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KS SPS-2

RICHARD C. INGBERG
Regional Engineer

Memorandum

Date: June 3, 1993

To: See Distribution

From: Richard C. Ingberg, Regional Engineer

Re: North Central Region
SPS-2 Construction Report

Attached is a copy of the SPS-2 construction report, entitled "SPS-2 Construction Report: I-70 Near Abilene, Kansas". This report was completed by Ann Johnson, of Braun Intertec.

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SPS-2 Construction Report
I-70 Near Abilene, Kansas
Sections 200201 to 200212

SHRP North Central Region

Report Prepared by:

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Braun Intertec Pavement, Inc.
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St. Paul, MN 55117

March 1993

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The SPS-2 Experimental Design and Research Plan

The SPS-2 experiment has been developed to study the structural factors for rigid pavements. The proposed experimental design incorporates factors from the experiments on subsurface drainage and high strength concrete proposed in the May 1986 *SHRP Research Plans*. The objective of the study is to more precisely determine the relative influence of the factors that affect the performance of rigid pavements. The primary factors addressed in the study include drainage, base type, concrete strength and thickness, and lane width. Other factors include load transfer, joint orientation, and reinforcement. Determining the influence of environmental region and soil type on these factors is another objective, which will provide substantially improve methods for design and construction of new and reconstructed pavements.

Some of the products of this experiment will help accomplish the objectives of the SHRP Long Term Pavement Performance project. The key products from the SPS-2 experiment will include an evaluation of the existing design methods, development of improved design equations for new and reconstructed pavements, determination of the effects of specific design features on pavement performance, and development of a comprehensive data base for use by state and provincial engineers and other researchers.

Development of the national pavement data base is the first step to facilitate the analyses and produce the other products. This data base will permit centralized and efficient distribution of massive quantities of data to participating highway authorities and researchers. In addition, the data produced by this experiment will be used to evaluate existing design methods and the performance equations. The AASHTO basic design equation for rigid pavements can be evaluated by comparing observed serviceability index, derived from profile and distress measurements on each test section against that predicted by the design equation. All of the inputs concerning the pavement structure, traffic, environment, drainage, and material properties will be quantified. Additionally, this experiment will permit the variability associated with each of the inputs to be quantified and allow evaluation of the reliability aspects of the model.

The proposed experimental design consists of one primary and two secondary experiments. The objective of the primary experiment is to determine the effects of the following specific pavement design features:

1. In-pavement drainage systems
2. Base type
3. Concrete strength
4. Pavement thickness
5. Lane width

The objectives of the secondary experiments are to study the effects of load transfer, joint orientation, and reinforcement. The interaction of all these factors are determined in combination with the effect of environmental region and soil type, studied under realistic performance conditions with significant materials and construction control.

The Kansas SPS-2 project included the primary experiment only. Table 1 gives the basic experiment design for the SPS-2 experiment, Doweled Jointed Plain Concrete Pavements. The SPS-2 experiment in Kansas includes those sections listed in the R cells.

Table 1. Basic Experiment on Doweled Jointed Plain Concrete Pavements (SPS-2)

PAVEMENT STRUCTURE					CLIMATE ZONES, SUBGRADE, SITE															
DRAIN	BASE TYPE	PCC		LANE WIDTH	WET								DRY							
					FREEZE				NO FREEZE				FREEZE				NO FREEZE			
		THICK	STRENGTH		FINE		COARSE		FINE		COARSE		FINE		COARSE		FINE		COARSE	
		in.	psi	ft	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
NO	AGG	8	550	12	J1		L1		N1		P1		R1		T1		V1		X1	
				14		K1		M1		O1		Q1		S1		U1		W1		Y1
			900	12		K2		M2		O2		Q2		S2		U2		W2		Y2
				14	J2		L2		N2		P2		R2		T2		V2		X2	
		11	550	12		K3		M3		O3		Q3		S3		U3		W3		Y3
				14	J3		L3		N3		P3		R3		T3		V3		X3	
			900	12	J4		L4		N4		P4		R4		T4		V4		X4	
				14		K4		M4		O4		Q4		S4		U4		W4		Y4
NO	LCB	8	550	12	J5		L5		N5		P5		R5		T5		V5		X5	
				14		K5		M5		O5		Q5		S5		U5		W5		Y5
			900	12		K6		M6		O6		Q6		S6		U6		W6		Y6
				14	J6		L6		N6		P6		R6		T6		V6		X6	
		11	550	12		K7		M7		O7		Q7		S7		U7		W7		Y7
				14	J7		L7		N7		P7		R7		T7		V7		X7	
			900	12	J8		L8		N8		P8		R8		T8		V8		X8	
				14		K8		M8		O8		Q8		S8		U8		W8		Y8
YES	Perm. ATB	8	550	12	J9		L9		N9		P9		R9		T9		V9		X9	
				14		K9		M9		O9		Q9		S9		U9		W9		Y9
			900	12		K10		M10		O10		Q10		S10		U10		W10		Y10
				14	J10		L10		N10		P10		R10		T10		V10		X10	
		11	550	12		K11		M11		O11		Q11		S11		U11		W11		Y11
				14	J11		L11		N11		P11		R11		T11		V11		X11	
			900	12	J12		L12		N12		P12		R12		T12		V12		X12	
				14		K12		M12		O12		Q12		S12		U12		W12		Y12

AGG = Dense-graded untreated aggregate base
LCB = Lean concrete base
Perm. ATB = Permeable asphalt treated base
All perpendicular doweled joints at 15-feet spacing

Project Details

The Kansas SPS-2 project was constructed in 1992 and is located in the westbound driving lane of Interstate 70, near Abilene (see Figure 1 for project location). This was the first SPS-2 experiment to be constructed as part of the Long Term Pavement Performance project, and was featured in an Open House held June 3 and 4, 1992. The Open House was attended by over 150 representatives from many states across the nation and highlighted the construction of the new concrete pavement.

The project involved the reconstruction of an existing concrete divided interstate highway. The SPS experiment consisted of 12 test sections and one Kansas DOT control section, and is built in the dry-freeze zone. Subgrade soils on the project are silty clay. Figure 2 shows the existing soils. The project was initially chosen to be constructed as an S experiment. However, at the time this decision was made, the design of the project was advanced to a stage where construction of the S experiment was not possible. After review by SHRP staff, it was determined that test site R was more suitable to the location.

The project included the twelve standard sections and the KDOT control section. No supplemental sections were constructed. The existing concrete pavement was removed, new base placed and a new plain doweled concrete pavement constructed in a similar alignment.

Interstate 70 carries an average two-way ADT of 13,750, with 21.4 percent trucks. The estimated design 18K ESAL in the SHRP lane is 1,300,678 with a total of 26,013,550 18K ESAL applications over the 20-year design period.

There were no known deviations from project guidelines. All test sections were located between the Chapman interchange (F.A.S. 124) and F.A.S. 270. There are no horizontal curves located in the SHRP areas and the vertical grade in the sections varies from -2.48 percent to +2.11 percent in the direction of travel. All sections are located on fill sections.

Several of the test sections contain underground structures. They are as follows:

- Section 200210 - Transverse drain of PATB
- Section 200209 - Box culvert, approx. 10 ft. below CL elevation
- Section 200212 - Box culvert
- Section 200211 - Median drain approx. 4 ft. below CL elevation
- Section 200211 - Box culvert
- Section 200208 - Box culvert
- Section 200204 - Box culvert

There are also several 18-inch median drains within the sections that are five or more feet below the surface.

No weather station has been installed to date, but one is scheduled for installation in 1993 or 1994. A weigh-in-motion system was installed and is operating at station 268+00, by the Toledo Scale Company. The Toledo Model 9430 High Speed WIM System provides automatic high speed weighing, classifying and data collection. It is completely automatic, and reports and collected data are available on demand via a telephone modem or at the site.

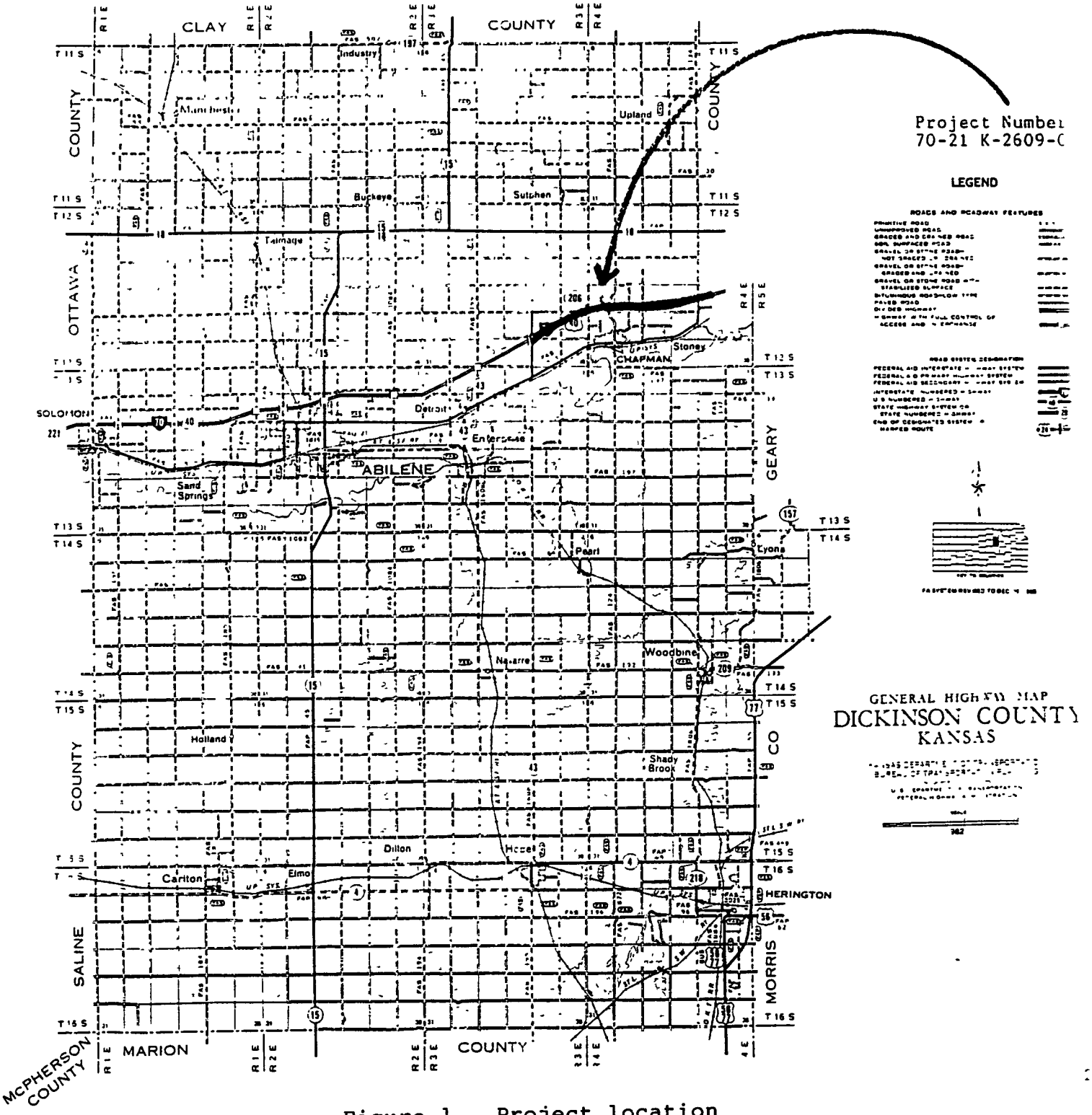
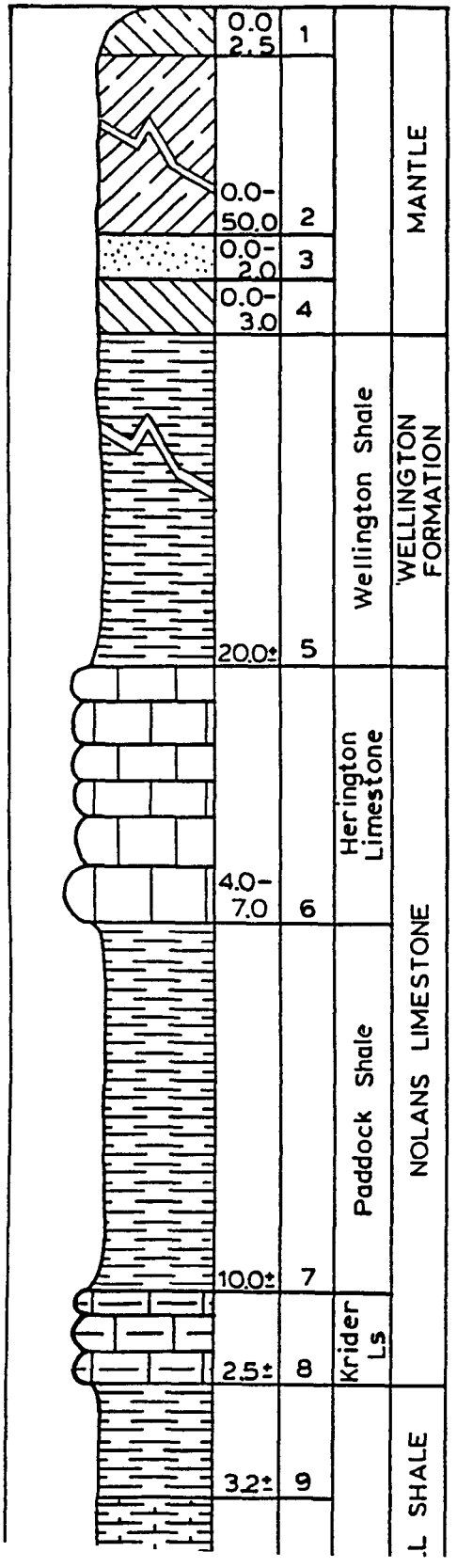


Figure 1. Project location



Geological description and formational sequence

MANTLE

1. Topsoil, silty clay; brown to grayish-brown, scattered sand.

2. Alluvium and Terrace material; silty clay and moderately well sorted fine to coarse sand, grayish-brown to dark yellowish-orange.

3. Dune sand; well sorted very fine to fine grained sand, pale yellowish-brown to yellowish-gray.

4. Residual clay; reddish-brown to dark yellowish-orange, tight.

PERMIAN SYSTEM
LOWER PERMIAN SERIES
SUMNER GROUP

Wellington Shale (20.0')

5. Shale; green with maroon bands, blocky, clayey.

CHASE GROUP

Herington Limestone (4.0'-7.0')

6. Limestone; white to grayish-white, chalky, somewhat blocky, lower 1.5' weathers brown and is harder than the upper part.

Paddock Shale (10.0')

7. Shale; gray, blocky, weathers green.

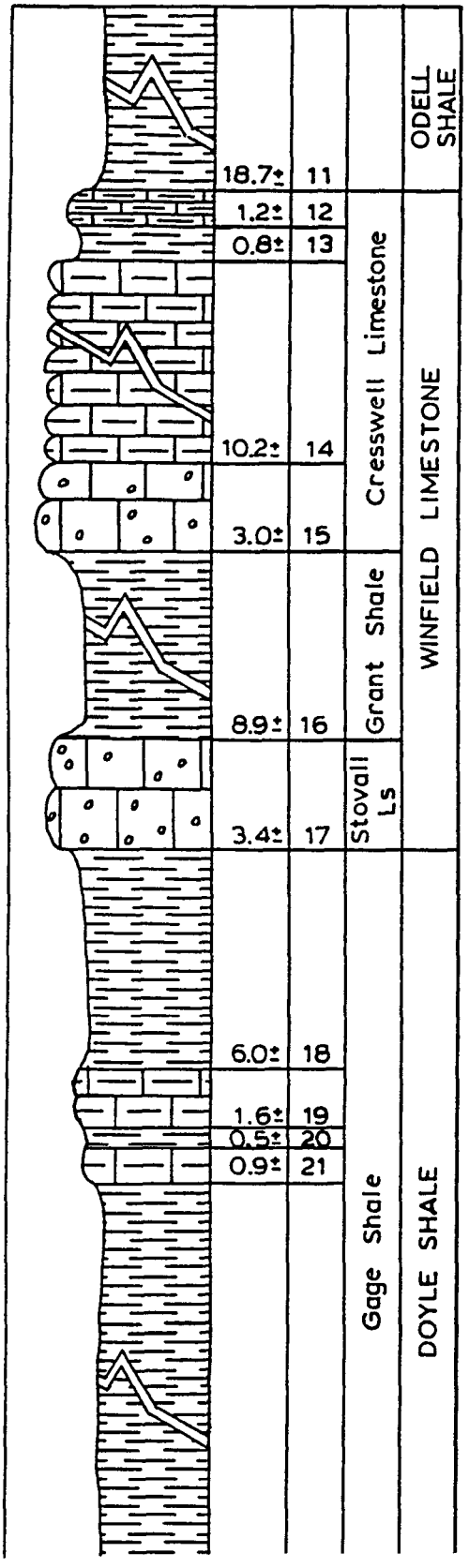
Krider Limestone (2.5')

8. Limestone; light gray, somewhat shaly, blocky, some horizontal partings.

Odell Shale (24.7')

9. Shale; grayish-green, platy, upper

Figure 2. Existing Soils



Odell Shale (continued)

11. Shale; varicolored maroon and green, blocky.

Cresswell Limestone (15.2')

12. Limestone; white, shaly, platy.

13. Shale; green, blocky.

14. Limestone; white, shaly, platy.

15. Limestone; yellowish-brown, weathers light brown, contains scattered chert nodules.

Grant Shale (8.9')

16. Shale; gray, weathers light green, platy.

Stovall Limestone (3.4')

17. Limestone; yellowish-brown to yellowish-gray, cherty.

Gage Shale (38.7')

18. Shale; light green, blocky.

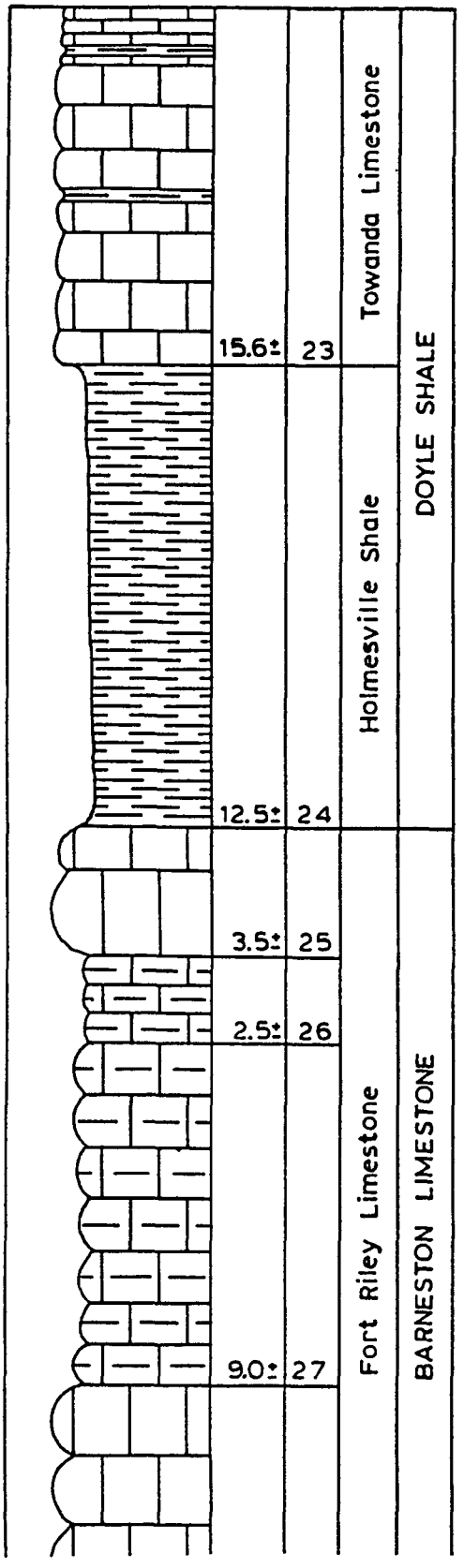
19. Limestone; yellowish-brown, somewhat shaly.

20. Shale; green, blocky.

21. Limestone; light gray, nodular, weathers readily.

22. Shale; green and maroon, thin limy lenses.

Figure 2. Existing Soils (cont.)



Towanda Limestone (15.6')

23. Limestone; light gray, weathers yellowish-brown, thin lensing shale partings, upper part platy.

Holmesville Shale (12.5')

24. Shale; green, blocky, limy in lower part, 0.6' maroon band in lower part.

Fort Riley Limestone (21.0')

25. Limestone; yellowish-brown, platy, somewhat honeycombed.

26. Limestone; shaly, weak, contains thin lenses of green shale.

27. Limestone; yellowish-brown, platy, shaly.

28. Limestone; yellowish-brown, massive, blocky, weathers gray (rimrock).

Figure 2. Existing Soils (cont.)

A record is produced for each vehicle traversing the scale which includes the following:

Wheel Load	Axle Load
Axle-Group Load	Gross-vehicle weight
Speed	Vehicle Class
Site Identification Code	Lane of Travel
Date and time of passage	Sequential vehicle record number
Wheelbase	ESAL
Violation Code	

The Kansas DOT conducted their own sampling and testing, and also provided their own Resident Engineer. Jim Kowach, P.E. served as Construction Engineer and Chuck Luedders, P.E. coordinated all sampling and testing for the DOT. A listing of all people who were actively involved in the project is shown below:

Kansas Department of Transportation:

Chuck Luedders
Kansas DOT
1014 N. Third
Salina, KS 67402
(913) 827-3754

Jim Kowach
Kansas DOT
1014 N. Third
Salina, KS 67402
(913) 827-6286

Bill Parcells
Kansas DOT
2300 Van Buren
Topeka, KS 66611
(913) 296-7410

Lonnie Ingram
Richard Riley
Rodney Maag
Kansas DOT
Docking State Office Bldg.
Topeka, KS 66612
(913) 296-3711

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Gene Skok
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St. Paul, MN 55117
(612) 776-7522

Richard Ingberg
FHWA
1983 Sloan Place - Suite 10
St. Paul, MN 55117
(612) 776-2210

The DOT staff experienced many problems with the sampling and testing requirements, including insufficient numbers of cores specified in the sampling and testing plan for the amount of tests required. Also, several tests were specified for each core, some of which were destructive. This resulted in the need for additional cores to be taken after original sampling was done. It was impossible to core the PATB, as the cores fell apart, and to sample the PATB, it had to be pounded into forms. The DOT also had limited space in which to work during construction, due to the 40-ft. paving lanes.

The general contractor for this project is listed below:

Hawkins Construction Company
P.O. Box 9008, Station C
Omaha, Nebraska 68109

Phone: (402) 342-1607

They performed all of the primary work for the project, including grading and paving.

Layout

Beginning at the west end of the project, sections were laid out according to base type. Lane width and surface thickness were not considered in the layout. The Kansas DOT control section was first, followed by those sections with permeable asphalt treated base over dense graded aggregate base (sections 9, 10, 11, and 12). Those sections containing lean concrete base were placed next (sections 8, 7, 6, and 5). The last sections were those containing dense graded aggregate base (sections 2, 1, 4, and 3).

Figure 3 shows the section layout, and Table 2 gives a description of the sections. Pavement sections are shown in Figures 4 through 7.

Table 2. Kansas SPS-2 Section Layout

Construction Station	SHRP ID	Base	Surface				
			Thickness (Design)	Thickness (Actual)	Strength (Design)	Ave. Strength (Actual)	Width
264+28 to 269+28	KDOT Control	6" Stab Base 6" Mod Flyash	12"	12.2"	600 psi	647 psi	12'
270+78 to 275+78	200209	4" PATB 4" DGAB	8"	8.5"	550 psi	600 psi	12'
277+23 to 282+23	200210	4" PATB 4" DGAB	8"	8.3"	900 psi	882 psi	14'
302+58 to 307+58	200211	4" PATB 4" DGAB	11"	10.0"	550 psi	625 psi	14'
329+43 to 334+43	200212	4" PATB 4" DGAB	11"	9.1"	900 psi	928 psi	12'
335+73 to 340+73	200208	6" LCB	11"	11.1"	900 psi	945 psi	12'
342+18 to 347+18	200207	6" LCB	11"	10.1"	550 psi	617 psi	14'
348+63 to 353+63	200205	6" LCB	8"	8.1"	550 psi	704 psi	12'
355+08 to 360+08	200206	6" LCB	8"	7.8"	900 psi	879 psi	14'
361+53 to 366+53	200202	6" DGAB	8"	8.2"	900 psi	857 psi	14'
367+98 to 372+98	200201	6" DGAB	8"	7.8"	550 psi	600 psi	12'
393+18 to 398+18	200204	6" DGAB	11"	11.4"	900 psi	817 psi	12'
399+63 to 404+63	200203	6" DGAB	11"	11.2"	550 psi	626 psi	14'

Material Sampling and Testing

The Material Sampling and Testing Plan is shown in Figure 8.

Several attempts were made to obtain field cores of the PATB, but the state was unable to do so. Therefore, it was impossible to conduct tests on samples CA01, 02, 03, 05, 47, 48, 51, 54, and 55. Uncompacted mix samples were obtained from the plant conveyor belt, and several tests could be completed on the loose material. The moisture susceptibility test (P05) was not conducted as it is not applicable to permeable asphalt treated bases.

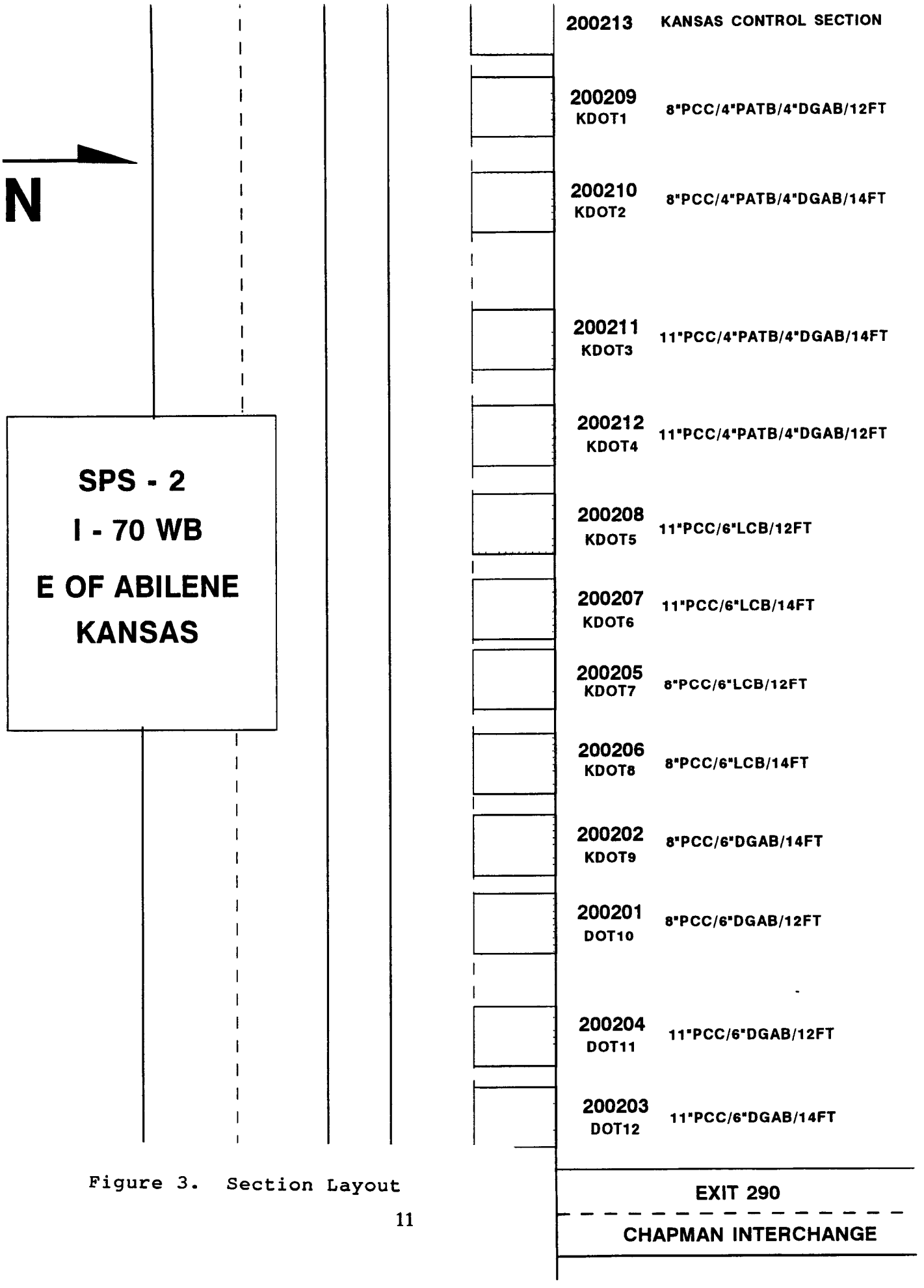

Figure 3. Section Layout

I - 70 PROJECT PAVEMENT

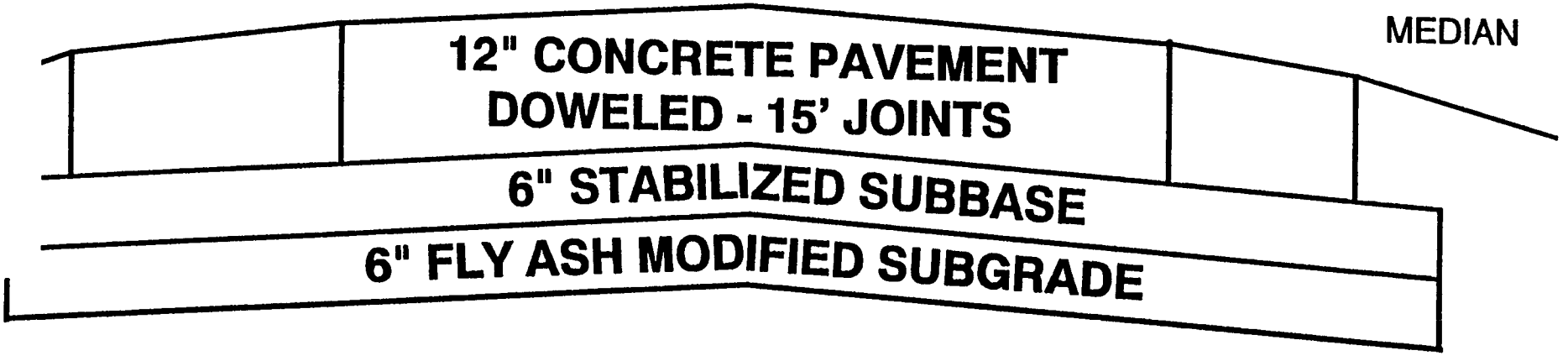

Figure 4. KDOT Control Section

TEST SECTIONS
1 THRU 4

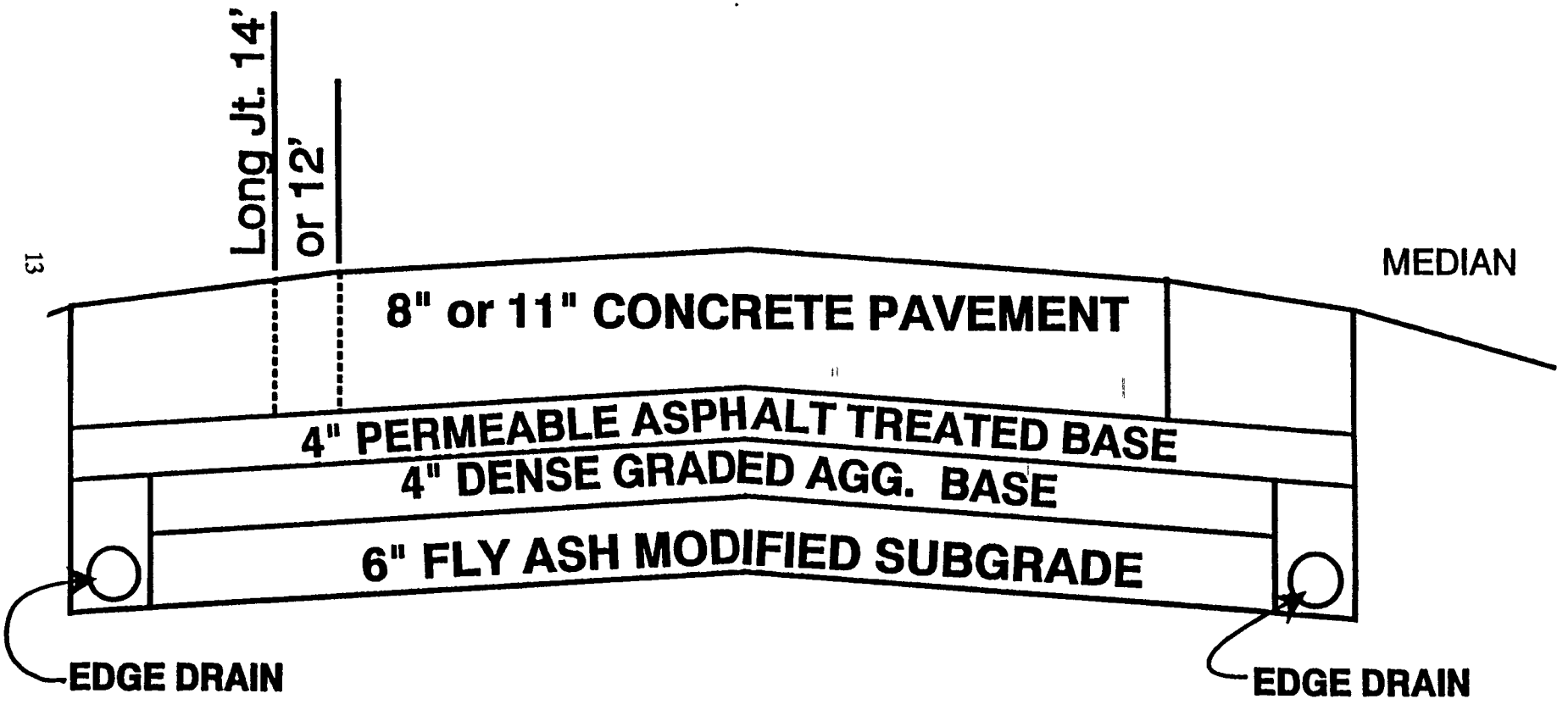

Figure 5. Section 200209 through 200212

TEST SECTIONS
5 THRU 8

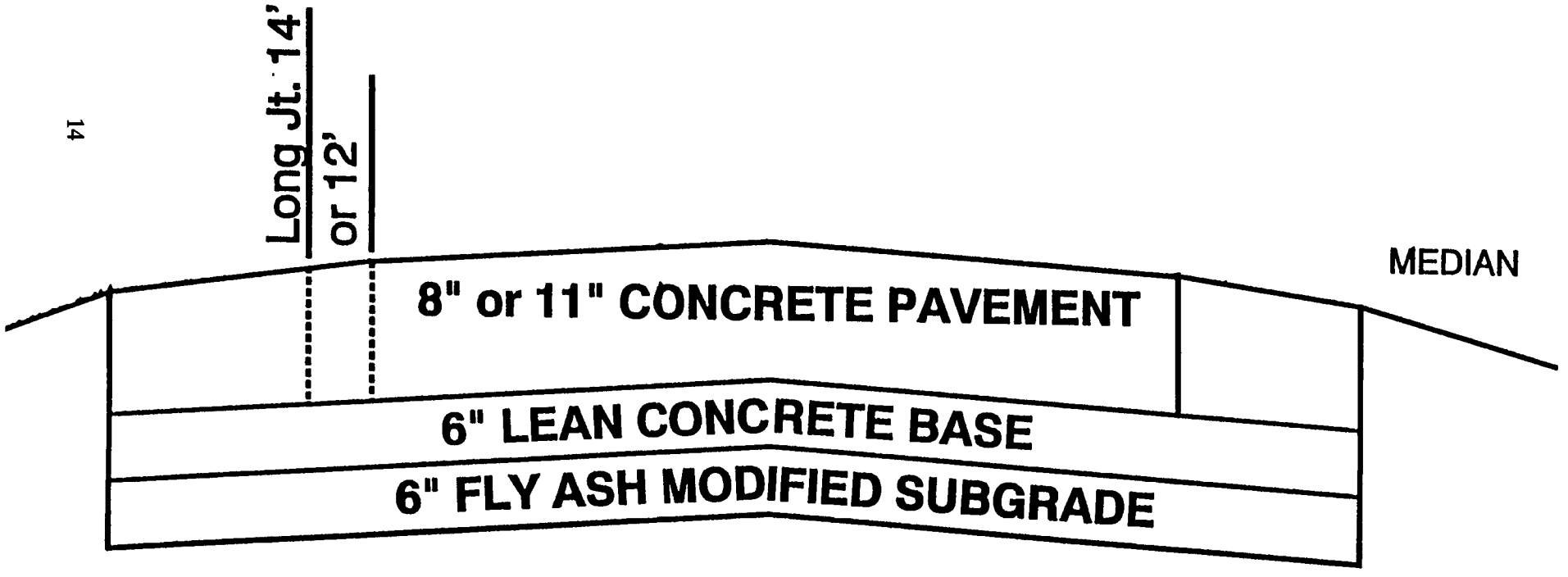

Figure 6. Section 200205 through 200208

TEST SECTIONS
9 THRU 12

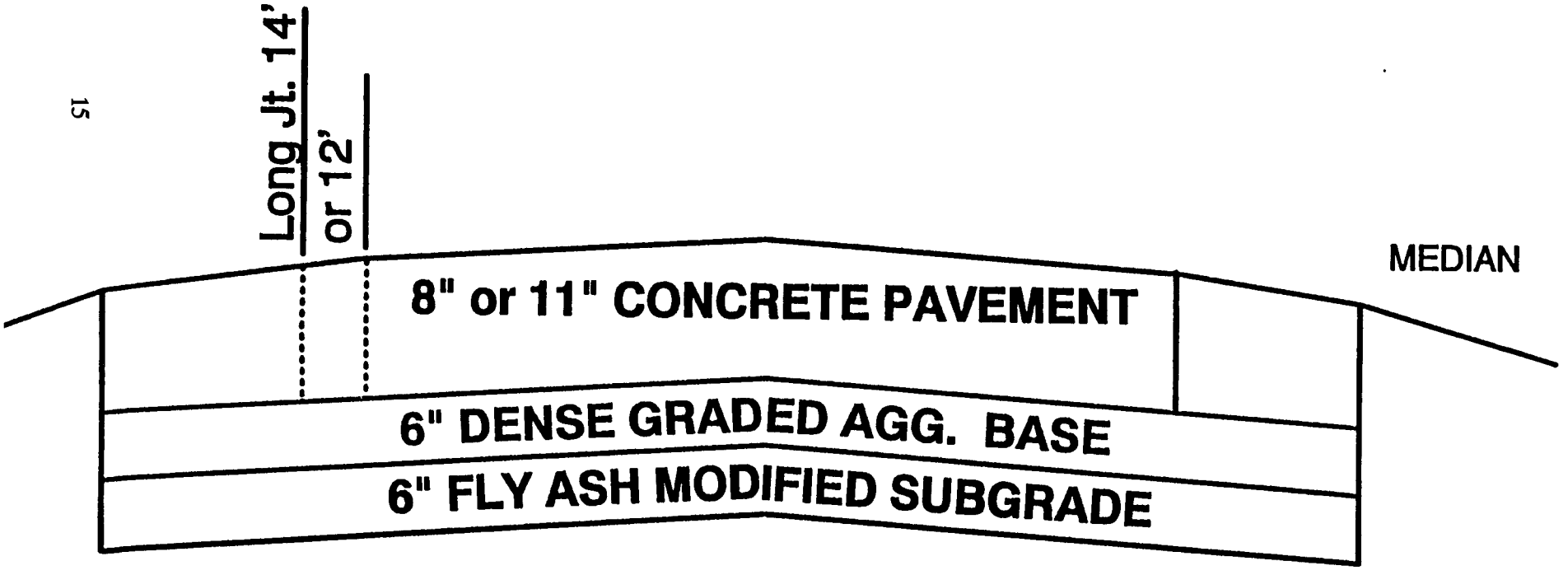

Figure 7. Sections 200201 through 200204

Construction

The construction schedule is shown on Figure 9. Construction was delayed due to an especially rainy season. Work began April 6, 1992. Work on the SHRP sections began June 6th with the placement of aggregate base on sections 1, 2, 3, and 4. Subbase for sections 9 through 12 was placed on June 30th, and paving on the first four sections began July 2nd. The lean concrete base for sections 5 through 9 was placed July 9th, and they were paved July 17th. The final two sections, 11 and 12 were paved July 25th. All paving for the project was completed July 30th, and the westbound lanes were opened to traffic on August 13, 1992.

There were no major problems with construction, aside from the very rainy weather conditions which slowed progress. Many problems arose during construction of the permeable asphalt treated base (PATB). The contractor placed the PATB too thick, and the excess was removed with a trimmer. After several trials, the Contractor was able to roll the material at the correct temperature so that it did not roll out more than expected.

Subgrade Preparation

The original construction of I-70 was completed in 1959. The pavement consisted of 9 inches of doweled jointed reinforced concrete pavement over a 4-inch granular subbase. To utilize existing materials the existing granular subbase and shoulder material were incorporated into a stabilized aggregate subbase. To prevent saturated subgrade soils that previous construction projects experienced, the DOT stipulated that Type C flyash was to be used to dry up the subgrade soil prior to the construction of the stabilized aggregate subbase.

Mix Designs and Paving

All of the mixes, including lean concrete base and surface concrete used 70% natural sand and 30% crushed stone. Crushed limestone was used in the lean concrete base and the 550 psi concrete mix. The 900 psi mix was switched to calcite cemented sandstone for the stone portion to help in increasing the flexural strength. All concrete mix designs are given in Figures 10 through 12.

Tables 3, 4, and 5 are a summary of the portland cement concrete characteristics.

Table 3. Concrete Compressive Strength

Specimen Type	14 Day		28 Day	
	Average	Deviation	Average	Deviation
550 psi cores	4,269	649	5,039	580
550 psi cylinders	4,088	564	4,841	543
900 psi cores	6,918	559	7,904	491
900 psi cylinders	6,356	818	7,168	1,113
KDOT mix cores	Insufficient Samples for Realistic Averages			
KDOT mix cylinders	4,094	59	4,768	238

Table 4. Concrete Flexural Strength

Specimen Type	14 Day		28 Day	
	Average	Deviation	Average	Deviation
900 psi beams	843	49.9	925	77.1
550 psi beams	608	49.9	649	43.7
KDOT mix beams	618	42.1	677	58.5

Table 5. Concrete Unit Weight

Specimen Type	14 Day		28 Day	
	Average	Deviation	Average	Deviation
900 psi core	146.6	1.18	147.3	1.52
550 psi core	144.6	0.78	144.7	1.10
KDOT mix core	No information		145.9	one core

Project Cost

As part of the presentation for the Open House, the Kansas Department of Transportation prepared cost summaries for each of the thirteen sections. Those unit costs are given in Tables 7 through 12, and are summarized below:

Table 6. Unit Costs for Each Section

Section	Total Cost	Cost/sq yd
KDOT Control	$59,224.680	$21.15
200201	66,977.90	23.62
200202	71,294.81	25.73
200203	74,802.86	26.38
200204	73,395.80	26.48
200205	65,754.16	22.94
200206	69,601.26	24.28
200207	58,134.47	20.28
200208	63,827.77	22.27
200209	50,898.95	17.76
200210	45,205.66	15.77
200211	56,672.44	19.77
200212	53,973.96	18.40

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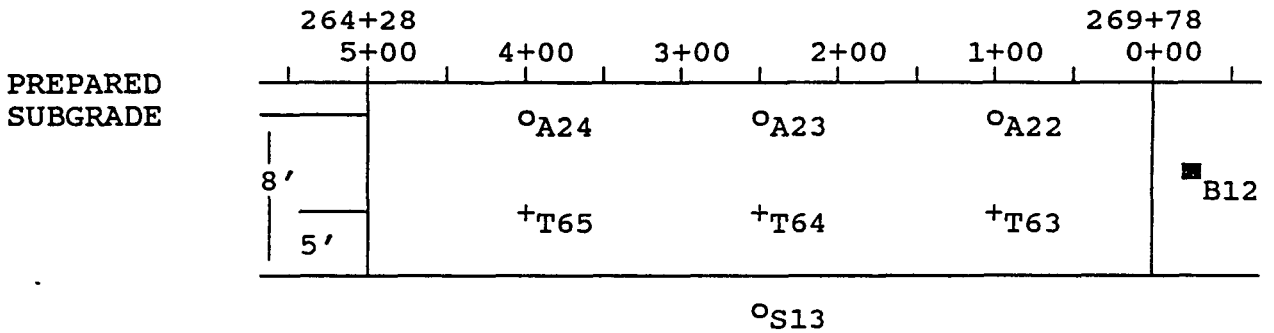
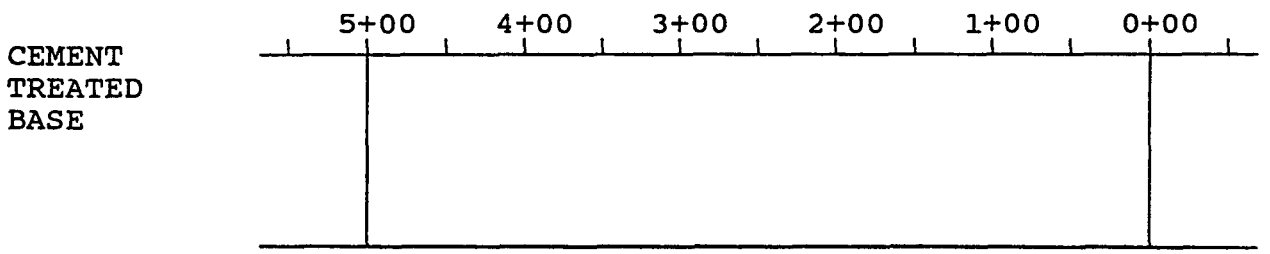
SPS-2 MATERIALS SAMPLING

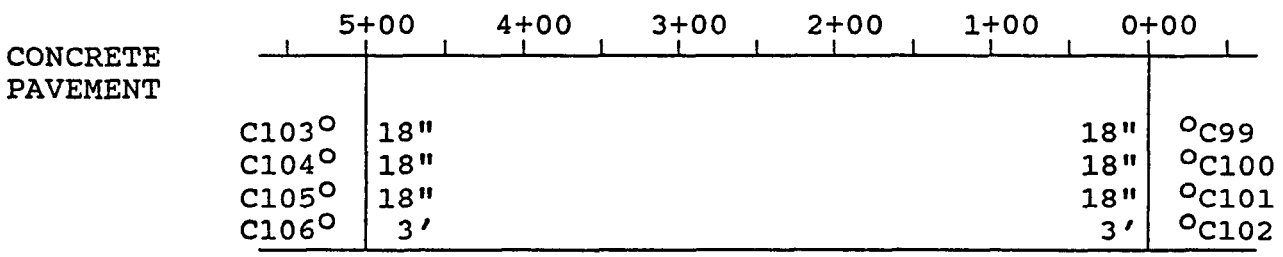
KDOT CONTROL SECTION
70-21 K-2609-01



A22 - A24 (Four Foot Shelby Tubes) Date _____
T63 - T65 (In-Place Densities) Date _____
B12 (Bulk Sample, Moist. & Density) Date _____
S13 (Shoulder Probe) Date _____



BP3 (Compression Specimums) Date _____



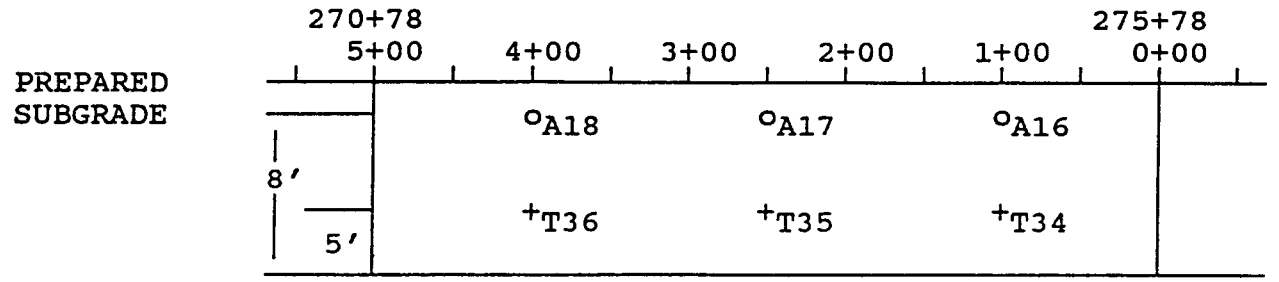
FC37 - FC54 (Beams, Cylinders & Tests) Date _____
C99 - C106* (Cores of Pavement & Base) Date _____

* Coring to be done by Headquarters Pavement Coring Crew

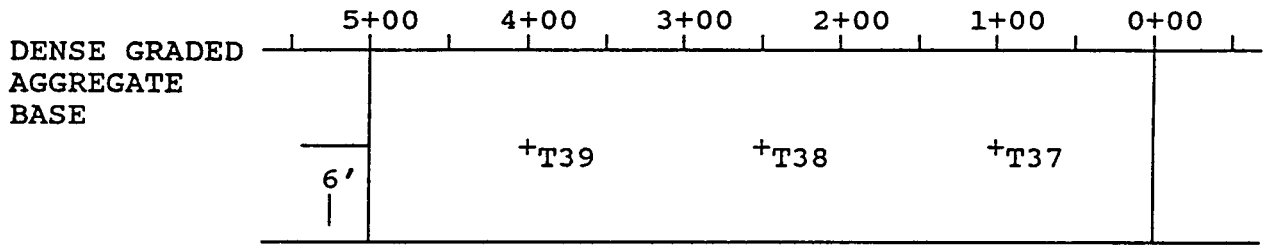
Figure 8. Materials Sampling and Testing Plan

SPS-2 MATERIALS SAMPLING

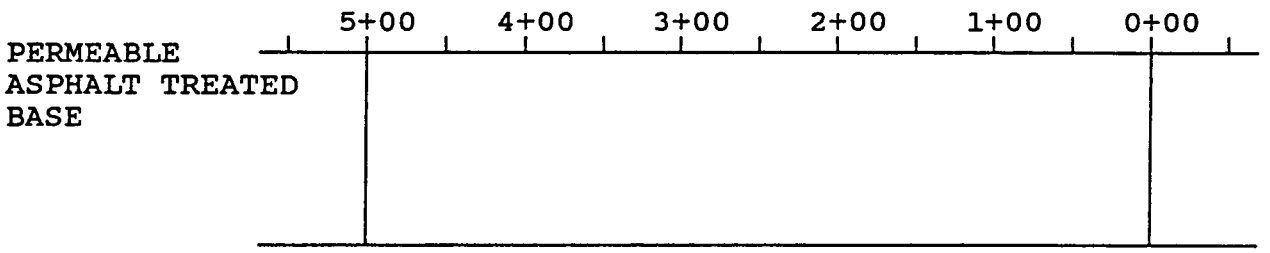
KDOT TEST SECTION NO. 1
SHRP TEST SECTION NO. 9
70-21 K-2609-01



A16 - A18 (Four Foot Shelby Tubes) Date _____
S12 (Shoulder Probe) Date _____
T34 - T36 (In-Place Densities) Date _____



T37 - T39 (In Place Densities) Date _____



BT1 (Asphalt Pavement Sample) Date _____

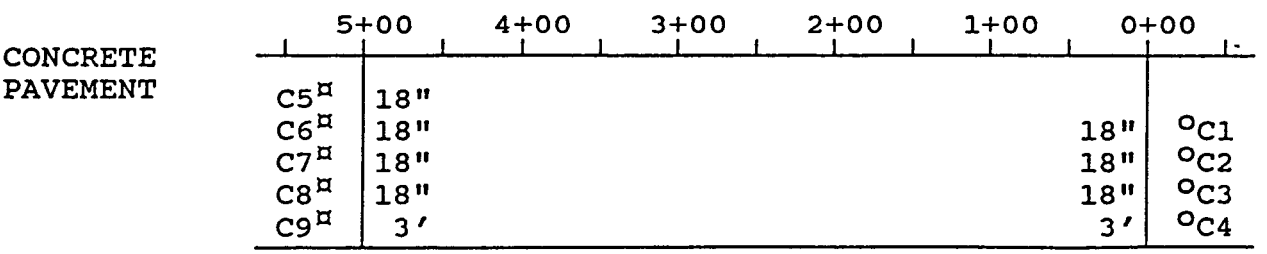
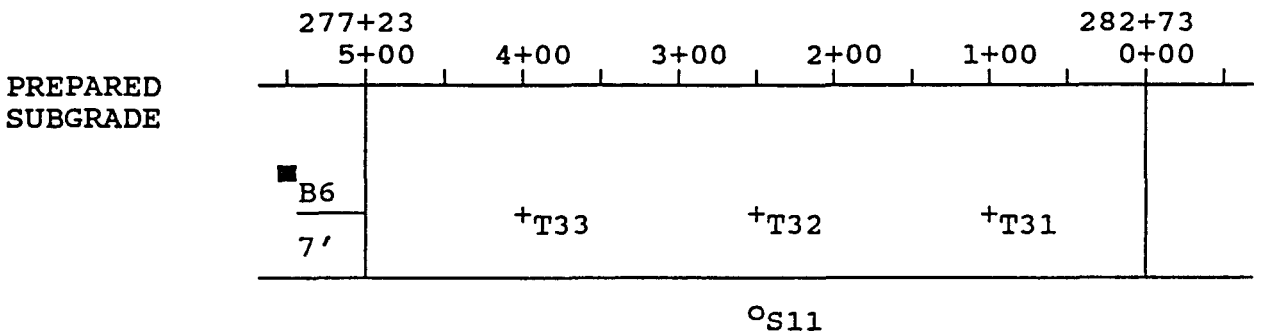


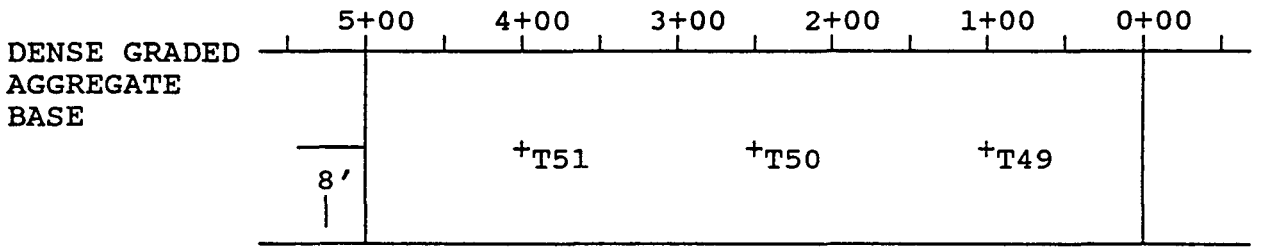
Figure 8. Sampling and Testing Plan (cont.)

SPS-2 MATERIALS SAMPLING

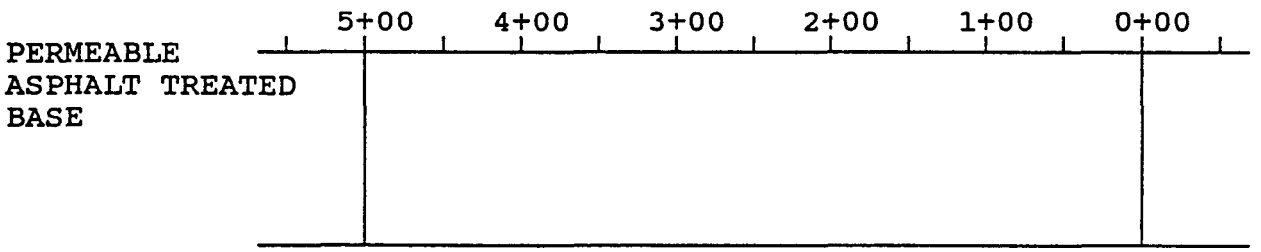
KDOT TEST SECTION NO. 2
SHRP TEST SECTION NO. 10
70-21 K-2609-01



T31 - T33 (In-Place Densities) Date _____
B6 (Bulk Sample, Moist. & Density) Date _____
S11 (Shoulder Probe) Date _____



T49 - T51 (In-Place Densities) Date _____



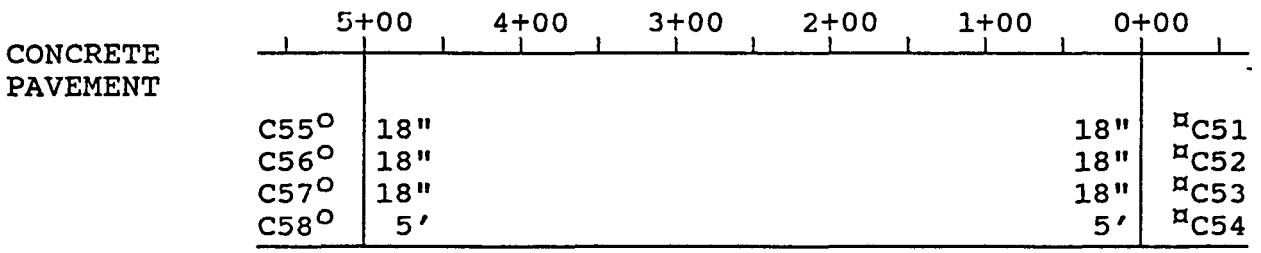
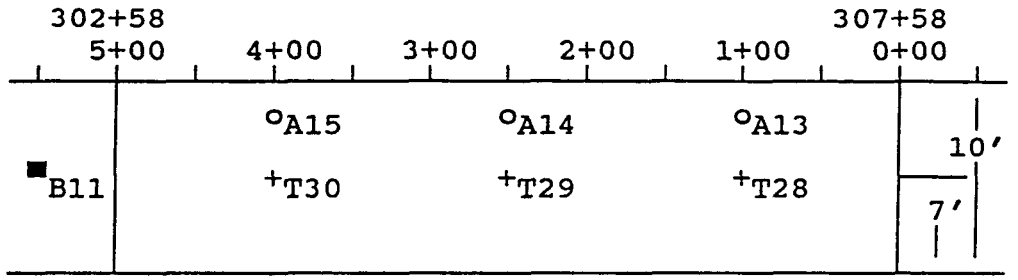


Figure 8. Materials Sampling and Testing Plan (cont.)

SPS-2 MATERIALS SAMPLING

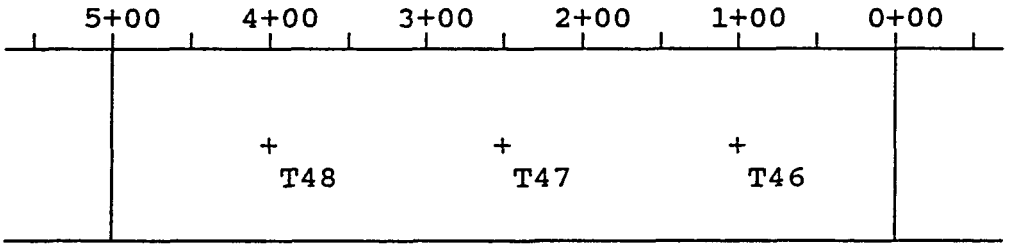
KDOT TEST SECTION NO. 3
SHRP TEST SECTION NO. 11
70-21 K-2609-01

PREPARED SUBGRADE



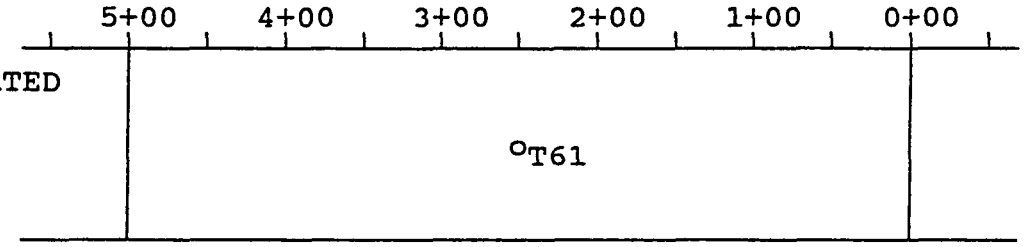
A13 - A15 (Four Foot Shelby Tubes) Date _____
T28 - T30 (In-Place Densities) Date _____
T29 (Plate Bearing Test)
B11 (Bulk Sample, Moist. & Density) Date _____
S10 (Shoulder Probe) Date _____

DENSE GRADED AGGREGATE BASE



T46 - T48 (In-Place Densities) Date _____

PERMEABLE ASPHALT TREATED BASE



BT2 - (Asphalt Pavement Sample) Date _____
T61 - (Plate Bearing Test) Date _____

CONCRETE PAVEMENT

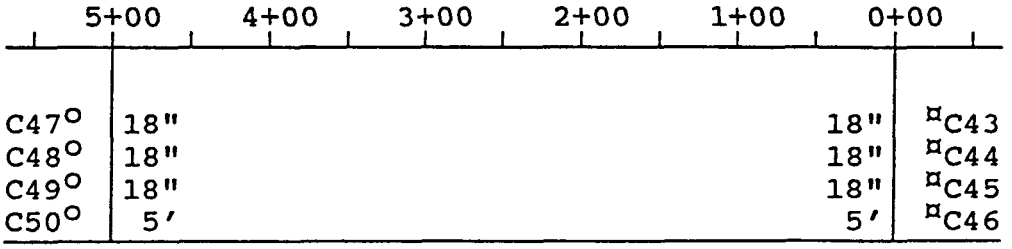
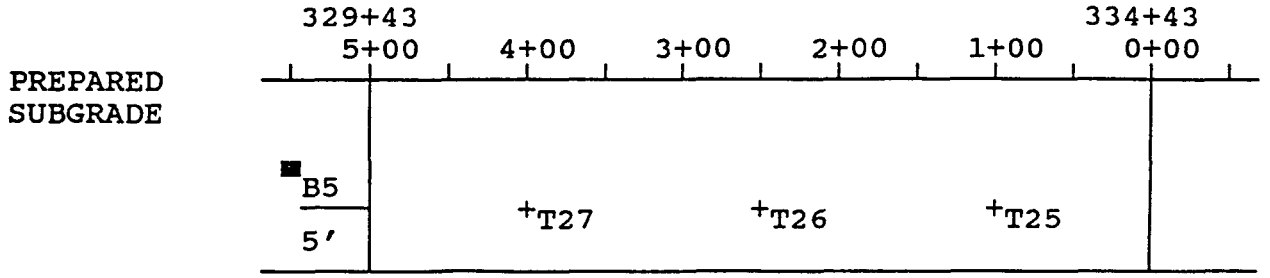


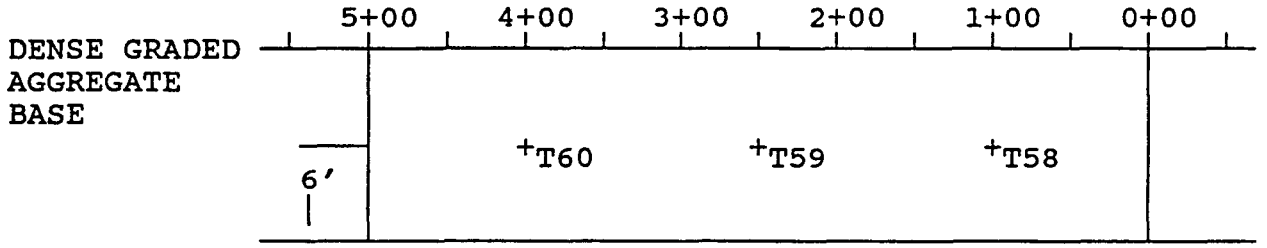
Figure 8. Materials Sampling and Testing Plan (cont.)

SPS-2 MATERIALS SAMPLING

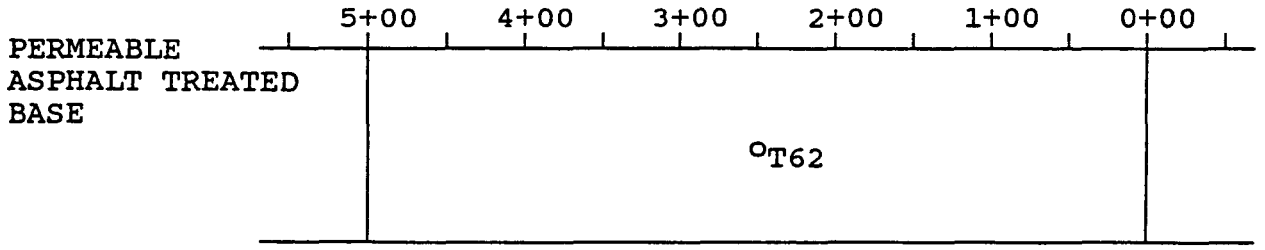
KDOT TEST SECTION NO. 4
SHRP TEST SECTION NO. 12
70-21 K-2609-01



T25 - T27 (In-Place Densities) Date _____
S9 (Shoulder Probe) Date _____
B5 (Bulk Sample, Moist. & Density) Date _____



T58 - T60 (In-Place Densities) Date _____



BT3 - (Asphalt Pavement Sample) Date _____
T62 - (Plate Bearing Test) Date _____

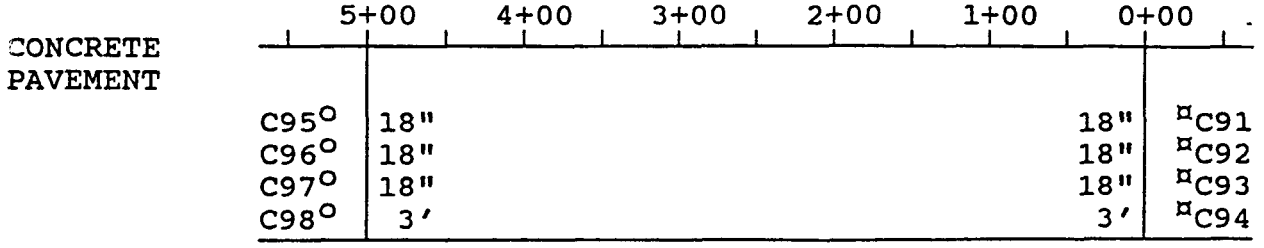
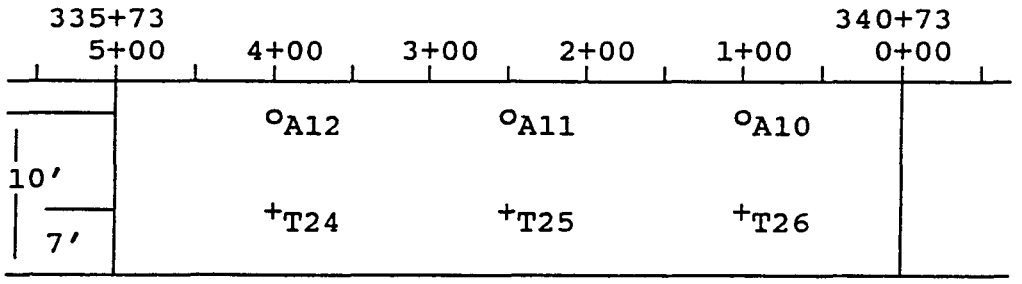


Figure 8. Materials Sampling and Testing Plan (cont.)

SPS-2 MATERIALS SAMPLING

KDOT TEST SECTION NO. 5
SHRP TEST SECTION NO. 8
70-21 K-2609-01

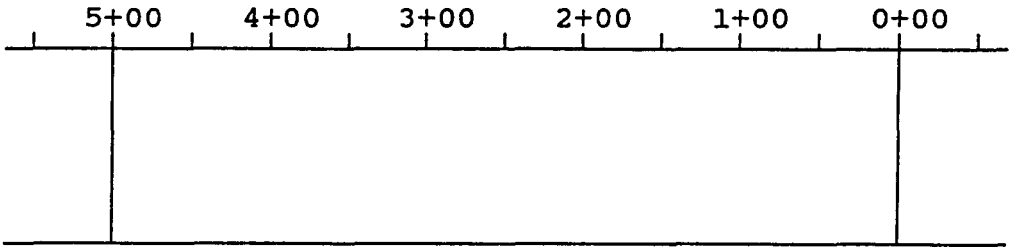
PREPARED SUBGRADE



°S8

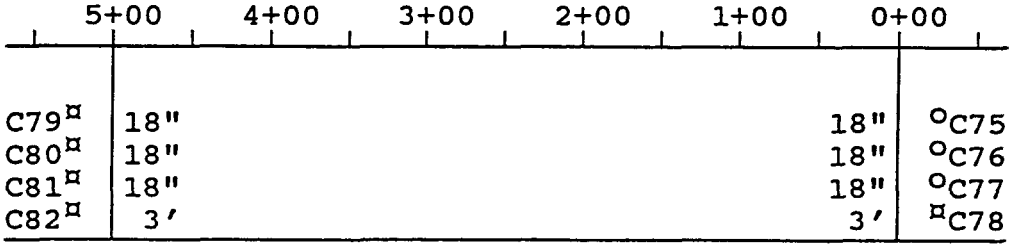
A10 - A12 (Four Foot Shelby Tubes) Date _____
T24 - T26 (In-Place Densities) Date _____
S8 (Shoulder Probe) Date _____

LEAN CONCRETE BASE



BP1 (Compression Specimums) Date _____

CONCRETE PAVEMENT



FC37 - FC54 (Beams, Cylinders & Tests) Date _____
C75 - C77* (Cores of Pavement & Base) Date _____
C78 - C82* (Cores of Pavement Only) Date _____

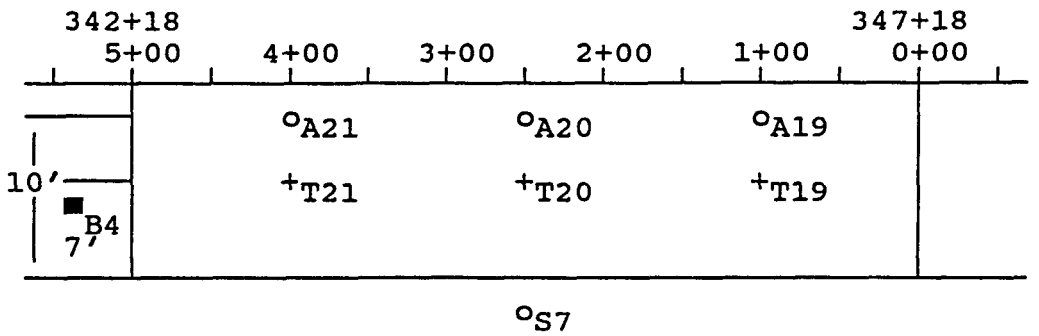
* Coring to be done by Headquarters Pavement Coring Crew

Figure 8. Materials Sampling and Testing Plan (cont.)

SPS-2 MATERIALS SAMPLING

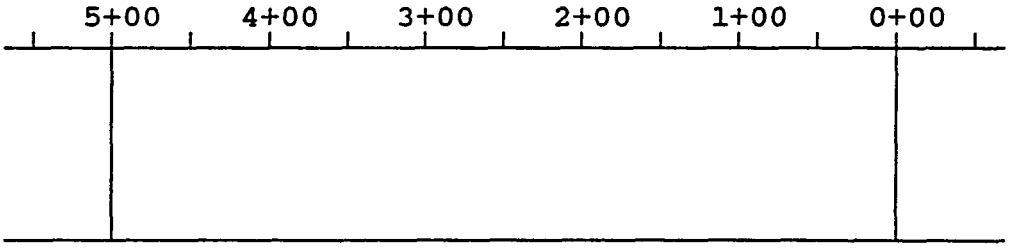
KDOT TEST SECTION NO. 6
SHRP TEST SECTION NO. 7
70-21 K-2609-01

PREPARED SUBGRADE

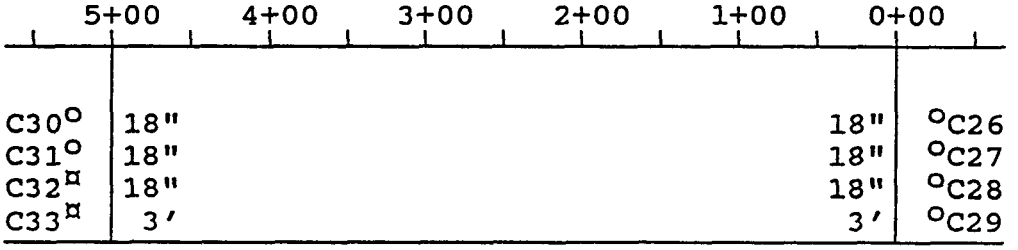


A19 - A21 (Four Foot Shelby Tubes) Date _____
T19 - T21 (In-Place Densities) Date _____
B4 (Bulk Sample, Moist. & Density) Date _____
S7 (Shoulder Probe) Date _____

LEAN CONCRETE BASE



CONCRETE PAVEMENT



FC37 - FC54 (Beams, Cylinders & Tests) Date _____
C26 - C31* (Cores of Pavement & Base) Date _____
C32 - C33* (Cores of Pavement Only) Date _____

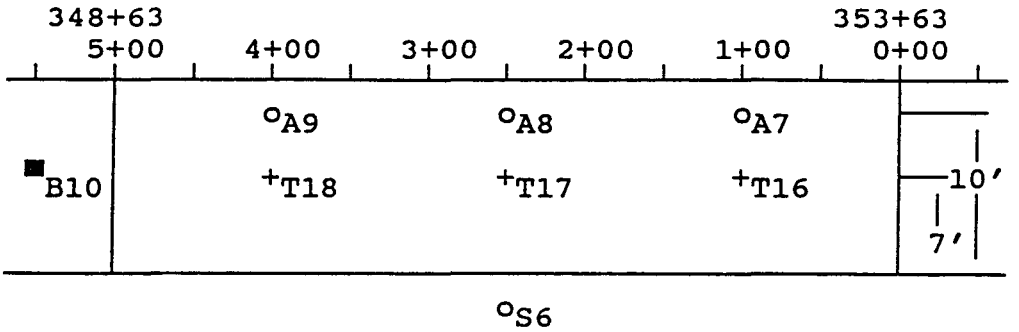
* Coring to be done by Headquarters Pavement Coring Crew

Figure 8. Materials Sampling and Testing Plan (cont.)

SPS-2 MATERIALS SAMPLING

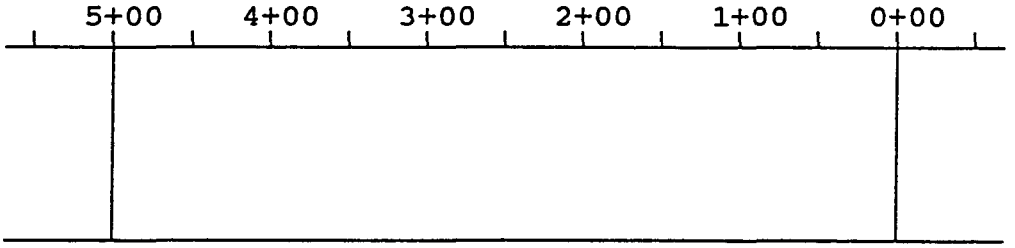
KDOT TEST SECTION NO. 7
SHRP TEST SECTION NO. 5
70-21 K-2609-01

PREPARED SUBGRADE



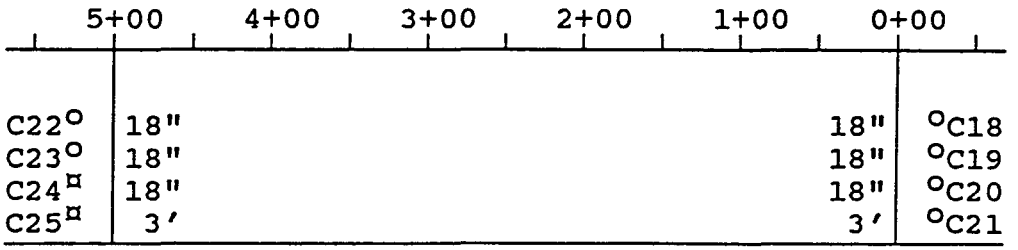
A7 - A9 (Four Foot Shelby Tubes) Date _____
T16 - T18 (In-Place Densities) Date _____
B10 (Bulk Sample, Moist. & Density) Date _____
S6 (Shoulder Probe) Date _____

LEAN CONCRETE BASE



BP7 (Compression Specimums) Date _____

CONCRETE PAVEMENT



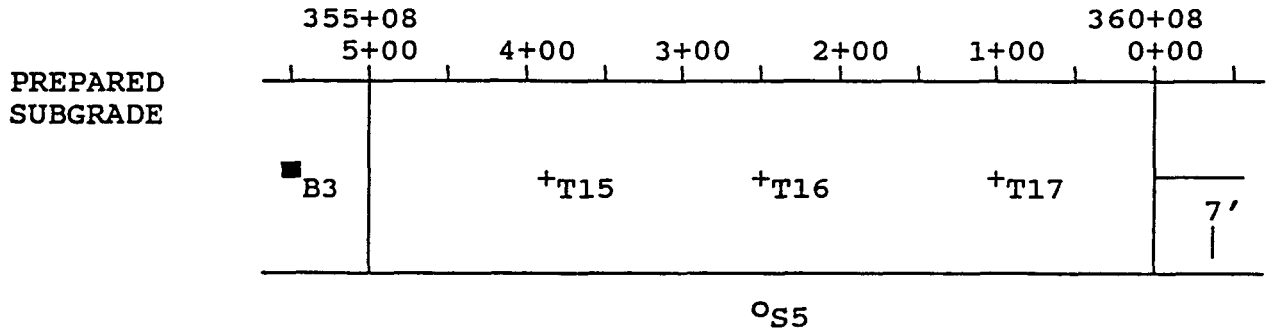
FC37 - FC54 (Beams, Cylinders & Tests) Date _____
C18 - C24* (Cores of Pavement & Base) Date _____
C24 - C25* (Cores of Pavement Only) Date _____

* Coring to be done by Headquarters Pavement Coring Crew

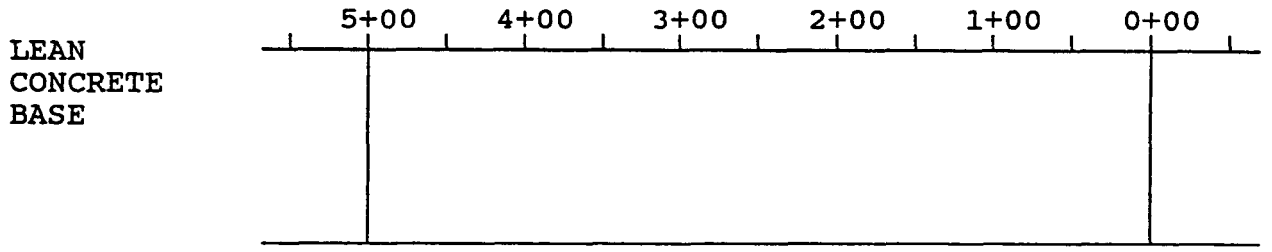
Figure 8. Materials Sampling and Testing Plan (cont.)

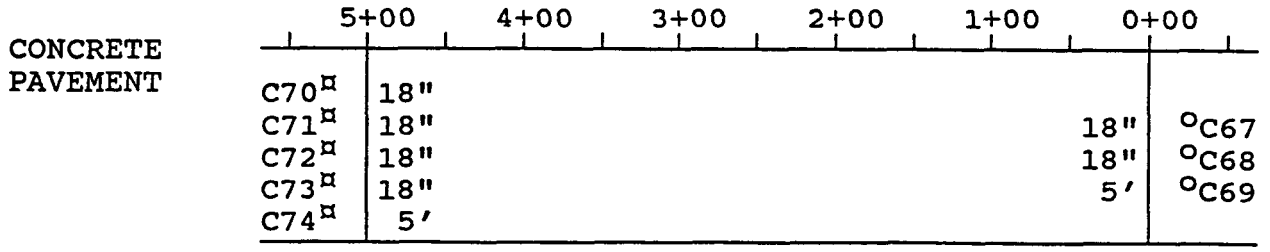
SPS-2 MATERIALS SAMPLING

KDOT TEST SECTION NO. 8
SHRP TEST SECTION NO. 6
70-21 K-2609-01



T15 - T17 (In-Place Densities) Date _____
B3 (Bulk Sample, Moist. & Density) Date _____
S5 (Shoulder Probe) Date _____





FC37 - FC54 (Beams, Cylinders & Tests) Date _____
C67 - C69* (Cores of Pavement & Base) Date _____
C70 - C74* (Cores of Pavement Only) Date _____

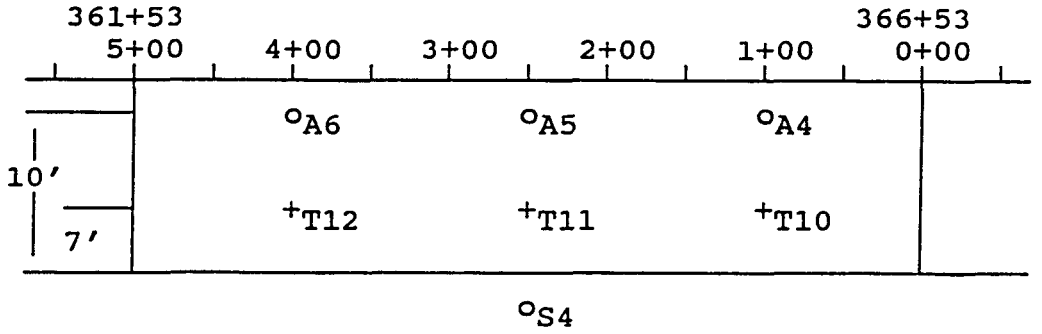
* Coring to be done by Headquarters Pavement Coring Crew

Figure 8. Materials Sampling and Testing Plan (cont.)

SPS-2 MATERIALS SAMPLING

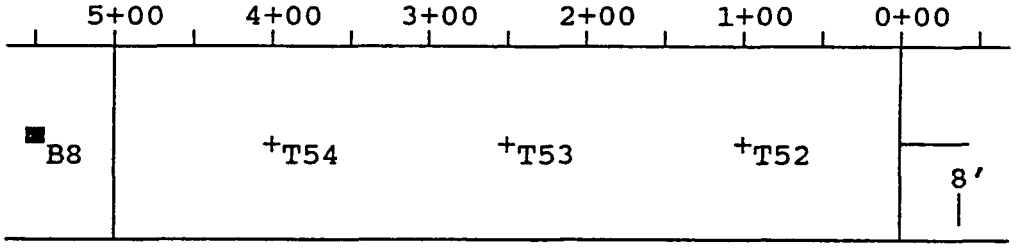
KDOT TEST SECTION NO. 9
SHRP TEST SECTION NO. 2
70-21 K-2609-01

PREPARED SUBGRADE



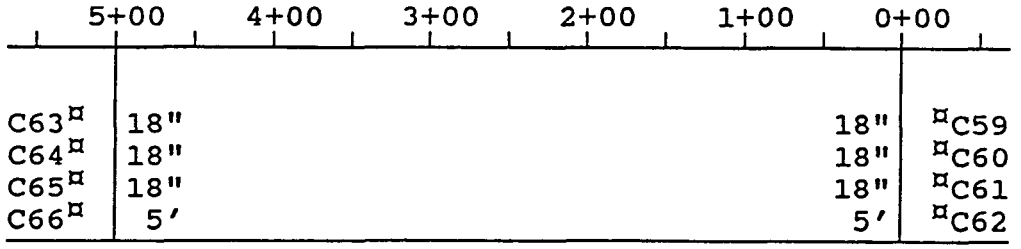
A4 - A6 (Four Foot Shelby Tubes) Date _____
T10 - T12 (In-Place Densities) Date _____
S4 (Shoulder Probe) Date _____

DENSE GRADED AGGREGATE BASE



T52 - T54 (In-Place Densities) Date _____
T53 (Plate Bearing Test) Date _____
B8 (2 x 2 Base Sample) Date _____

CONCRETE PAVEMENT



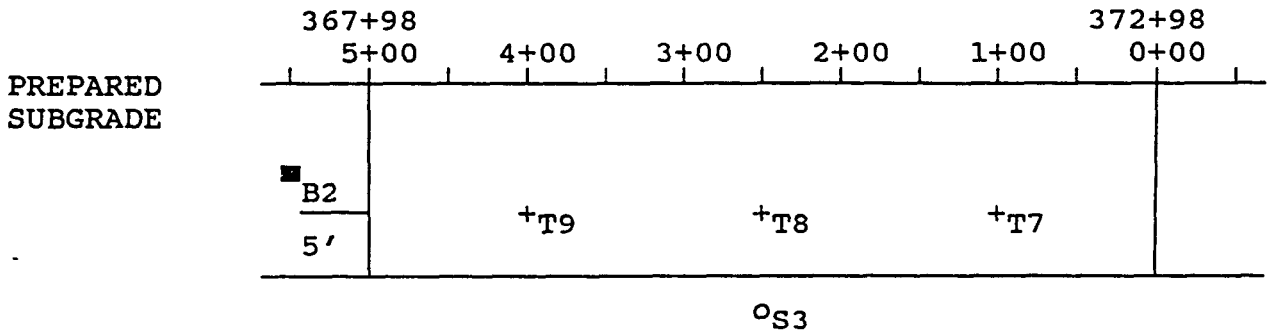
FC37 - FC54 (Beams, Cylinders & Tests) Date _____
C59 - C66* (Cores of Pavement Only) Date _____

* Coring to be done by Headquarters Pavement Coring Crew

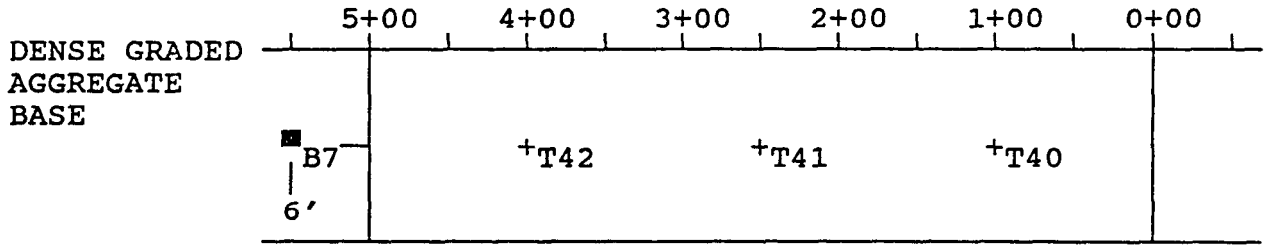
Figure 8. Materials Sampling and Testing Plan (cont.)

SPS-2 MATERIALS SAMPLING

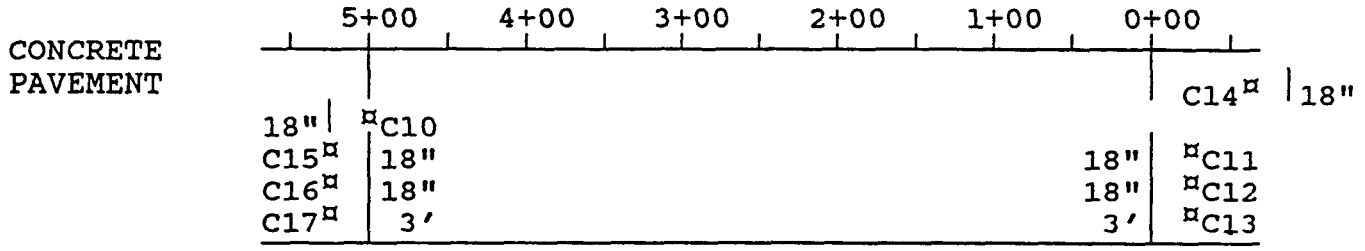
KDOT TEST SECTION NO. 10
SHRP TEST SECTION NO. 1
70-21 K-2609-01



T7 - T9 (In-Place Densities) Date _____
T8 (Plate Bearing Test)
B2 (Bulk Sample, Moist. & Density) Date _____
S3 (Shoulder Probe) Date _____



T40 - T42 (In-Place Densities) Date _____
T41 (Plate Bearing Test) Date _____
B7 (2 x 2 Aggregate Sample) Date _____



FC37 - FC54 (Beams, Cylinders & Tests) Date _____
C10 - C17* (Cores of Pavement Only) Date _____

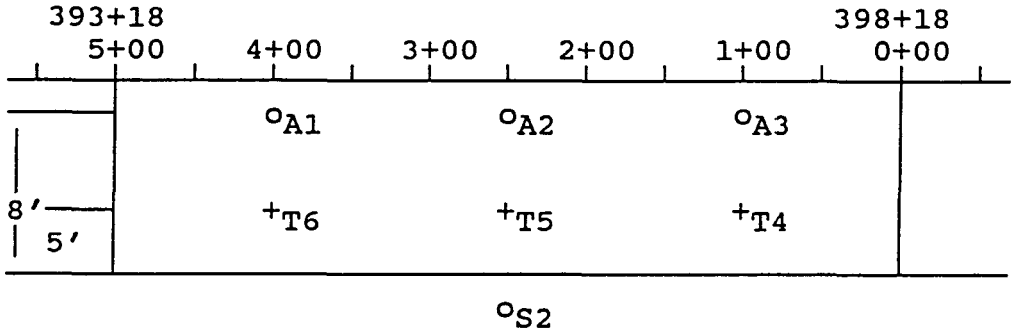
* Coring to be done by Headquarters Pavement Coring Crew SPS-2

Figure 8. Materials Sampling and Testing Plan (cont.)

MATERIALS SAMPLING

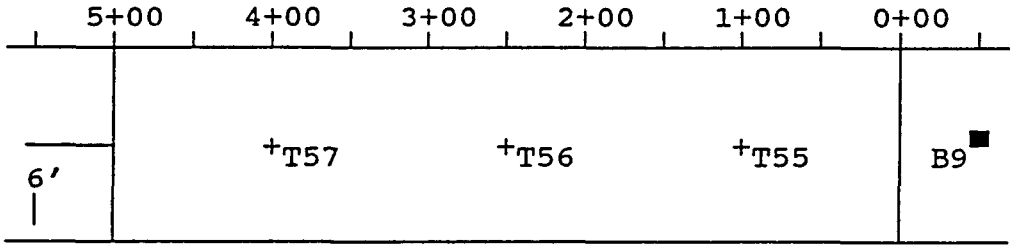
KDOT TEST SECTION NO. 11
SHRP TEST SECTION NO. 4
70-21 K-2609-01

PREPARED SUBGRADE



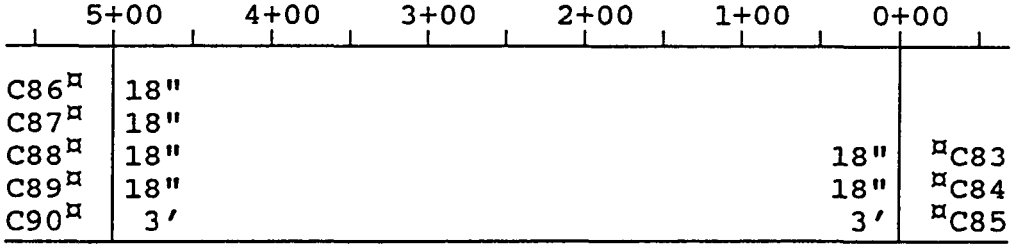
A1 - A3	(Four Foot Shelby Tubes)	Date _____
T4 - T6	(In-Place Densities)	Date _____
S2	(Shoulder Probe)	Date _____

DENSE GRADED AGGREGATE BASE



T55 - T57	(In-Place Densities)	Date _____
T56	(Plate Bearing Test)	Date _____
B9	(2 x 2 Aggregate Sample)	Date _____

CONCRETE PAVEMENT



FC37 - FC54	(Beams, Cylinders & Tests)	Date _____
C83 - C90*	(Cores of Pavement Only)	Date _____

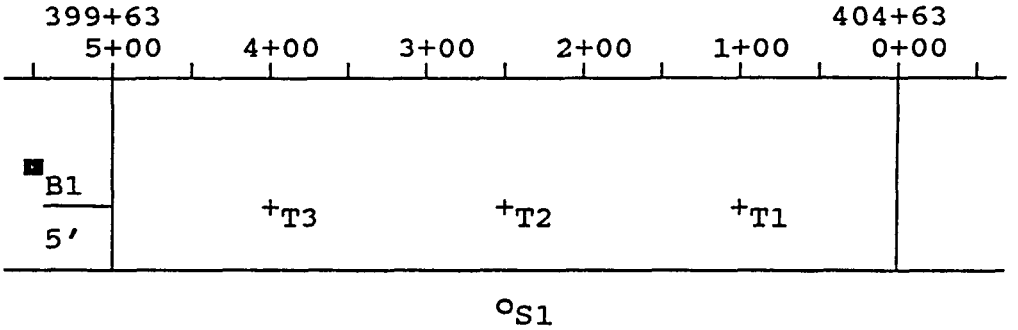
* Coring to be done by Headquarters Pavement Coring Crew

Figure 8. Materials Sampling and Testing Plan (cont.)

SPS-2 MATERIALS SAMPLING

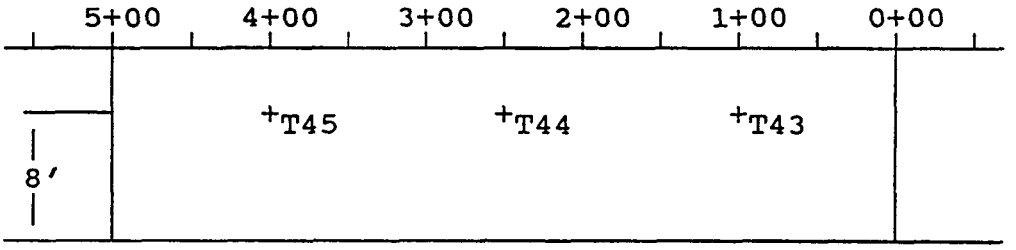
KDOT TEST SECTION NO. 12
SHRP TEST SECTION NO. 3
70-21 K-2609-01

PREPARED SUBGRADE



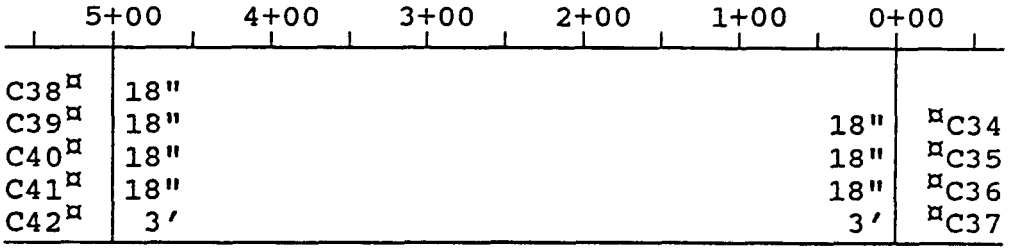
T1 - T3 (In-Place Densities) Date _____
B1 (Bulk Sample, Moist. & Density) Date _____
S1 (Shoulder Probe) Date _____

DENSE GRADED AGGREGATE BASE



T43 - T45 (In-Place Densities) Date _____
T44 (Plate Bearing Test) Date _____

CONCRETE PAVEMENT



FC37 - FC54 (Beams, Cylinders & Tests) Date _____
C34 - C42* (Cores of Pavement Only) Date _____

* Coring to be done by Headquarters Pavement Coring Crew

Figure 8. Materials Sampling and Testing Plan (cont.)

HAWKINS CONSTRUCTION COMPANY — PRIMAVERA PROJECT PLANNER — I-70 DICKINSON COUNTY KANSAS 1992

REPORT DATE 31JUL92 RUN NO. 33 — 2424 - KANSAS DEPARTMENT OF TRANPORTATION — START DATE 3FEB92 FIN DATE 25NOV92*

Schedule Report - Sorted by ES, TF — DATA DATE 31JUL92 PAGE NO. 1

ACTIVITY ID	ORIG DUR	REM DUR	PCT	CODE	ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	LATE START	LATE FINISH	TOTAL FLOAT
5	25	0	100		MOBILIZE EQUIPMENT	3FEB92A	13MAR92A			
10	9	0	100		PHASE I TRAF CONTROL	26FEB92A	27FEB92A			
35	28	0	100		PHASE II TRAF CONTROL	28FEB92A	6APR92A			
25	24	0	100		EB PATCH WORK	4MAR92A	4APR92A			
30	8	0	100		BUILD X-OVERS	9MAR92A	1APR92A			
15	19	0	100		SET-UP EQUIP/FINISH MOB.	16MAR92A	1MAY92A			
20	54	12	77		HAUL CONCRETE AGG	23MAR92A	17AUG92		20CT92	32
40	12	0	100		ASPH X-OVERS	26MAR92A	4APR92A			
50	6	0	100		RMV 3 FT SHLDR	6APR92A	10APR92A			
45	3	0	100		MODIFY G-RAIL	11APR92A	16APR92A			
55	7	0	100		EB ASPH OVERLAY	13APR92A	15APR92A			
70	12	0	100		DETOUR ASPH PATCH & OVERLAY	16APR92A	8MAY92A			
60	1	0	100		PHASE II TRAF HEAD TO HEAD	20APR92A	20APR92A			
65	8	0	100		WB RMV EXIST G-RAIL	20APR92A	23APR92A			
75	6	0	100		WB RMV ASPH SHLDRS	20APR92A	7MAY92A			
90	25	0	100		WB RMV PCC PAVE	21APR92A	7MAY92A			
95	25	0	100		WB TRIM/SALV ALL BASE	21APR92A	13JUN92A			
100	25	5	80		WB EMB WORK	24APR92A	6AUG92		6AUG92	0
120	28	0	100		WB FLY-ASH SBGR	27APR92A	30JUN92A			
105	28	0	100		WB BOX CULV EXT	29APR92A	6JUL92A			
85	12	0	100		BR REPAIR #30 & #31	5MAY92A	12JUN92A			
125	13	0	100		WB SUBBASE TO STA 269+00	5MAY92A	29MAY92A			
135	22	0	100		WB BR REPAIR #28 & #29	5MAY92A	10JUL92A			
130	8	0	100		WB PCC ML TO RMP	15MAY92A	12JUN92A			
135	1	0	100		WB CLOSE RAMPS	18MAY92A	18MAY92A			
145	3	0	100		WB RMV RAMPS	21MAY92A	21MAY92A			
155	6	0	100		WB RAMP FLY-ASH SUBGR	3JUN92A	10JUN92A			
165	6	0	100		WB RAMP SUBBASE	7JUN92A	12JUN92A			
110	30	0	100		WB RMV/RPLC FENCE	8JUN92A	27JUL92A			
150	4	0	100		WB PCC ML @ BRIDGE	17JUN92A	21JUN92A			
170	4	0	100		WB PCC RAMPS	18JUN92A	26JUN92A			
185	8	0	100		WB RAMP TIE-INS	19JUN92A	26JUN92A			
225	23	6	72		WB SHLDR EMB.	21JUN92A	7AUG92		6AUG92	-1
140	2	0	100		SHRP AGG BASE, #1 & #2	22JUN92A	27JUN92A			
162	2	0	100		SHRP BASE #3 & #4	25JUN92A	30JUN92A			
160	2	0	100		WB BASE ML @ 308+48	29JUN92A	1JUL92A			
180	7	0	100		S.H.P.P. SUBBASE #9-#12	30JUN92A	6JUL92A			
210	1	0	100		OPEN WB RAMPS	2JUL92A	2JUL92A			
215	1	0	100		SHRP PAVING #1 & #2	2JUL92A	2JUL92A			
205	2	0	100		FINISH ML STAB SUBBASE	5JUL92A	7JUL92A			
220	3	0	100		WB PCC ML; SHRP #3 & #4	5JUL92A	5JUL92A			
200	2	0	100		SHRP LEAN BASE #5-#9	9JUL92A	13JUL92A			
175	16	0	100		PCC BRIDGE APPR.	14JUL92A	24JUL92A			
235	2	0	100		SHRP PAVING #5-#10	17JUL92A	25JUL92A			

Figure 9. Construction Schedule

HAWKINS CONSTRUCTION COMPANY | PRIMAVERA PROJECT PLANNER | I-70 DICKINSON COUNTY KANSAS 1992

REPORT DATE 31JUL92 RUN NO. 33 | 2424 - KANSAS DEPARTMENT OF TRANPORTATION | START DATE 3FEB92 FIN DATE 25NOV92*

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ACTIVITY ID	ORIG DUR	REM DUR	PCT	CODE	ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	LATE START	LATE FINISH	TOTAL FLOAT
255	15	7	55		WB INSTALL G-RAIL	21JUL92A	10AUG92		7AUG92	-1
240	2	0	100		WB PCC ML	25JUL92A	25JUL92A			
245	2	0	100		SHPP PAVING #11 & #12	25JUL92A	28JUL92A			
260	6	4	30		WB CLEAN-UP	25JUL92A	7AUG92		7AUG92	0
115	10	5	50		SLOPE PROT/DITCH-LINER	27JUL92A	6AUG92		7AUG92	1
250	6	6	0		PHASE IV TRAF CONTROL	31JUL92	7AUG92	31JUL92	7AUG92	0
230	5	5	0		PHASE III TRAF SIGNS	31JUL92	6AUG92	3AUG92	7AUG92	1
265	1	1	0		SWITCH EB TO WB TRAF	10AUG92	10AUG92*	10AUG92	10AUG92*	0
270	6	6	0		EB RMV ASPH SHLDR	11AUG92	18AUG92	29JUL92	5AUG92	-9
275	8	8	0		EB RMV G-RAIL	11AUG92	20AUG92	29JUL92	7AUG92	-9
280	8	8	0		EB TRIM/SALV SHLDR BASE	11AUG92	20AUG92	29JUL92	7AUG92	-9
285	25	25	0		EB RMV PCC	19AUG92	24SEP92	11AUG92	16SEP92	-6
290	12	12	0		EB BR REPAIR #30 & #31	19AUG92	3SEP92	1SEP92	18SEP92	9
300	20	20	0		EB BOX CULV EXT.	21AUG92	21SEP92	20AUG92	18SEP92	-1
305	30	30	0		EB RMV/RPLC FENCE	21AUG92	5OCT92	2SEP92	15OCT92	8
295	25	25	0		EB TRIM/SALV ML BASE	24AUG92	29SEP92	11AUG92	16SEP92	-9
310	25	25	0		EB EMB WORK	24AUG92	29SEP92	11AUG92	16SEP92	-9
320	28	28	0		EB FLY-ASH SUBGR	25AUG92	5OCT92	12AUG92	22SEP92	-9
325	13	13	0		EB STAB SUBBASE TO BRIDGE	26AUG92	15SEP92	13AUG92	31AUG92	-7
445	11	11	0		EB PCC ML TO BRIDGE	8SEP92	22SEP92	25AUG92	10SEP92	-8
330	1	1	0		EB CLOSE RAMPS	11SEP92	11SEP92	2SEP92	2SEP92	-5
335	3	3	0		EB RMV RAMPS	14SEP92	16SEP92	3SEP92	9SEP92	-5
460	6	6	0		EB RAMP FLY-ASH SUBGR	15SEP92	22SEP92	8SEP92	15SEP92	-5
465	6	6	0		EB RAMP STAB SUBBASE	15SEP92	22SEP92	8SEP92	15SEP92	-5
340	3	3	0		EB STAB SUBBASE @ BRIDGE	16SEP92	18SEP92	1SEP92	3SEP92	-9
490	13	13	0		EB STAB SUBBASE ML	21SEP92	7OCT92	8SEP92	24SEP92	-9
315	10	10	0		EB SLOPE PROT/DITCH-LINER	22SEP92	5OCT92	21SEP92	2OCT92	-1
450	12	12	0		EB BRIDGE APPR	23SEP92	8OCT92	11SEP92	28SEP92	-8
455	22	22	0		BR REPAIR #28 & #29	23SEP92	22OCT92	16SEP92	15OCT92	-5
470	4	4	0		EB PCC RAMPS	23SEP92	28SEP92	16SEP92	21SEP92	-5
485	2	2	0		EB PCC ML @ BRIDGES	25SEP92	28SEP92	17SEP92	18SEP92	-6
475	8	8	0		EB RAMP TIE-INS	29SEP92	8OCT92	22SEP92	1OCT92	-5
500	20	20	0		FINISH SHLDR EMB.	29SEP92	27OCT92	22SEP92	19OCT92	-5
495	10	10	0		EB PCC ML FINISH	2OCT92	15OCT92	21SEP92	2OCT92	-9
520	18	18	0		CLEAN-UP/PUNCH LIST	2OCT92	29OCT92	21SEP92	14OCT92	-9
510	12	12	0		PREP PCC MEDIAN X-OVERS	2OCT92	19OCT92	23SEP92	14OCT92	-3
505	13	13	0		EB G-RAIL	9OCT92	23OCT92	29SEP92	15OCT92	-8
525	15	15	0		EB SEEDING	9OCT92	30OCT92	29SEP92	19OCT92	-8
480	1	1	0		EB OPEN RAMPS	9OCT92	9OCT92	2OCT92	2OCT92	-5
515	10	10	0		PAVT MARKINGS	16OCT92	30OCT92	5OCT92	16OCT92	-9
530	1	1	0		NORMAL TRAFFIC	3NOV92	3NOV92	2OCT92	2OCT92	-4
535	13	13	0		RMV X-OVERS	4NOV92	25NOV92	21OCT92	10NOV92	-9
540	15	15	0		WB SEEDING	4NOV92	30NOV92	21OCT92	13NOV92	-9
545	10	10	0		FINISH PAVT MARKINGS	4NOV92	19NOV92	21OCT92	4NOV92	-9

Figure 9. Construction Schedule (cont.)

HAWKINS CONSTRUCTION COMPANY | PRIMAVERA PROJECT PLANNER | I-70 DICKINSON COUNTY KANSAS 1992

REPORT DATE 31JUL92 RUN NO. 33 | 2424 - KANSAS DEPARTMENT OF TRANPORTATION | START DATE 3FEB92 FIN DATE 25NOV92*

Schedule Report - Sorted by ES, TF | DATA DATE 31JUL92 PAGE NO. 3

ACTIVITY ID	ORIG DUR	REM DUR	PCT	CODE	ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	LATE START	LATE FINISH	TOTAL FLOAT
550	3	3	0		FINAL JOB	16NOV92	18NOV92*	16NOV92	18NOV92*	0

Figure 9. Construction Schedule (cont.)

• COMMERCIAL
• INDUSTRIAL
• TRANSPORTATION
• UTILITIES
HAWKINS CONSTRUCTION COMPANY

LEAN CONCRETE BASE

DESCRIPTION: Lean Concrete Base (6")

DESIGN CRITERIA:

- Cement	Type II
- Yield	Compressive 500-750 PSI After 7 Day Cure
- Slump	1" - 3"
- Air Content	4 - 9%

AGGREGATE SOURCE:

Coarse Agg -	Walker Stone	CA-6
Fine Agg -	Konza Sand	MA-II

DESIGNED MIX:

Cement:	279 lb
Air:	6.2%
Unit wt:	135.4 PCF
Fine Agg:	2169 lb
Coarse Agg:	929 lb
Water:	280 lb
Air Ent:	0.7 oz

DESIGN DATA:

1) 4 mixes
2) 4 samples per mix
3) One 5 day break
   Three 7 day breaks

Figure 10. Lean Concrete Base Mix Design

MAILING ADDRESS
PO BOX 9008 STATION C
OMAHA NEBRASKA 68109

2512 DEER PARK BOULEVARD
OMAHA NEBRASKA
(402) 342 1607
FAX (402) 342 2221

• COMMERCIAL
• INDUSTRIAL
• TRANSPORTATION
• UTILITIES
HAWKINS CONSTRUCTION COMPANY

550 PSI FLEXURAL CONCRETE

DESIGN CRITERIA:

- Cement	Type II
- Yield	550 PSI ± 60 PSI After 14 Days *Third Point Loading
- Slump	1 3/4" ± 3/4"
- Coarse Agg	CA-6
- Fine Agg	MA-II
- Mixed Agg	55% Crushed Retained on #8 Sieve

MATERIAL SOURCE:

- Cement	LaFarge / Mo. Portland
- Coarse Agg.	Walker Stone "Limestone"
- Fine Agg.	Konza Sand
- Air Ent.	Prokrete Industries

DESIGNED MIX:

- Cement	532 Lb
- Coarse Agg.	891 Lb
- Fine Agg.	2,071 lb
- Air Ent.	2.6 oz
- Unit Wt	139.2 PCF
- Water	266 lbs

Figure 11. 550 psi Flexural Concrete Mix Design

MAILING ADDRESS
PO BOX 9008 STATION C
OMAHA NEBRASKA 68109

1512 DEER PARK BOULEVARD
OMAHA NEBRASKA
(402) 342 1607
FAX (402) 342 3221

• COMMERCIAL
• INDUSTRIAL
• TRANSPORTATION
• UTILITIES
HAWKINS CONSTRUCTION COMPANY

550 PSI FLEXURAL CONCRETE

DESIGN CRITERIA:

- Cement	Type II
- Yield	550 PSI ± 60 PSI After 14 Days *Third Point Loading
- Slump	1 3/4" ± 3/4"
- Coarse Agg	CA-6
- Fine Agg	MA-II
- Mixed Agg	55% Crushed Retained on #8 Sieve

MATERIAL SOURCE:

- Cement	LaFarge / Mo. Portland
- Coarse Agg.	Walker Stone "Limestone"
- Fine Agg.	Konza Sand
- Air Ent.	Prokrete Industries

DESIGNED MIX:

- Cement	532 Lb
- Coarse Agg.	891 Lb
- Fine Agg.	2,071 lb
- Air Ent.	2.6 oz
- Unit Wt	139.2 PCF
- Water	266 lbs

Figure 11. 550 psi Flexural Concrete Mix Design

MAILING ADDRESS
PO BOX 9008 STATION C
OMAHA NEBRASKA 68109

1512 DEER PARK BOULEVARD
OMAHA NEBRASKA
(402) 342 1607
FAX (402) 342 3321

• COMMERCIAL
• INDUSTRIAL
• TRANSPORTATION
• UTILITIES
HAWKINS CONSTRUCTION COMPANY

900 PSI FLEXURAL CONCRETE

DESIGN CRITERIA:

- Cement	Type II
- Yield	900 PSI ± 100 PSI After 14 Days *Third Point Loading
- Slump	1 3/4" ± 3/4"
- Coarse Agg	CA-6
- Fine Agg	MA-II
- Mixed Agg	55% Crushed Retained on #8 Sieve

MATERIAL SOURCE:

- Cement	LaFarge/Mo. Portland
- Coarse Agg.	Quartzite Quarry
- Fine Agg.	Konza Sand
- Air Entrainment	Prokrete Industries
- Water Reducer	Prokrete Industries

DESIGNED MIX:

- Cement	862 Lb
- Coarse Agg.	1,349 Lb
- Fine Agg.	1,347 Lb
- Air Content	7.7 oz
- Unit Weight	143 PCF
- Water	301 lb
- Water Reducer	43.1 oz

Figure 12. 900 psi Flexural Concrete Mix Design

MAILING ADDRESS
PO BOX 9008 STATION C
OMAHA NEBRASKA 68109

2512 DEER PARK BOULEVARD
OMAHA NEBRASKA
(402) 342 1607
FAX (402) 342 2221

Control Section KDOT #13

	Cost/Unit		Quanitity	Cost
Fly Ash	17.10	Ton	54.60	933.66
Manipulation	0.51	SqYd	2800.00	1428.00
Water	7.86	Mgal	27.80	218.51
Cement Subbase	1.53	SqYd	2800.00	4284.00
Water	8.13	Mgal	20.70	168.29
SS-1H	87.09	Ton	2.40	209.02
12" Unif. (AE)(Plain)	19.81	SqYd	1680.00	33280.80
12" Var. (AE)(plain)	14.02	SqYd	1120.00	15702.40
Contractor Staking	3000.00	Each	1.00	3000.00
			TOTAL	59224.68
	Cost per Square Yard (2800 Yd)			21.15

SHRP SECTION #1

	Cost/Unit		Quanitity	Cost
Fly Ash	17.10	Ton	54.60	933.66
Manipulation	0.51	SqYd	2835.80	1446.26
Water	7.86	Mgal	27.80	218.51
4" Dense-Graded Agg. Base	3.08	SqYd	2835.80	8734.26
4" Perm. Asph. Treated Base	22.84	Ton	527.90	12057.24
AC-10	91.45	Ton	12.90	1179.71
Perf. Drain Pipe	5.65	LnFt	1355.00	7655.75
Outlets	269.00	Each	1.00	269.00
8" Var. Conc. Pvmt. 550psi	10.49	SqYd	1173.30	12307.92
8" Unif. Conc. Pvmt. 550psi	10.66	SqYd	1760.00	18761.60
Contractor Staking	3414.00	Each	1.00	3414.00
			TOTAL	66977.90
	Cost per Square Yard (2835.8 Yd)			$23.62

Table 7. Costs for KDOT Control Section and Section 200201

SHRP SECTION #2

	Cost/Unit		Quanitity	Cost
Fly Ash	17.10	Ton	53.40	913.14
Manipulation	0.51	SqYd	2771.40	1413.41
Water	7.86	Mgal	27.20	213.79
4" Dense-Graded Agg. Base	3.08	SqYd	2771.40	8535.91
4" Perm. Asph. Treated Base	22.84	Ton	515.90	11783.16
AC-10	91.45	Ton	12.60	1152.27
Perf. Drain Pipe	5.65	LnFt	1335.00	7542.75
Outlets	269.00	Each	1.00	269.00
8" Var. Conc. Pvmt. 900psi	13.28	SqYd	1146.70	15228.18
8" Unif. Conc. Pvmt. 900psi	12.11	SqYd	1720.00	20829.20
Contractor Staking	3414.00	Each	1.00	3414.00
			TOTAL	71294.81
	Cost per Square Yard (2771.4 Yd)			$25.73

SHRP SECTION #3

	Cost/Unit		Quanitity	Cost
Fly Ash	17.10	Ton	54.60	933.66
Manipulation	0.51	SqYd	2835.80	1446.26
Water	7.86	Mgal	27.80	218.51
4" Dense-Graded Agg. Base	3.08	SqYd	2835.80	8734.26
4" Perm. Asph. Treated Base	22.84	Ton	527.90	12057.24
AC-10	91.45	Ton	12.90	1179.71
Perf. Drain Pipe	5.65	LnFt	1360.00	7684.00
Outlets	269.00	Each	1.00	269.00
11" Var. Conc. Pvmt. 550psi	13.13	SqYd	1173.30	15405.43
11" Unif. Conc. Pvmt. 550psi	13.33	SqYd	1760.00	23460.80
Contractor Staking	3414.00	Each	1.00	3414.00
			TOTAL	74802.86
	Cost per Square Yard (2835.8 Yd)			$26.38

Table 8. Costs for Section 200202 and 200203

SHRP SECTION #4

	Cost/Unit		Quanitity	Cost
Fly Ash	17.10	Ton	53.40	913.14
Manipulation	0.51	SqYd	2771.40	1413.41
Water	7.86	Mgal	27.20	213.79
4" Dense-Graded Agg. Base	3.08	SqYd	2771.40	8535.91
4" Perm. Asph. Treated Base	22.84	Ton	515.90	11783.16
AC-10	91.45	Ton	12.60	1152.27
Perf. Drain Pipe	5.65	LnFt	685.00	3870.25
Outlets	269.00	Each	1.00	269.00
11" Var. Conc. Pvmt. 900psi	13.98	SqYd	1146.70	16030.87
11" Unif. Conc. Pvmt. 900psi	15.00	SqYd	1720.00	25800.00
Contractor Staking	3414.00	Each	1.00	3414.00
			TOTAL	73395.80
	Cost per Square Yard (2771.4 Yd)			$26.48

SHRP SECTION #5

	Cost/Unit		Quanitity	Cost
Fly Ash	17.10	Ton	55.20	943.92
Manipulation	0.51	SqYd	2866.70	1462.02
Water	7.86	Mgal	28.10	220.87
6" Lean Conc. Base	7.58	SqYd	2866.70	21729.59
11" Var. Conc. Pvmt. 550psi	13.13	SqYd	1146.70	15056.17
11" Unif. Conc. Pvmt. 550psi	13.33	SqYd	1720.00	22927.60
Contractor Staking	3414.00	Each	1.00	3414.00
			TOTAL	65754.16
	Cost per Square Yard (2866.7 Yd)			$22.94

Table 9. Costs for Section 200204 and 200205

SHRP SECTION #6

	Cost/Unit		Quanitity	Cost
Fly Ash	17.10	Ton	55.20	943.92
Manipulation	0.51	SqYd	2866.70	1462.02
Water	7.86	Mgal	28.10	220.87
6" Lean Conc. Base	7.58	SqYd	2866.70	21729.59
11" Var. Conc. Pvmt. 900psi	13.98	SqYd	1146.70	16030.87
11" Unif. Conc. Pvmt. 900psi	15.00	SqYd	1720.00	25800.00
Contractor Staking	3414.00	Each	1.00	3414.00
			TOTAL	69601.26
	Cost per Square Yard (2866.7 Yd)			$24.28

SHRP SECTION #7

	Cost/Unit		Quanitity	Cost
Fly Ash	17.10	Ton	55.20	943.92
Manipulation	0.51	SqYd	2866.70	1462.02
Water	7.86	Mgal	28.10	220.87
6" Lean Conc. Base	7.58	SqYd	2866.70	21729.59
8" Var. Conc. Pvmt. 550psi	10.49	SqYd	1146.70	12028.88
8" Unif. Conc. Pvmt. 550psi	10.66	SqYd	1720.00	18335.20
Contractor Staking	3414.00	Each	1.00	3414.00
			TOTAL	58134.47
	Cost per Square Yard (2866.7 Yd)			$20.28

Table 10. Costs for Section 200206 and 200207

Cost per Square Yard (2866.7 Yd)		$20.28

SHRP SECTION #8

	Cost/Unit	Quanitity	Cost
Fly Ash	17.10 Ton	55.20	943.92
Manipulation	0.51 SqYd	2866.70	1462.02
Water	7.86 Mgal	28.10	220.87
6" Lean Conc. Base	7.58 SqYd	2866.70	21729.59
8" Var. Conc. Pvmt. 900psi	13.28 SqYd	1146.70	15228.18
8" Unif. Conc. Pvmt. 900psi	12.11 SqYd	1720.00	20829.20
Contractor Staking	3414.00 Each	1.00	3414.00
		TOTAL	63827.77
Cost per Square Yard (2866.7 Yd)			$22.27

SHRP SECTION #9

	Cost/Unit	Quanitity	Cost
Fly Ash	17.10 Ton	55.20	943.92
Manipulation	0.51 SqYd	2866.70	1462.02
Water	7.86 Mgal	28.10	220.87
6" Dense-Graded Agg. Base	3.07 SqYd	2866.70	8800.77
8" Var. Conc. Pvmt. 900psi	13.28 SqYd	1146.70	15228.18
8" Unif. Conc. Pvmt. 900psi	12.11 SqYd	1720.00	20829.20
Contractor Staking	3414.00 Each	1.00	3414.00
		TOTAL	50898.95
Cost per Square Yard (2866.7 Yd)			$17.76

Table 11. Costs for Section 200208 and 200209

SHRP SECTION #10

	Cost/Unit		Quanitity	Cost
Fly Ash	17.10	Ton	55.20	943.92
Manipulation	0.51	SqYd	2866.70	1462.02
Water	7.86	Mgal	28.10	220.87
6" Dense-Graded Agg. Base	3.07	SqYd	2866.70	8800.77
8" Var. Conc. Pvmt. 550psi	10.49	SqYd	1146.70	12028.88
8" Unif. Conc. Pvmt. 550psi	10.66	SqYd	1720.00	18335.20
Contractor Staking	3414.00	Each	1.00	3414.00
			TOTAL	45205.66
	Cost per Square Yard (2866.7 Yd)			$15.77

SHRP SECTION #11

	Cost/Unit		Quanitity	Cost
Fly Ash	17.10	Ton	55.20	943.92
Manipulation	0.51	SqYd	2866.70	1462.02
Water	7.86	Mgal	28.10	220.87
6" Dense-Graded Agg. Base	3.07	SqYd	2866.70	8800.77
11" Var. Conc. Pvmt. 900psi	13.98	SqYd	1146.70	16030.87
11" Unif. Conc. Pvmt. 900psi	15.00	SqYd	1720.00	25800.00
Contractor Staking	3414.00	Each	1.00	3414.00
			TOTAL	56672.44
	Cost per Square Yard (2866.7 Yd)			$19.77

Table 12. Costs for Section 200210 and 200211

SHRP SECTION #12

	Cost/Unit		Quanitity	Cost
Fly Ash	17.10	Ton	56.50	966.15
Manipulation	0.51	SqYd	2933.30	1495.98
Water	7.86	Mgal	28.80	226.37
6" Dense-Graded Agg. Base	3.07	SqYd	2933.30	9005.23
11" Var. Conc. Pvmt. 550psi	13.13	SqYd	1173.30	15405.43
11" Unif. Conc. Pvmt. 550psi	13.33	SqYd	1760.00	23460.80
Contractor Staking	3414.00	Each	1.00	3414.00
			TOTAL	53973.96
	Cost per Square Yard (2933.3 Yd)			$18.40

Table 13. Costs for Section 200212