FEDERAL HIGHWAY ADMINISTRATION

Long Term Pavement Performance
Specific Pavement Studies

SPS-5 Construction Report on SHRP 810500

Alberta Department of Transportation and Utilities

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SPS-5 Construction Report
SHRP Project 810500
Edson, Alberta
October 2-10, 1990

Introduction

The Alberta Transportation and Utilities SPS-5 project is the rehabilitation of an asphalt concrete (AC) pavement which is in fair condition. The site is located in the Dry-Freeze environmental region. In addition to the eight test sections of the main experiment which incorporates minimum and intensive surface preparation treatments, two thicknesses of overlay (2" and 5"), and overlays with virgin or 30/70 recycled asphalt mixes, there is a control section with no overlay. The control section provides an indication of the rate of change expected for the test sections had they not been rehabilitated.

The project, presented in Figure 1, is located on Highway 16 east of Edson, Alberta. The road was undivided and one lane in each direction. During the summer of 1990 two new eastbound lanes were opened and the SHRP site became two westbound lanes of a divided highway.

The project starts 3.7 km west of the junction with Highway 32 at kilometer post 38.52 and proceeds west 2.1 km, ending at kilometer post 36.43. The roadway consists of two 12 foot driving lanes with 8 foot asphalt concrete shoulders. The existing pavement was constructed in 1977 and consists of 6 inches of asphalt concrete on 3 1/4 inches of asphalt treated base on 11 inches of gravel subbase on a sandy clay subgrade. It carries 4,250 vehicles per day with 12% trucks, and an estimated 175,000 ESAL's per year in each direction.

There are no intersections within the project length. A permanent AVC/WIM system was installed in the center of section 810502 in the spring of 1991. The terrain is relatively flat and the alignment is generally tangent with slight grades, large radius curvature and only shallow fills.

The SPS-5 project was advertised for bids in the summer 1990 and subsequently awarded to Peter Kewiet and Sons of Edmonton, Alberta. The Alberta Transportation and Utilities SHRP Coordinator and LTPP Contact is Mr. Ray Filipiak. The Transportation and Utilities Project Engineer was Mr. Zach Zacharia.

Pre-construction material sampling was performed by Mr. Doug Ikenberry, Crew Chief, Chen-Northern, Inc., Denver, Colorado. Post-construction sampling was performed by Mr. Doug Frith, Project Engineer, Nichols Consulting Engineers, Reno, Nevada. Both pre and post-construction laboratory testing were completed by Western Technologies Inc., Phoenix, Arizona.

Mr. Rick Hiemstra, Project Superintendent, Peter Kewiet and Sons, Edmonton, Alberta, was in charge of the construction work. Materials sampling during construction was performed by Mr. Robert Powers, Technologist, Edmonton Transportation Lab.

The asphalt mix plant was a 300 tons per hour Beta 400 drum mix plant utilizing a wet scrubber. Paving operation were performed with a Blaw-Knox PF-220 paver (single pass laydown width of 22 feet). Breakdown and final compaction were accomplished with a Dynapac 18 ton double drum vibratory roller, while intermediate compaction was completed with a Dynapac 10 ton pneumatic tired roller.

The milling machine, a Catepillar PR-450 with a 74" cutting head, was supplied and operated by subcontractor Budd Brothers Ltd. Earth Moving Contractors, Calgary, Alberta.

Project Details

Layout

Nine test sections (810501 - 810509) were constructed by Alberta Transportation and Utilities. These test sections, each 500 feet long, are laid out so that all of the virgin A.C. sections are grouped together, followed by the 30/70 recycled A.C. sections. Figure 2 presents the project layout and Table 1 summarizes the surface preparation, overlay material and thickness, and stationing for each section within the project.

Materials Sampling and Testing

Pre-construction materials sampling included extraction 4,6, and 12 inch diameter cores, 6 inch auger probes, and test pits (4' x 6' x 12"), designated C, A, BA, S, and TP respectively. Figure 3 shows the pre-construction drilling and sampling layout. Post-construction material sampling included 4 inch A.C. overlay coring. Figure 4 presents the post-construction sampling layout. The material sampling/testing locations in Figures 3 and 4 are tabulated in Table 2.

Table 3 summarizes the samples obtained prior to construction, during construction, and post-construction. Laboratory material testing plans are tabulated in Table 4 for pre-construction samples, and in Table 5 for during and post-Construction samples. Tables 4 and 5 indicate the SHRP Test Designation and SHRP Protocol the samples are subject to.

Construction Operations

Dates of the various construction activities are shown in Table 6.

Surface Preparation

A skin patch was placed over the test pit in the transition area between sections 810504 and 810503. The 10 foot wide patch covered the entire 100 foot transition and extended 10 feet into both adjacent sections.

Milling of the four intensive preparation test sections (810506-09) was performed on October 1-2, 1990. Milling of the driving lanes required four passes with the Catepillar PR-450 milling machine. The shoulders were not milled. Milling depths ranged from 1.9 inches on section 810508 to 2.2 inches on section 810506.

All sections were tack coated between successive paving lifts. The tack coat, an SS-1 emulsion, was applied at a rate of 0.04 gallons per square yard with a dilution rate of 10%.

Mix Design

Mix designs for the SPS-5 test sections were prepared by Alberta Testing Services Transportation Laboratory. The aggregate blends used to make the mixes are shown in Table 7. Tables 8 and 9 present the mix designs and asphalt cement properties for the project.

AC Plant

The Achter asphalt plant was located 16 kilometers from the project site and haul times averaged 20 minutes. Thirty percent of the aggregate used in the recycle mix was reclaimed asphalt pavement obtained from the milling process on the intensive preparation sections.

Paving Operations

For each lift, details of time and date of paving, mix temperatures in the truck and in the mat are presented in Table 10. Paving of all virgin AC sections (810504-07) was completed on October 3, 1990. Paving of all recycled AC sections (810502,03,08,09) was completed on October 3 and 10, 1990. Table 11 provides overlay thicknesses for each test section lift determined from levels taken at five transverse points across the lane, at 50 foot intervals along each 500 foot section.

Overall, the placement and compaction of the virgin and recycled AC mixes were completed without any problems. The following is a summary of notes taken during the construction activities:

Section 810501

Pavement Structure. Control Section, no overlay.

SHRP Lane. The last 40 feet of the section was tacked with a light shot of SS-1. Tack was shot light and thus should not cause any problems.

Passing Lane. Same as SHRP lane.

Section 810505

Pavement Structure. Minimum Preparation, 2-inch Virgin Mix.

SHRP Lane. Near the middle of the section one of the pneumatic rollers spun its wheels leaving a slight depression.

Passing Lane. Tack coat was light and spotty in the inside wheel path.

Section 810506

Pavement Structure. Intensive Preparation, 2-inch Virgin Mix.

SHRP Lane. Mill width varied from 11'8" to 12'4". Paving of the inlay and the surface course o.k.

Passing Lane. Milled 11.5 feet wide, cut edge drains in transition. Paving of the inlay and surface course o.k.

Section 810507

Pavement Structure. Intensive Preparation, 5-inch Virgin Mix.

SHRP Lane. Milling same as section 810506, paving of the inlay and binder course o.k. Tack coat prior to surface course shot too heavy and had to be bladed off with the grader.

Passing Lane. Milling same as section 810506, paving of the inlay, binder course and surface course o.k.

Section 810504

Pavement Structure. Minimum Preparation, 5-inch Virgin Mix.

SHRP Lane. Low spot near the end of the section in the binder course. Paving of the surface course was performed in the dark. Ran out of mix just past the end of the section, cleaned the paver out to get 12 feet past the end of the section where a cold joint was placed.

Passing Lane. Paver stopped while waiting for trucks near station 1+50 and left a ridge in the binder course lift. Cold joint place in the transition at the end of the section for the surface course lift.

Section 810503

Pavement Structure. Minimum Preparation, 5-inch Recycle Mix.

SHRP Lane. Tack coat not cured before paving of the binder course. Snow flurries present during the beginning of binder course paving. Surface course o.k.

Passing Lane. Tack coat placed day before binder course paving. Centerline of surface course lift offset 6 inches from the binder course lift.

Section 810508

Pavement Structure. Intensive Preparation, 5-inch Recycle Mix.

SHRP Lane. Milling width 10.5 feet. Paving of inlay overlaps shoulder by 2.5 feet. Edge drain was hand patched during inlay. Snow flurries present during last 100 feet of inlay paving. Tack coat not cured at time of binder course paving. Surface course o.k.

Passing Lane. Milling o.k. Tack coat placed day before inlay paving. Inlay paving width is 13 feet. Binder and surface courses o.k.

Section 810509

Pavement Structure. Intensive Preparation, 2-inch Recycle Mix.

SHRP Lane. Milling o.k. (width 11 feet) Surface re-tacked before inlay paving. Inlay paving width is 13.5 feet. Inlay that overlaps shoulder now has a 15 foot crack 1 inch wide centered at station 0+25. Paving of surface course o.k.

Passing Lane. Milling o.k. Inlay paving o.k.(some snow flurries present), tack coat place day prior. Surface course centerline offset 10 inches from inlay. Near station 5+00 truck bumped into paver and bump was hand raked.

Section 810502

Pavement Structure. Minimum Preparation, 2-inch Recycle Mix.

SHRP Lane. Surface course paving o.k., some problems with tack coat bubbling through surface course lift.

Passing Lane. Surface course paving o.k.

Initial Performance

A distress survey performed seven months after construction showed no serious distress present. Table 12 presents a summary of distress survey performed.

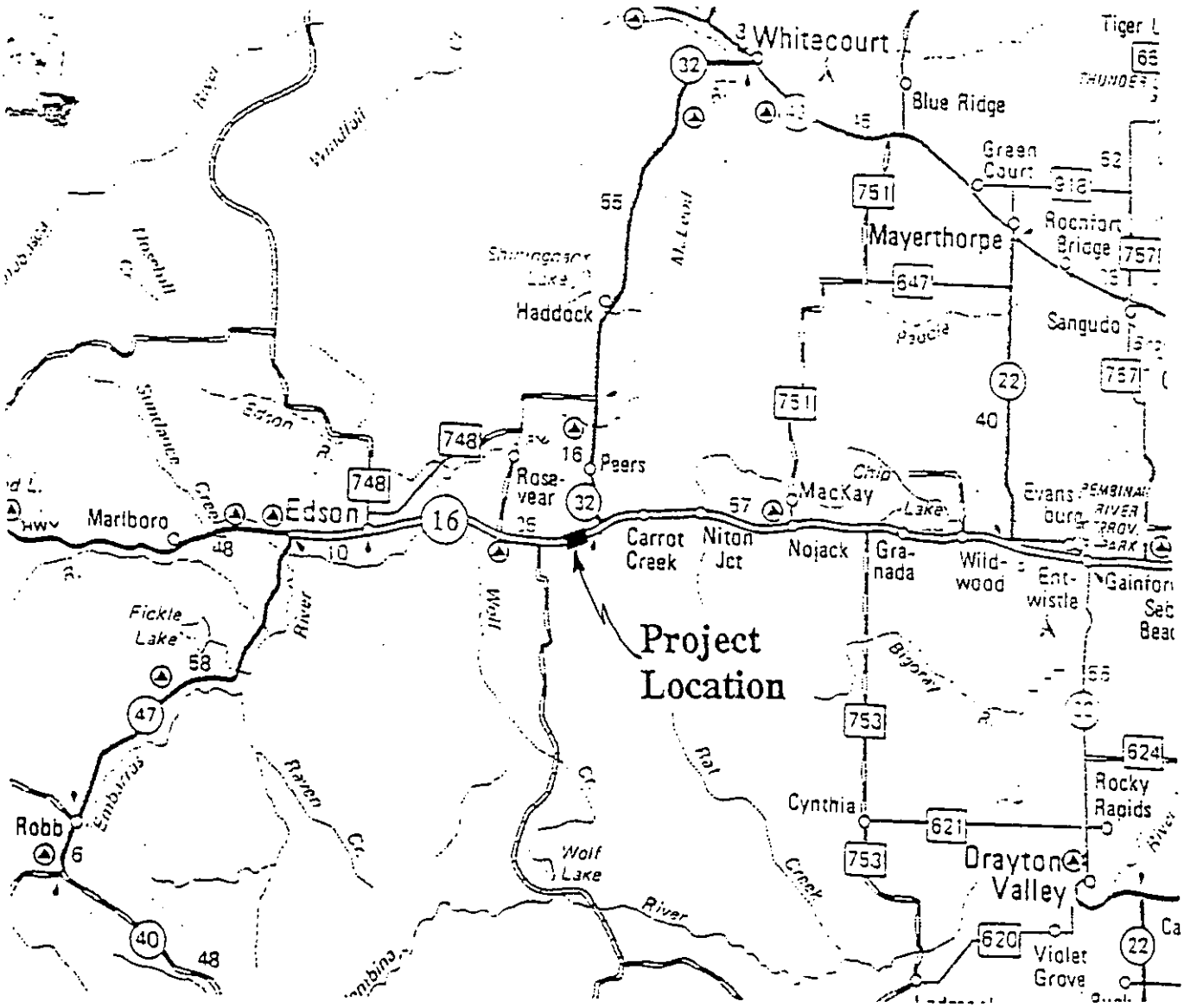


Figure 1. Alberta SPS-5 Project Vicinity Map

FIGURE 2. SPS-5 PROJECT LAYOUT, AS CONSTRUCTED
810500 HIGHWAY 16-06 WESTBOUND
EAST OF EDSON, ALBERTA 11/08/90
NOT TO SCALE

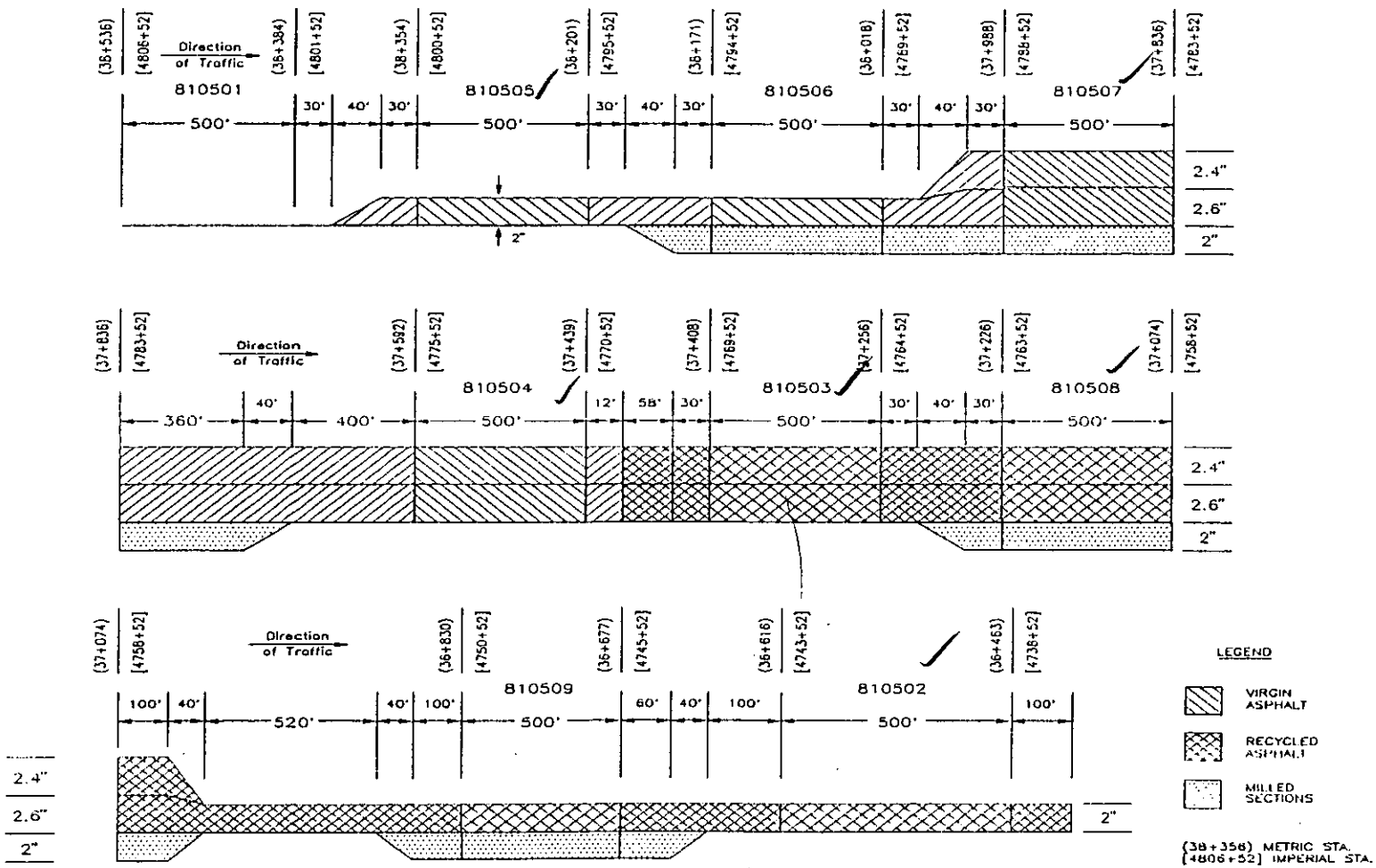
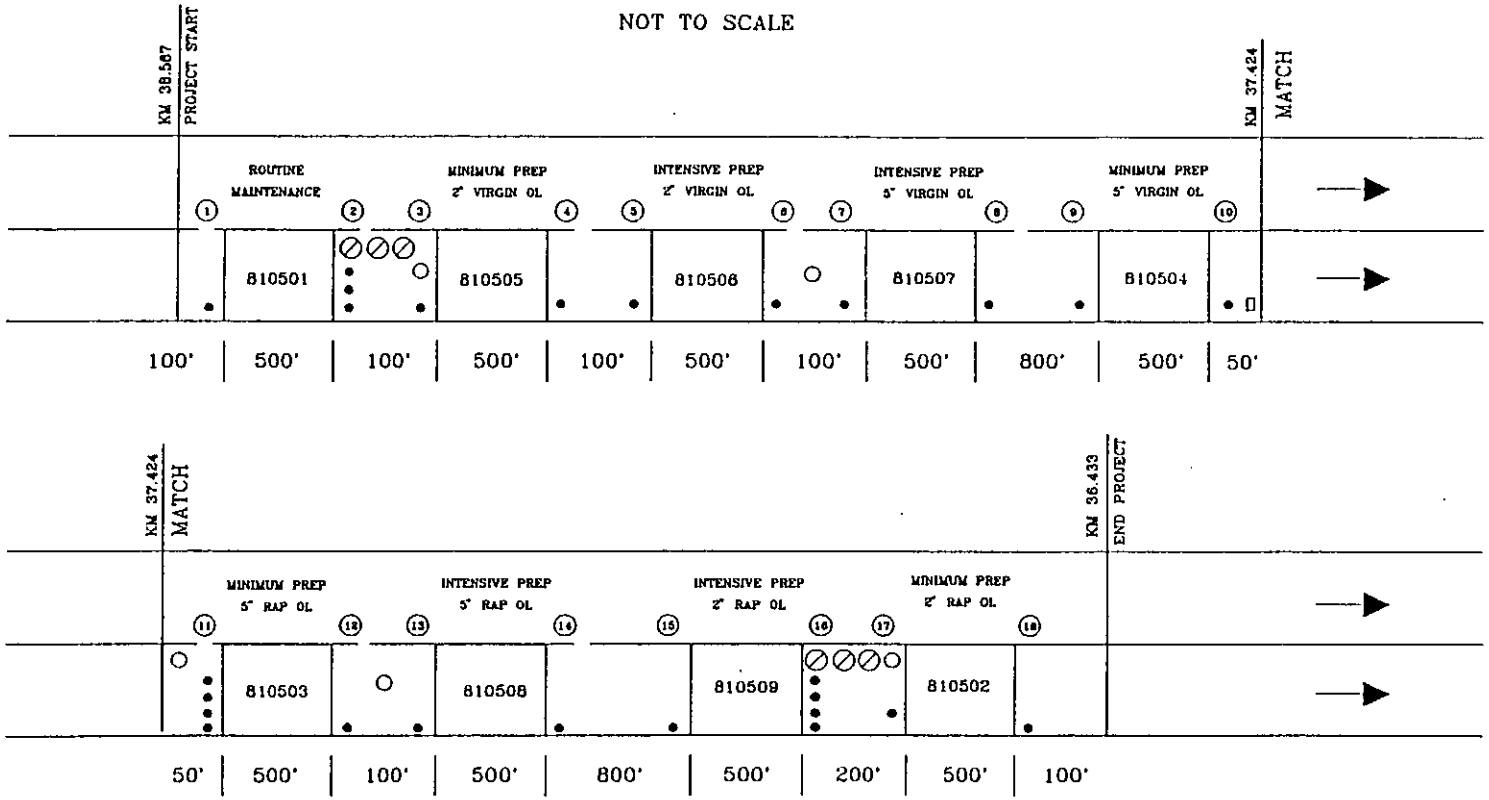


FIGURE 3. SPS-5 PRE-CONSTRUCTION DRILLING AND SAMPLING LAYOUT

810500 HIGHWAY 16-06 WESTBOUND

EAST OF EDSON, ALBERTA 06/05/90

NOT TO SCALE



LEGEND

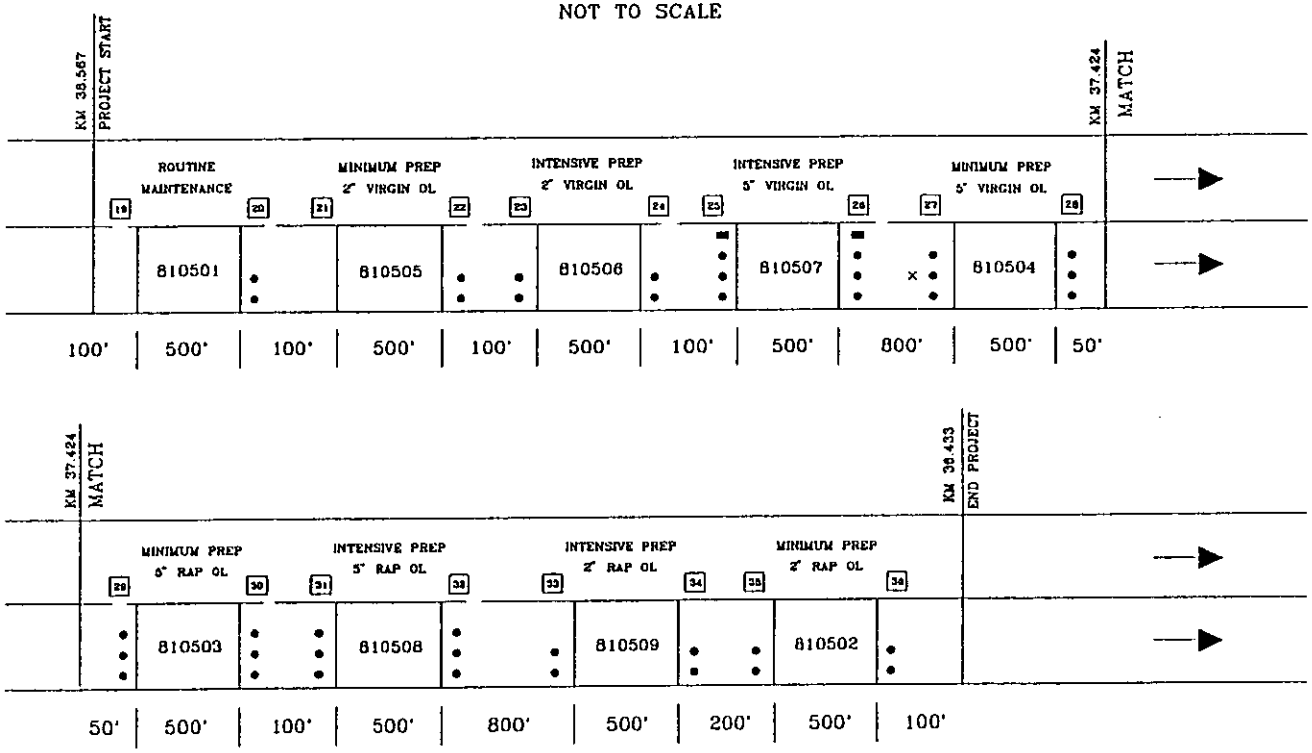
- ● 4" OD core of AC pavement surface and asphalt treated base (ATB), C1-C26.
- ○ 6" OD core of AC pavement surface and ATB, augering of unbound granular base and subbase for Shelby Tube sampling to 4' below top of subgrade, A1-A5.
- ⊘ 12" OD core of AC pavement surface and treated layers; augering of unbound granular base and subbase and untreated subgrade to 12" below top of subgrade, BA1-BA6, for bulk sample retrieval.
- ⊗ Shoulder Probe – to 20' depth, S1-S2.
- ▯ Test pit (4' x 6' x 12" below top of subgrade). Removal of pavement layers; collection of (12" x 12") AC pavement block; nuclear density and moisture measurements on unbound granular base and subbase layers and untreated subgrade; bulk sampling of unbound granular base and subbase layers and untreated subgrade.
- (11) Pre-construction sampling area.

FIGURE 4. SPS-5 POST-CONSTRUCTION DRILLING AND SAMPLING LAYOUT

810500 HIGHWAY 16-06 WESTBOUND

EAST OF EDSON, ALBERTA 02/01/91

NOT TO SCALE



LEGEND

- • 4" OD cores of AC overlay for LTPP studies, C27-C66.
- ▬ 4" OD cores of AC overlay for University of Texas at Austin (A-005 contractor), CT1-CT30.
- × 4" OD cores of AC overlay for Oregon State University (A-003 contractor), COSU1-COSU12.
- ⊞ Post-Construction sampling area.

TABLE 1. SPS-5 TEST SECTION LAYOUT, HIGHWAY 16-06 WB, EAST OF EDSON, ALBERTA

CONSTRUCTION STATION	SHRP-ID#	SURFACE PREPARATION	OVERLAY THICKNESS AND MATERIAL
(38+536) to (38+384) [4806+52] to [4801+52]	810501	None	None, Control Section
(38+354) to (38+201) [4800+52] to [4795+52]	810505	Minimum	2", Virgin AC
(38+171) to (38+018) [4794+52] to [4789+52]	810506	Intensive (milling)	2", Virgin AC
(37+988) to (37+836) [4788+52] to [4783+52]	810507	Intensive (milling)	5", Virgin AC
(37+592) to (37+439) [4775+52] to [4770+52]	810504	Minimum	5", Virgin AC
(37+408) to (37+256) [4769+52] to [4764+52]	810503	Minimum	5", 30/70 Recycled AC
(37+226) to (37+074) [4763+52] to [4758+52]	810508	Intensive (milling)	5", 30/70 Recycled AC
(36+830) to (36+677) [4750+52] to [4745+52]	810509	Intensive (milling)	2", 30/70 Recycled AC
(36+616) to (36+463) [4743+52] to [4738+52]	810502	Minimum	2", 30/70 Recycled AC

Notes: (38+536) = Metric Stationing
[4806+52]= Imperical Stationing

TABLE 2. ALBERTA SPS-5 LAYOUT AND SAMPLING LOCATIONS, HIGHWAY 16-06 WB

STA.	SHRP ID NO.	SECT. LENG.	SURFACE PREP.	O/L THICKN.	OVERLAY MATERIAL	* SAMP. AREA	PRE-CONST. SAMPLES	POST-CONST. SAMPLES
4808+52 4807+52					Project Start	1/19	C1	
4806+52 4801+52	810501	500'	None		Control Section, No Overlay			
4801+22 4800+82			Begin Minimum Prep.	Begins Taper 0"-2" Ends	Begin Virgin AC Mix	2/20 3/21	C2, C3, C4, BA1-BA3 C5, A1	C27, C28
4800+52 4795+52	840505	500'	Minimum	2"	Virgin AC Mix			
4795+22			End Minimum Prep. Begin Intensive Prep.		Replace Milled Depth With 2" Virgin AC Mix	4/22 5/23	C6 C7	C29, C30 C31, C32
4794+52 4789+52	840506	500'	Intensive	2"	Virgin AC Mix		S1	
4789+22 4788+82				Begins Taper 2"-5" Ends	Virgin AC Mixes 2.6" Binder Lift 2.4" Surface Lift	6/24 7/25	C8, A2 C9	C33, C34 C35-C37, CT1-CT15
4788+52 4783+52	840507	500'	Intensive	5"	Virgin AC Mixes			
4779+52			End Intensive Prep. Begin Minimum Prep.		End Virgin AC Mill Replacement	8/26 9/27	C10 C11	C38-C40, CT16-CT30 C41-C43, COSU1-12
4775+52 4770+52	840504	500'	Minimum	5"	Virgin AC Mixes			
4770+40					End Virgin AC Mixes. Begin Recycled AC Mixes 2.6" Binder Lift 2.4" Surface Lift	10/28	C12, TP1	C44-C46

* Sample Area - Pre/Post Construction (see Figures 3,4)

TABLE 2. (CONT.) ALBERTA SPS-5 LAYOUT AND SAMPLING LOCATIONS, HIGHWAY 16-06 WB

STA.	SHRP ID NO.	SECT. LENG.	SURFACE PREP.	O/L THICKN.	OVERLAY MATERIAL	* SAMP. AREA	PRE-CONST. SAMPLES	POST-CONST. SAMPLES
4770+40					Recycled AC Mixes 2.6" Binder Lift 2.4" Surface Lift	11/29	A3, C13-16	C47-C49
4769+52 4764+52	810503	500'	Minimum	5"	Recycled AC Mixes			
4764+22			End Minimum Prep. Begin Intensive Prep.		Replace Milled Depth With 2" Recycled AC Mix	12/30 13/31	C17 A4, C18	C50-C52 C53-C55
4763+52 4758+52	840508	500'	Intensive	5"	Recycled AC Mixes			
4758+52 4757+12			End Intensive Prep. Begin Minimum Prep.	Begins Taper 5"-2" Ends	End Recycled AC Mill Replacement	14/32	C19	C56-C58
4751+92			End Minimum Prep. Begin Intensive Prep		Replace Milled Depth With 2" Recycled AC Mix	15/33	C20	C59, C60
4750+52 4745+52	840509	500'	Intensive	2"	Recycled AC Mixes			
4744+52			End Intensive Prep. Begin Minimum Prep		End Recycled AC Mill Replacement	16/34 17/35	C21-C24, BA4-BA6 C25, A5, S2	C61, C62 C63, C64
4743+52 4738+52	840502	500'	Minimum	2"	Recycled AC Mix			
4737+52					Project End	18/36	C26	C65, C66

* Sample Area - Pre/Post Construction (see Figures 3,4)

Table 3. Alberta SPS-5 Material Sampling Summary

MATERIAL AND SAMPLE DESCRIPTION	NUMBER OF MATERIAL SAMPLES	SAMPLE LOCATIONS
PRE-CONSTRUCTION SAMPLING		
1. Asphalt Concrete (original layer)		
Coring - 4" diam. cores	26	C1-C26
Coring - 6" diam. cores	5	A1-A5
Coring - 12" diam. cores	6	BA1-BA6
Bulk Sampling (12" by 12" slab)	1	TP1
2. Unbound Base/Subbase Layers (per layer)		
Augering 6" diam. holes	5	A1-A5
Bulk sampling in 12" diam. holes	12	BA1-BA6
Bulk sampling in test pit	4	TP1
In situ density and moisture content (nuclear gauge)	1	TP1
Moisture content samples	8	TP1, BA1-BA6
3. Bound Base/Subbase Layers (per layer)		
Coring - 4" diam. cores	12	C1-C7, C12-C16
Coring - 6" diam. cores	2	A1, A3
Coring - 12" diam. cores	1	BA1
4. Subgrade		
Thin-walled tube sampling	9	A1-A5
Bulk sampling in 12" diam. holes	6	BA1-BA6
Bulk sampling in test pit	4	TP1
In situ density and moisture content (nuclear gauge)	1	TP1
Moisture content samples	8	TP1, BA1-BA6
5. Shoulder Auger Probes	2	S1(>20'), S2(>20')
DURING-CONSTRUCTION SAMPLING		
1. Bulk sampling of virgin and recycled mixes on site (5 gallon pails)	6	BV1 (3 pails), BR1 (3 pails)
POST-CONSTRUCTION SAMPLING		
1. Asphaltic Concrete (overlay)		
Coring - 4" diam. cores	82	C27-C66, CT1-CT30, COSU1-COSU12

Table 4. Alberta SPS-5 Material Testing Summary (Pre - Construction)

MATERIAL TYPE AND PROPERTIES	SHRP TEST DESIGNATION	SHRP PROTOCOL	# OF TESTS PER LAYER	MATERIAL SOURCE/ SAMPLE TYPE DESIGNATION
PRE-CONSTRUCTION				
I. ASPHALT CONCRETE				
A. ASPHALTIC CONCRETE:				
Core Examination/Thickness	AC01	P01	26	All C - Cores
Bulk Specific Gravity	AC02	P02	9	[C2 - C4], [C13 - C15], [C21 - C23][3]
Maximum Specific Gravity	AC03	P03	3	BA1, BA4, TP1
Asphalt Content (Extraction)	AC04	P04	3	BA1, BA4, TP1
Creep Compliance[1]	AC06	P06	3	C1, C8, C19
Resilient Modulus	AC07	P07	6	[C2, C3], [C13, C14], [C21, C22]
Tensile Strength	AC07	P07	9	[C2 - C4], [C13 - C15], [C21 - C23]
B. EXTRACTED AGGREGATE:				
Type and Classification:				
Coarse Aggregate	AG03	P13	3	BA1, BA4, TP1
Fine Aggregate	AG03	P13	3	BA1, BA4, TP1
Gradation of Aggregate	AG04	P14	3	BA1, BA4, TP1
NAA Test for Fine Aggregate Particle Shape[2]	AG05	P14A	3	BA1, BA4, TP1
C. ASPHALT CEMENT:				
Abson Recovery	AE01	P21	3	BA1, BA4, TP1
Penetration at 77° and 115°F	AE02	P22	3	BA1, BA4, TP1
Specific Gravity (60°F)	AE03	P23	3	BA1, BA4, TP1
Viscosity at 77°F	AE04	P24	3	BA1, BA4, TP1
Viscosity at 140° and 275°F	AE05	P25	3	BA1, BA4, TP1

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

Table 4. Alberta SPS-5 Material Testing Summary (Pre - Construction) continued

MATERIAL TYPE AND PROPERTIES	SHRP TEST DESIGNATION	SHRP PROTOCOL	# OF TESTS PER LAYER	MATERIAL SOURCE/ SAMPLE TYPE DESIGNATION
II. BOUND (TREATED) BASE AND SUBBASE				
Type and Classification of Material and Treatment	TB01	P31	3	C3, C10, 13
Pozzolanic/Cementitious: Compressive Strength	TB02	P32	--	---
Asphalt Treated: Dynamic Modulus (77°F)	TB03	P33	--	---
HMAC: Resilient Modulus	AC07	P07	--	---
III. UNBOUND GRANULAR BASE AND SUBBASE				
Particle Size Analysis	UG01	P41	3	[BA1 - BA3], [BA4 - BA6], TP1
Sieve Analysis (washed)	UG02	P42	3	[BA1 - BA3], [BA4 - BA6], TP1
Atterberg Limits	UG04	P43	3	[BA1 - BA3], [BA4 - BA6], TP1
Moisture-Density Relations	UG05	P44	3	[BA1 - BA3], [BA4 - BA6], TP1
Resilient Modulus	UG07	P46	3	[BA1 - BA3], [BA4 - BA6], TP1
Classification	UG08	P47	3	[BA1 - BA3], [BA4 - BA6], TP1
Permeability	UG09	P48	3	[BA1 - BA3], [BA4 - BA6], TP1
Natural Moisture Content	UG10	P49	3	[BA1 - BA3], [BA4 - BA6], TP1
IV. SUBGRADE				
Sieve Analysis	SS01	P51	3	[BA1 - BA3], [BA4 - BA6], TP1
Hydrometer to 0.001mm	SS02	P42	3	[BA1 - BA3], [BA4 - BA6], TP1
Atterberg Limits	SS03	P43	3	[BA1 - BA3], [BA4 - BA6], TP1
Classification	SS04	P52	3	[BA1 - BA3], [BA4 - BA6], TP1
Moisture-Density Relations	SS05	P55	3	[BA1 - BA3], [BA4 - BA6], TP1
Resilient Modulus	SS07	P46	3	[BA1 - BA3], [BA4 - BA6], TP1
Unit Weight	SS08	P56	3	[BA1 - BA3], [BA4 - BA6], TP1
Natural Moisture Content	SS09	P49	3	[BA1 - BA3], [BA4 - BA6], TP1
Depth to Rigid Layer			2	S1, S2

Table 5. Alberta SPS-5 Material Testing Summary (Post - Construction)

MATERIAL TYPE AND PROPERTIES	SHRP TEST DESIGNATION	SHRP PROTOCOL	# OF TESTS PER LAYER	MATERIAL SOURCE/ SAMPLE TYPE DESIGNATION
A. ASPHALTIC CONCRETE:				
Core Examination/Thickness	AC01	P01	40	C1 - C40
Bulk Specific Gravity	AC02	P02	40	C1 - C40
Maximum Specific Gravity	AC03	P03	6	BV1(3 Pails), BR1(3 Pails)[4]
Asphalt Content (Extraction)	AC04	P04	6	BV1(3 Pails), BR1(3 Pails)
Moisture Susceptibility	AC05	P05	6	BV1(3 Pails), BR1(3 Pails)
Creep Compliance[1]	AC06	P06	6	[C35 - C37], [C53 -C55]
Resilient Modulus	AC07	P07	18	[C38-40], [C41-43], [C44-46], [C47-49], [C50-52], [C56-58]
Tensile Strength	AC07	P07	6	C38, C41, C44, C47, C50, C56
B. EXTRACTED AGGREGATE:				
Bulk Specific Gravity:				
Coarse Aggregate	AGO1	P11	6	BV1(3 Pails), BR1(3 Pails)
Fine Aggregate	AG02	P12	6	BV1(3 Pails), BR1(3 Pails)
Type and Classification:				
Coarse Aggregate	AG03	P13	6	BV1(3 Pails), BR1(3 Pails)
Fine Aggregate	AG03	P13	6	BV1(3 Pails), BR1(3 Pails)
Gradation of Aggregate				
NAA Test for Fine	AG04	P14	6	BV1(3 Pails), BR1(3 Pails)
Aggregate Particle Shape[2]	AG05	P14A	--	--
C. ASPHALT CEMENT:				
Abson Recovery	AE01	P21	6	BV1(3 Pails), BR1(3 Pails)
Penetration at 77° and 115°F	AE02	P22	6	BV1(3 Pails), BR1(3 Pails)
Specific Gravity (60°F)	AE03	P23	6	BV1(3 Pails), BR1(3 Pails)
Viscosity at 77°F	AE04	P24	6	BV1(3 Pails), BR1(3 Pails)
Viscosity at 140° and 275°F	AE05	P25	6	BV1(3 Pails), BR1(3 Pails)

Notes:
1 Creep compliance will be performed when suitable procedures are developed -- cores will be stored.
2 The National Aggregate Association will perform tests at no cost to the State.
3 Cores within brackets are from the same sampling area.
4 BV, BR -- Bulk samples of virgin and recycled mixes taken on site during construction.

Table 6. Alberta SPS-5 Construction Activity Summary

			Construction Activity Type and Date Performed				
SHRP ID #	Material Type	Surface Prep.	Patching	Milling	Inlay	Binder Course	Surface Course
810505	2", Vir.	Minimum					10/3/90
810506	2", Vir.	Intensive		10/1/90	10/3/90		10/3/90
810507	5", Vir.	Intensive		10/1/90	10/3/90	10/3/90	10/3/90
810504	5", Vir.	Minimum	5/90			10/3/90	10/3/90
810503	5", Rec.	Minimum	5/90			10/10/90	10/10/90
810508	5", Rec.	Intensive		10/2/90	10/10/90	10/10/90	10/10/90
810509	2", Rec.	Intensive		10/2/90	10/10/90		10/10/90
810502	2", Rec.	Minimum					10/10/90

Weather Notes on Paving Dates

10/03/90 - Cool and cloudy, occassional snow flurries, 30° - 41°F.
10/10/90 - Cool and cloudy, 31° - 50°F.

Table 7. Alberta SPS-5 Aggregate Blends

Aggregate Mixture	Design Proportions	
	Virgin	Recycled
Recycled Asphalt Pavement	---	30%
Coarse	47	35
Fine	23	15
Manufactured Fines	30	20
AC Content (Total)	5.4	5.4

Table 8. Alberta SPS-5 Mix Designs

Sieve Size	Total Percent Passing Each Sieve	
	Virgin AC	Recycled AC
1 1/2"	100	100
1"	100	100
3/4"	100	100
1/2"	90	92
3/8"	81	81
#4	64	64
#10	46	47
#40	28	30
#80	14	16
#200	8.6	10.5
% AC in RAP		1.5
% AC		3.9
Total % AC	5.4	5.4
Type AC	150-200A	200-300A
AC Source	Esso	Esso
Marshall Design		
Bulk Specific Gravity	2.624	2.610
Optimum AC %	5.4	5.4
% Air Voids	3.2	3.1
Stability (lbs.)	1549	1539
# Blows	75	75
Flow (0.25mm)	10.8	11.6

Table 9. Alberta SPS-5 Asphalt Cement Properties

AC PROPERTY	SHRP VIRGIN	SHRP RECYCLED
Asphalt Grade	150-200A	200-300A
Asphalt Source	Esso	Esso
Viscosity of Asphalt @ 140°F (Poises)	3770	3828
Viscosity of Asphalt @ 275°F (Centistokes)	558	482
Penetration @ 77°F (Millimeters)	60	66
Penetration @ 115°F (Millimeters)	295	291

Table 10. Construction Data Summary For All Lifts

Section	Date	Paving Time		Mix Temp		Air Temp °F
		Start	Finish	Truck, °F	Laydown, °F	
		INLAY				
810506	10/03/90	09:53 AM	10:03 AM	270	256	35
810507	10/03/90	10:04 AM	10:17 AM	289	248	41
810508	10/10/90	08:20 AM	08:35 AM	250	250	34
810509	10/10/90	08:45 AM	09:00 AM	---	275	32
		BINDER COURSE				
810505	10/03/90	02:10 PM	02:32 PM	265	255	---
810506	10/03/90	02:33 PM	02:48 PM	280	275	---
810507	10/03/90	02:50 PM	03:10 PM	271	268	---
810504	10/03/90	03:51 PM	04:17 PM	294	270	---
810503	10/10/90	12:15 PM	12:30 PM	---	272	---
810508	10/10/90	12:30 PM	12:45 PM	---	273	---
810509	10/10/90	01:25 PM	01:35 PM	---	269	---
810502	10/10/90	01:45 PM	01:45 PM	270	290	50
		SURFACE COURSE				
810507	10/03/90	06:38 PM	07:05 PM	275	270	---
810504	10/03/90	07:12 PM	07:45 PM	298	267	---
810503	10/10/90	04:10 PM	04:25 PM	280	268	47
810508	10/10/90	04:30 PM	04:45 PM	---	269	42

Table 11. Alberta SPS-5 Layer Thicknesses

SHRP ID NO.	SURFACE PREP, MATERIAL TYPE	LAYER THICKNESS (INCHES)		
		INLAY	FIRST BINDER	SURFACE COURSE
810505	Min., Virgin AC			2.5
810506	Int., Virigin AC	1.6		2.5
810507	Int., Virgin AC	1.7	2.2	2.1
810504	Min., Virgin AC		2.5	2.3
810503	Min., Recycled AC		3.0	2.0
810508	Int., Recycled AC	2.1	2.3	2.3
810509	Int., Recycled AC	1.5		1.5
810502	Min., Recycled AC			2.1

Table 12. Alberta SPS-5 Initial Pavement Performance

SHRP ID NO.	MIX TYPE	TREATMENT	PAVEMENT CONDITION
810505	Virgin	2", Min.	O.K.
810506	Virgin	2", Int.	O.K.
810507	Virgin	5", Int.	Surface slightly pitted due to some coarse aggregate loss
810504	Virgin	5", Min.	Same as 810506 and roller checking near centerline (C/L)
810503	30/70 RAP	5", Min.	O.K.
810508	30/70 RAP	5", Int.	O.K.
810509	30/70 RAP	2", Int.	O.K.
810502	30/70 RAP	2", Min.	Roller checking near C/L

Notes: Initial performance data based on a distress survey performed on 05/08/91.

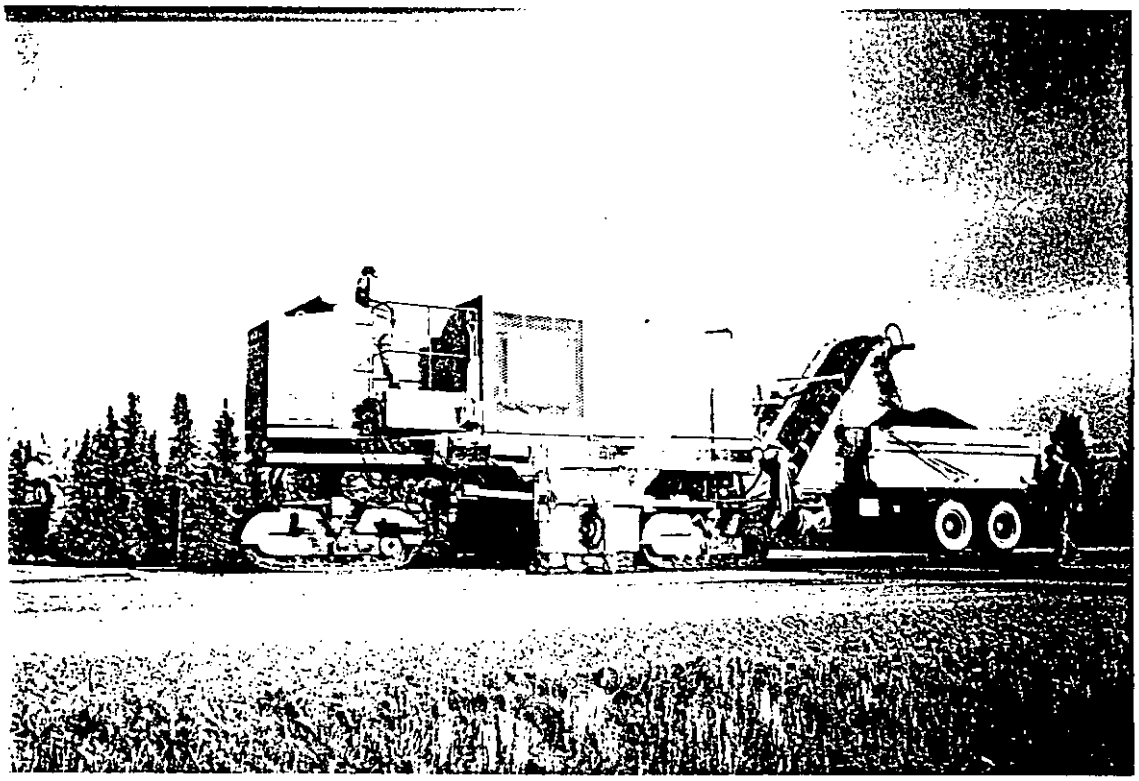


Photo 1. Typical milling

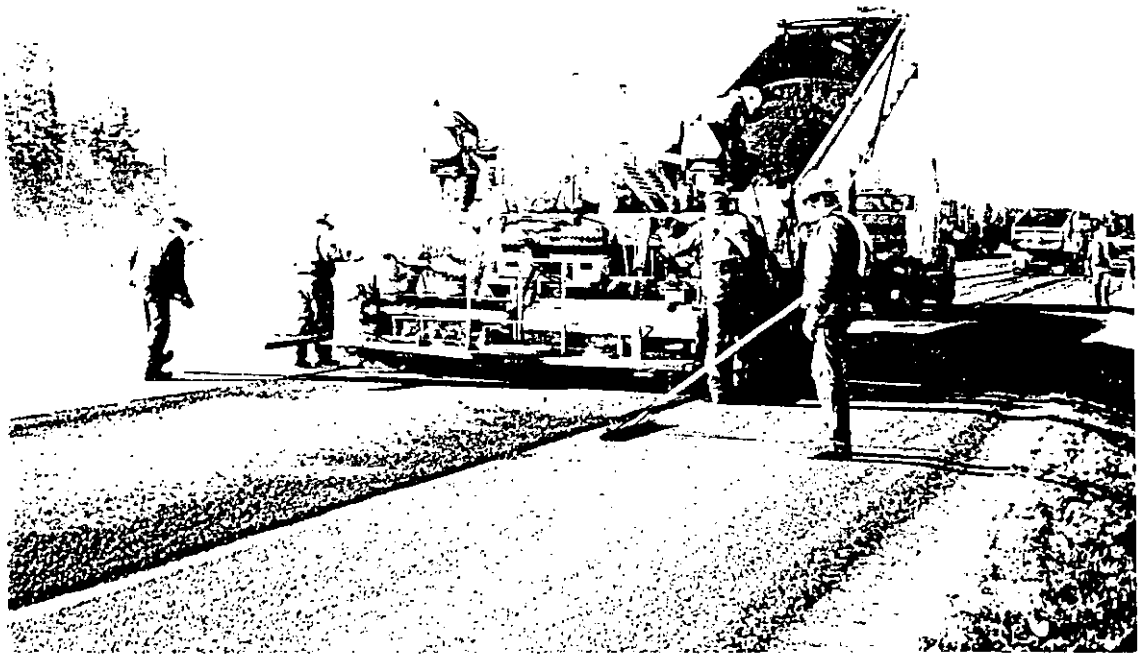


Photo 2. Paving of inlays.

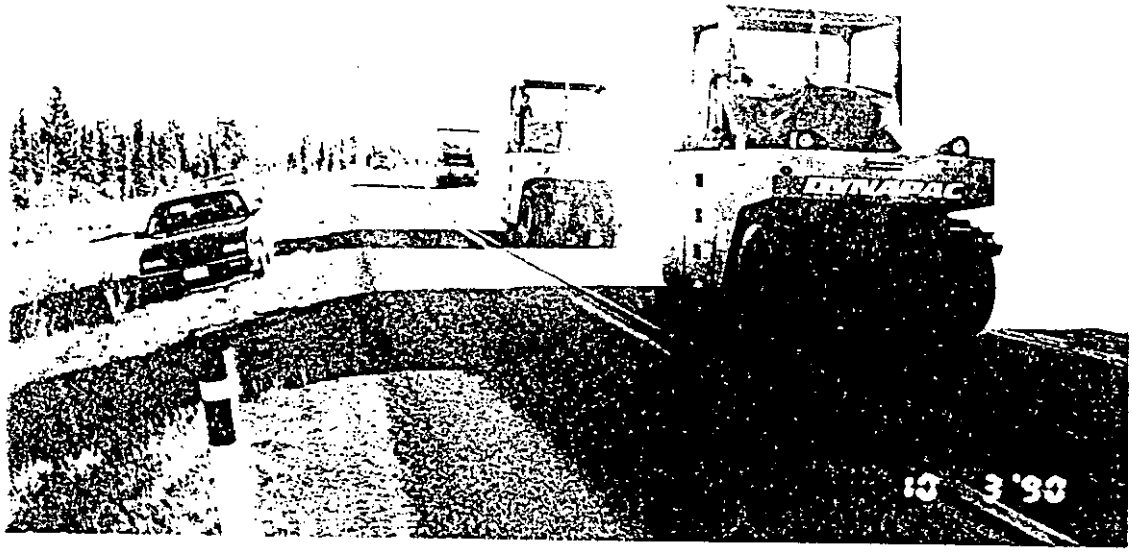


Photo 3. Rolling inlay lifts.

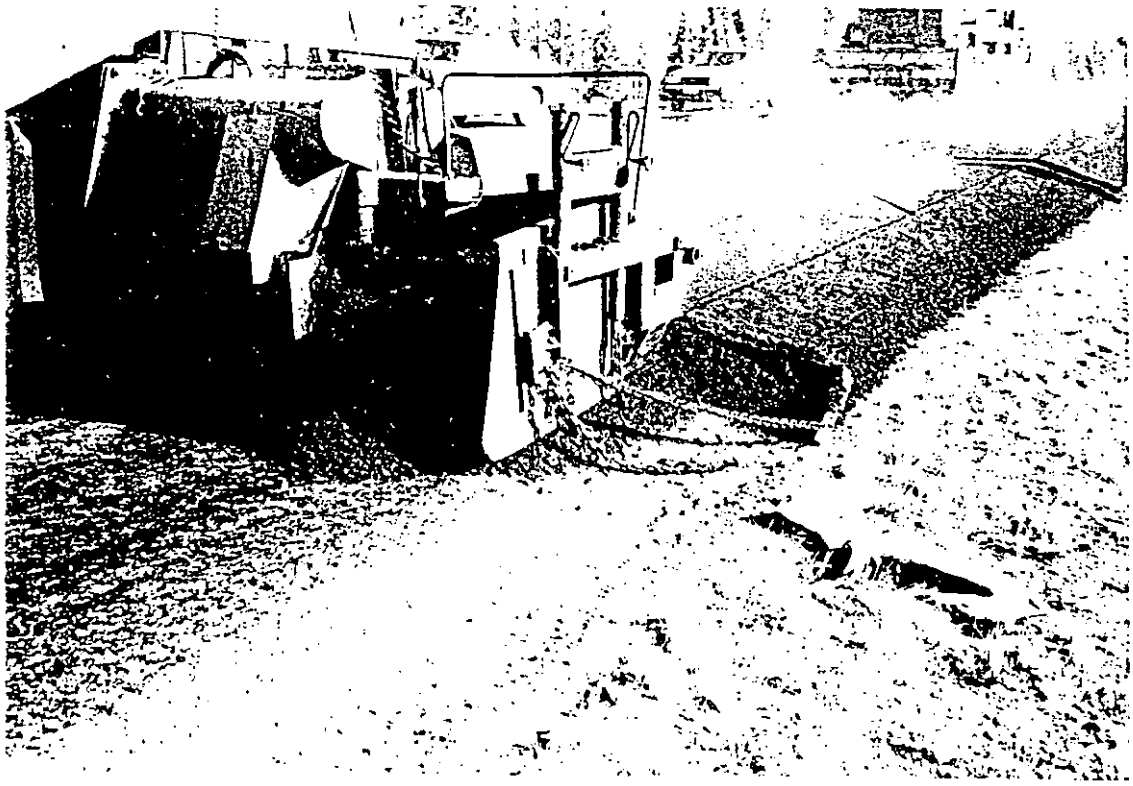


Photo 4. Typical virgin mix paving.

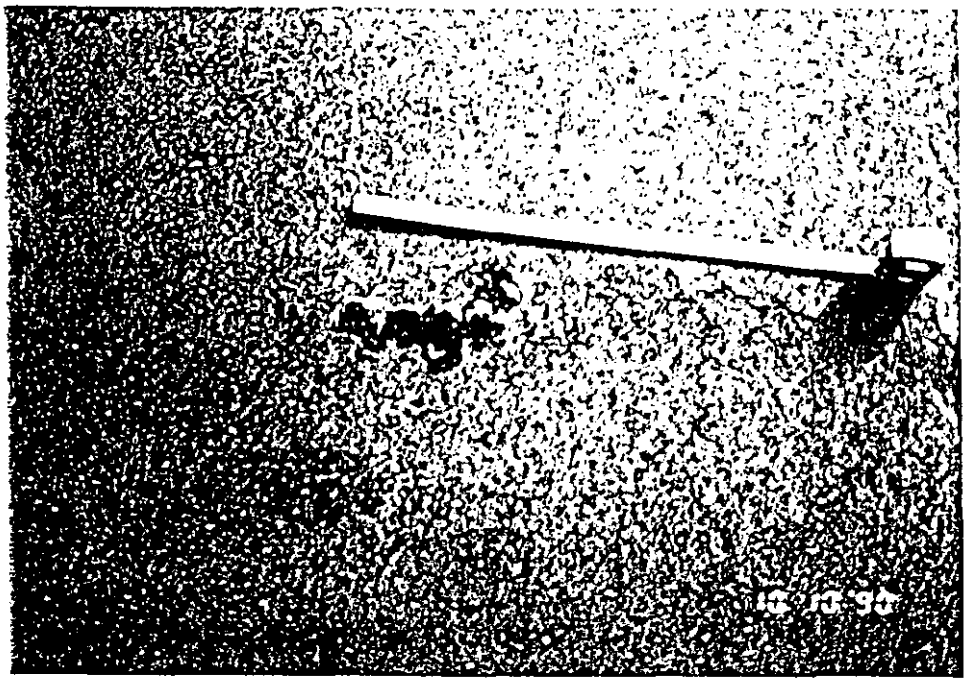


Photo 5. Tack coat off paver tires boiling through surface on section 810502.

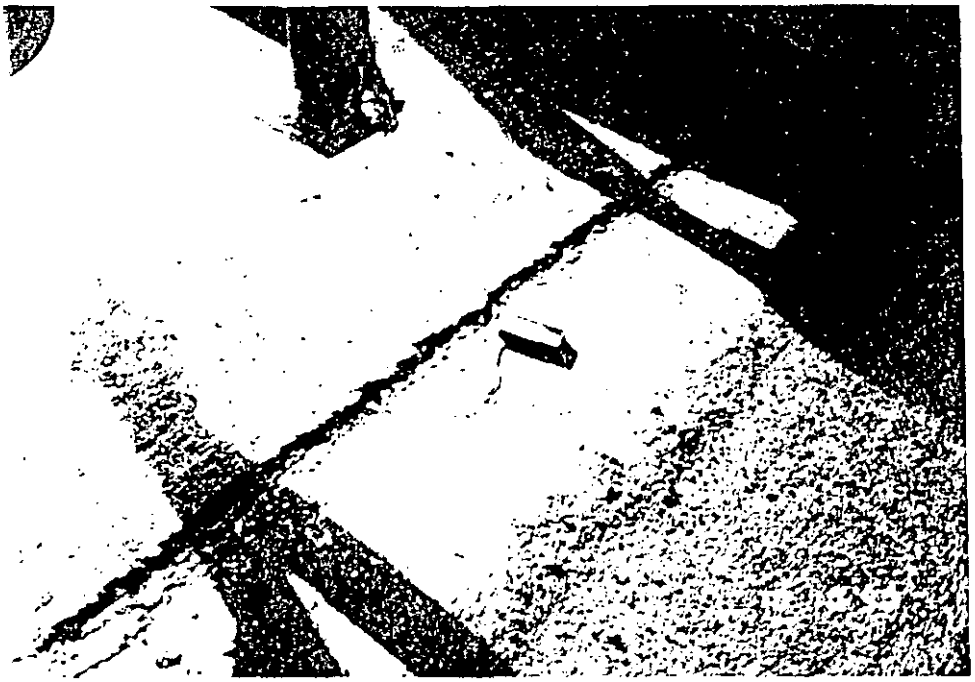


Photo 6. Crack at shoulder of section 810509.