1]
   - Butt..................... 1 Insert Weakened Plane..... 3
   - Sawed Weakened Plane...... 2
   - Other (Specify) ______________________ 4

*5. AVERAGE DEPTH OF SAWCUT, FROM MEASUREMENTS (Inches).............. [2.7 5]

6. TIME INTERVAL BETWEEN CONCRETE PLACEMENT AND SAWCUT (HOURS)....... [_ _ _.] 8-10 HRS

7. TRANSVERSE JOINT SEALANT TYPE (AS BUILT) [3]
   - Preformed (Open Web)...... 1 Rubberized Asphalt........ 3
   - Asphalt.................. 2 Low-Modulus Silicone...... 4
   - Other (Specify) ______________________ 5

TRANSVERSE JOINT SEALANT RESERVOIR (AS BUILT)

8. WIDTH, (Inches).. [0.2 0]

9. DEPTH, (Inches).. [2.7 5]

LONGITUDINAL JOINT SEALANT RESERVOIR (AS BUILT)

10. WIDTH, (Inches) ... . [0.2 0]

11. DEPTH, (Inches)... .... [3.6 7]

12. BETWEEN LANE TIE BAR DIAMETER (Inches) [0 6 3]

13. BETWEEN LANE TIE BAR LENGTH (Inches) [3 0.]

ENT'D FEB 23 2001

14. BETWEEN LANE TIE BAR SPACING (Inches) [3 0 0]

SHOULDER-TRAFFIC LANE JOINT SEALANT RESERVOIR (AS BUILT)

15. WIDTH, (Inches). . ... [_._ N]

16. DEPTH, (Inches) ... . [_ _ N]

SPS-8 CONSTRUCTION DATA SHEET 19 PORTLAND CEMENT CONCRETE LAYERS - MIXTURE DATA	* STATE CODE * SPS PROJECT CODE * TEST SECTION NO.	[5 3] [A 8] [1 0]

*1 LAYER NUMBER (FROM CONSTRUCTION DATA SHEET 4) [4]

MIX DESIGN (OVEN DRIED WEIGHT - PER CUBIC YARD)

*2. Coarse Aggregate (Pounds) .... [~~2 2 4 0~~ 2 2 5 0 .]

*3. Fine Aggregate (Pounds) .... [~~1 1 5 6~~ 1 1 3 0 .]

*4. Cement (Pounds) .... [__ ~~5 5 9~~ 5 6 4 .]

*5. Water (Pounds) .... [__ ~~1 9 2~~ 2 4 5 .]

*6. TYPE CEMENT USED (See Cement Type Codes, Table A.11) [4 1]
(If Other, Specify TILBURY TYPE I)

*7. ALKALI CONTENT OF CEMENT, (PERCENT BY WEIGHT OF CEMENT) [__ 0.5]

ADMIXTURES (PERCENT BY WEIGHT OF CEMENT)

		TYPE CODE		AMOUNT
*8.	ADMIXTURE #1 AIR	[0 8]	140 oz	[0 0.2]
*9.	ADMIXTURE #2 WATER REDUCER	[0 4]	76 oz	[0 0.1]
*10.	ADMIXTURE #3	[__ __]		[__ __.__]

(See Cement Admixture Codes, Table A.12)
(If Other, Specify) ____________________)

ENT'D FEB 23 2001

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

	TYPE OF AGGREGATE	TYPE OF TEST	RESULTS
11	Coarse	[0 1]	[__ 1 3 0]
12.	Coarse	[__ __]	[__ __ __ __]
13.	Coarse	[__ __]	[__ __ __ __]
14.	Coarse and Fine	[__ __]	[__ __ __.__]

SPS-8 CONSTRUCTION DATA SHEET 20 PORTLAND CEMENT CONCRETE LAYERS MIXTURE DATA (CONTINUED)	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO. [1 0]

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

COMPOSITION OF COARSE AGGREGATE

	TYPE	PERCENT
* 2.	[7]	[1 0 0]
* 3.	[_]	[_ _ _.]
* 4.	[_]	[_ _ _.]

Crushed Stone.... 1 Manufactured gravel...... 2 Crushed Gravel...... 3
Crushed Slag..... 4 Lightweight.............. 5 Recycled Concrete... 6
Other-(Specify) Washed River Rock (screened) 7

* 5. GEOLOGIC CLASSIFICATION OF COARSE AGGREGATE (SEE GEOLOGIC CLASSIFICATION CODES, TABLE A.9) [_ _.]

COMPOSITION OF FINE AGGREGATE

	TYPE	PERCENT
* 6.	[1]	[1 0 0.]
* 7.	[_]	[_ _ _.]
* 8.	[_]	[_ _ _.]

Natural Sand... 1
Crushed, Manufactured Sand (From Crushed Gravel or Stone)...2
Recycled Concrete... 3 Other (Specify)________ 4

9. INSOLUBLE RESIDUE, PERCENT (ASTM D3042) [_ _ _.] 0.5 to 2 rounded

10 GRADATION OF COARSE AGGREGATE

Sieve Size	% Passing
2"........	
1 1/2"....	100
1"........	85
7/8"......	
3/4". ..	54
5/8" . . .	
1/2".... .	28
3/8"......	21
No. 4. ...	3

29?

11. GRADATION OF FINE AGGREGATE

Sieve Size	% Passing
No. 8.....	77
No. 10....	
No. 16....	53
No. 30....	32
No. 40	
No 50 ..	16
No. 80 .	
No. 100 ..	4
No. 200. .	1

ENT'D FEB 23 2001

BULK SPECIFIC GRAVITIES:

12. Coarse Aggregate (AASHTO T85 or ASTM C127) [2.830]

13. Fine Aggregate (AASHTO T84 or ASTM C128) [2.710]

Jason Puccinelli NLE 02-20-01

September 1992

SPS-8 CONSTRUCTION DATA
SHEET 21
PORTLAND CEMENT CONCRETE LAYERS
PLACEMENT DATA

* STATE CODE [5 3]
* SPS PROJECT CODE [A 8]
* TEST SECTION NO. [1 6]

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [0 6-0 1-0 0]

*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [0 6-0 1-0 0]

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

*4. CONCRETE MIX PLANT AND HAUL

	Name	Haul Distance (Mi)	Time (Min)
Plant 1	Clyde	[_ _ 1]	[_ _ 2]
Plant 2		[_ _ _]	[_ _ _]
Plant 3		[_ _ _]	[_ _ _]

*5. PAVER TYPE [1]
Slip Form Paver.... 1 Side Form... 2
Other (Specify) ______ 3

6. PAVER MANUFACTURER AND MODEL NUMBER Gomaco GP 3500 (1987)

7. SPREADER TYPE (if applicable) Gomaco with augers, vibrators, and screed

8. SPREADER MANUFACTURER AND MODEL NUMBER ______

9. WIDTH PAVED IN ONE PASS (Feet) [2 4.0]

10. DOWEL PLACEMENT METHOD [2]
Dowel Bar Inserter (DBI)..... 1 Dowel Basket..... 2

11. NUMBER OF VIBRATORS [1 6]

12. VIBRATOR SPACING (Inches) [1 8]

13. DEPTH OF VIBRATORS BELOW SURFACE (Inches) [~~1 8.0~~] 6 6

14. ADDITIONAL VIBRATION APPLIED ______

ENT'D FEB 23 2001

JKS 3/6/04

September 1992

SPS-8 CONSTRUCTION DATA SHEET 22 PORTLAND CEMENT CONCRETE LAYERS PLACEMENT DATA (CONTINUED)	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO. [1 0]

1. CONSOLIDATION OF MATERIALS [1]
   Internal Vibrators... 1 Vibrating Screeds... 2 Troweling .. 3
   Rolling... 4 Tamping... 5
   Other (Specify)... 6 ______

2. FINISHING [4]
   Screeding... 1 Hand-Troweling... 2 Machine-Troweling... 3
   Other (Specify)... 4 Hand & Machine Troweling

3. CURING [1]
   Membrane Curing Compound...... 1
   Burlap Curing Blankets........ 2
   Waterproof Paper Blankets...... 3
   White Polyethylene Sheeting... 4
   Burlap-Polyethylene Blanket... 5
   Cotton Mat Curing............. 6
   Hay........................... 7
   Other (Specify) ______ 8

4. TEXTURING [1]
   Tine.......................... 1
   Broom......................... 2
   Burlap Drag................... 3
   Grooved Float................. 4
   Astro Turf.................... 5
   None.......................... 6
   Other (Specify) ______ 7

ENT'D FEB 23 2001

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September 1992

SPS-8 CONSTRUCTION DATA SHEET 23 PORTLAND CEMENT CONCRETE SURFACE LAYER PROFILE DATA	* STATE CODE [5 3] * SPS PROJECT CODE [A 8] * TEST SECTION NO. [1 0]

DATE PROFILE MEASURED (Month-Day-Year) [0 6 - 2 1 - 0 0]

2. PROFILOGRAPH TYPE California... 1 Rainhart... 2 [1]

PROFILE INDEX (Inches/Mile) [0 7]

4. INTERPRETATION METHOD Manual . 1 Mechanical . 2 Computer.. 3 [3]

5. HEIGHT OF BLANKING BAND (Inches) [0 . 2 0]

6. CUTOFF HEIGHT (Inches) [0 . 3 0]

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

8. WAS SURFACE PROFILE CORRECTED BY DIAMOND GRINDING? (YES, NO) [N]

IF YES COMPLETE THE FOLLOWING:

9. DATE DIAMOND GRINDING OPERATIONS BEGAN (Month-Day-Year) [_ _-_ _-_ _]

DATE DIAMOND GRINDING OPERATIONS COMPLETED (Month-Day-Year) [_ _-_ _-_ _]

11. REASON FOR GRINDING [_]
Elimination of Faulting... 1 Elimination of Slab Warping... 2
Improve Skid Resistance... 3
Restoration of Transverse Drainage Slope... 4
Correction of Construction Deficiencies...5
Other (Specify) .. 6 ____________

12. AVERAGE DEPTH OF CUT (Inches) [_ ._ _]

13. CUTTING HEAD WIDTH (Inches) [_ _ _ ._ _]

14. AVERAGE GROOVE WIDTH (Inches) [_ ._]

15. AVERAGE SPACING BETWEEN BLADES (Inches) [_._]

ENT'D FEB 23 2001

Jason Puccinelli NCE 02-20-01

SPS-8 CONSTRUCTION DATA SHEET 28 MISCELLANEOUS CONSTRUCTION NOTES AND COMMENTS	* STATE CODE [__ __] * SPS PROJECT CODE [__ __] * TEST SECTION NO. [__ __]

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.