



Illinois Department of Transportation

To: Masood Ahmad Attn: Becky Marruffo
From: Jack A. Elston By: Michael Brand *Michael Brand*
Subject: Pavement Design Approval
Date: August 11, 2021

Route: IL 40 Job No.: P-92-001-08
Section: 9TS & M-2 Contract No.: 64D78
County: Whiteside Target Letting:
Limits: North of LeFevre Road to Lynn Boulevard in Sterling, IL

The Pavement Selection Committee met on August 10, 2021 to review the pavement design for the above referenced project. The approximately 0.53 mile long project involves complete replacement of the pavement.

The pavement design resulted in two options: 10" full-depth HMA and 9" jointed PCC. The life cycle cost analysis showed the options to be within 10% of each other; however, the District was recommending the use of concrete due to the commercial traffic and land use along the roadway. The committee discussed the issues along with performance of the current pavement and agreed with the District in the use of concrete.

In summary, the approved pavement design is:

IL 40 - Replacement
9" Jointed PCC with tied C&G
12" ASI

If you have any questions, please contact Mike Brand at (217) 782-7651.



Illinois Department of Transportation

Memorandum

To: Jack Elston Attn: Michael Brand
From: Masood Ahmad By: Rebecca Marruffo
Subject: Pavement Design Renewal
Date: August 10, 2021

FAP Route 646 (IL 40)
Section 9TS & M-2
Whiteside County
P-92-001-08
Contract No. 64D78

This project consists of the complete pavement reconstruction of IL 40 from North of LeFevre Rd. to Lynn Boulevard in Sterling.

Attached is the pavement selection analysis for the subject section. This section consists of approximately 16,250 square yards of new pavement for approximately 0.53 miles.

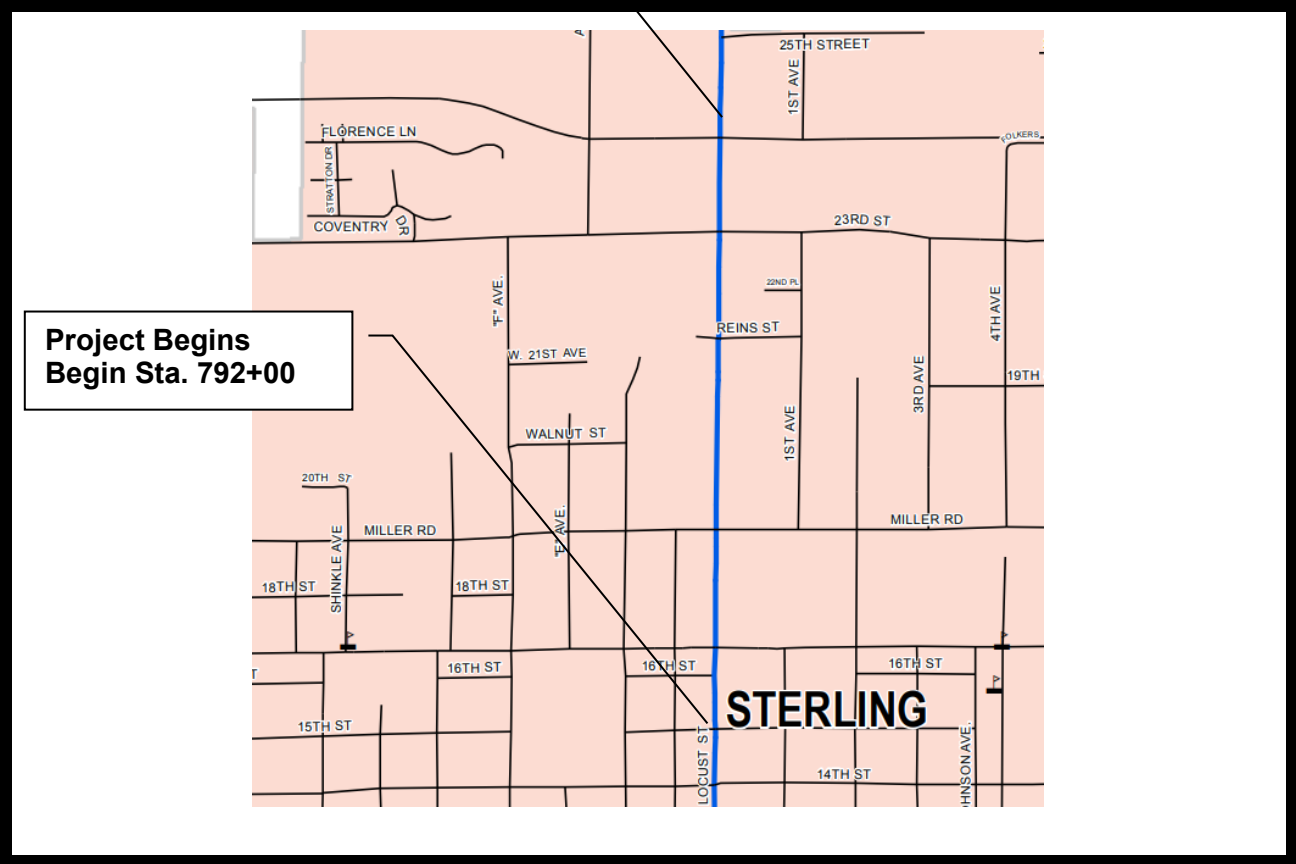
Mechanistic Pavement Design indicates that HMA pavement presents the lowest annual life cycle costs, providing a 4% annual cost savings versus a rigid pavement design. The recommended design consists of a 10" HMA full depth pavement.

However for the various reasons listed below the district would like to use the Rigid pavement thickness of 9".

- High truck traffic count with several industrial generators located North of project limits.
- 3 signalized intersections
- Numerous commercial entrances
- Being able to tie the concrete C&G to the pavement.
- Existing subgrade is very poor.
- Already approved pavement design favoring PCC Pavement
- City Of Sterling would like to see this portion PCC Pavement

If you have any questions or need additional information, please contact Brad Cushman at extension 815-284-996.

**Project Ends
Begin Sta. 834+40**



**Project Begins
Begin Sta. 792+00**

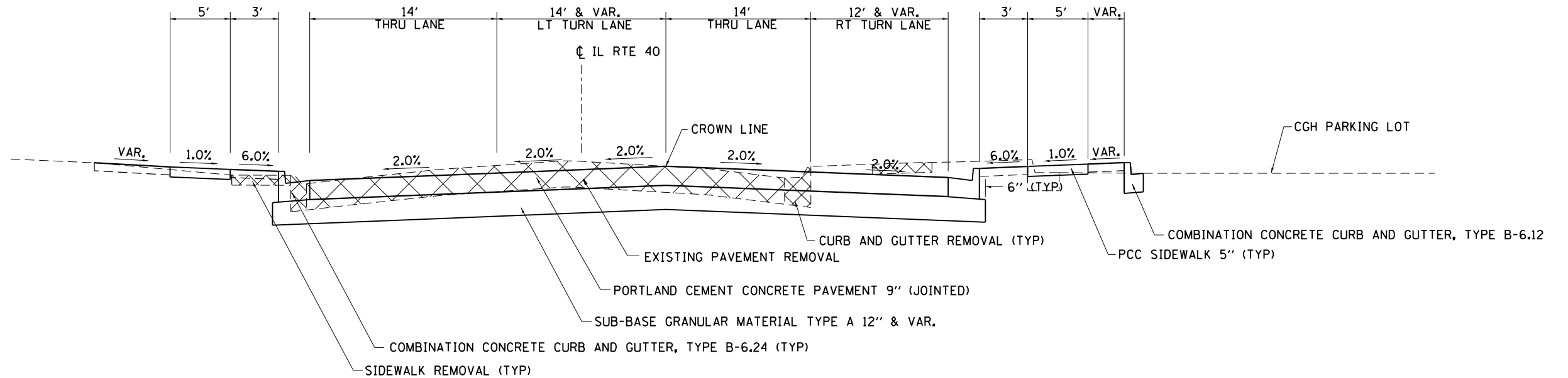
LOCATION MAP

**FAP ROUTE 646 (IL 40)
SECTION 9R & 9RS-3
WHITESIDE COUNTY
JOB NO. D-92-001-08
CONTRACT NO. 64D78
SEQUENCE NO. 16334A
LETTING NOVEMBER 5TH, 2021**

Reconstruction & Resurfacing IL 40 FROM 0.1 Mile North of Lynn Blvd. to 0.1 Mile South of LeFevre Rd. in Sterling.

TYPICAL SECTIONS

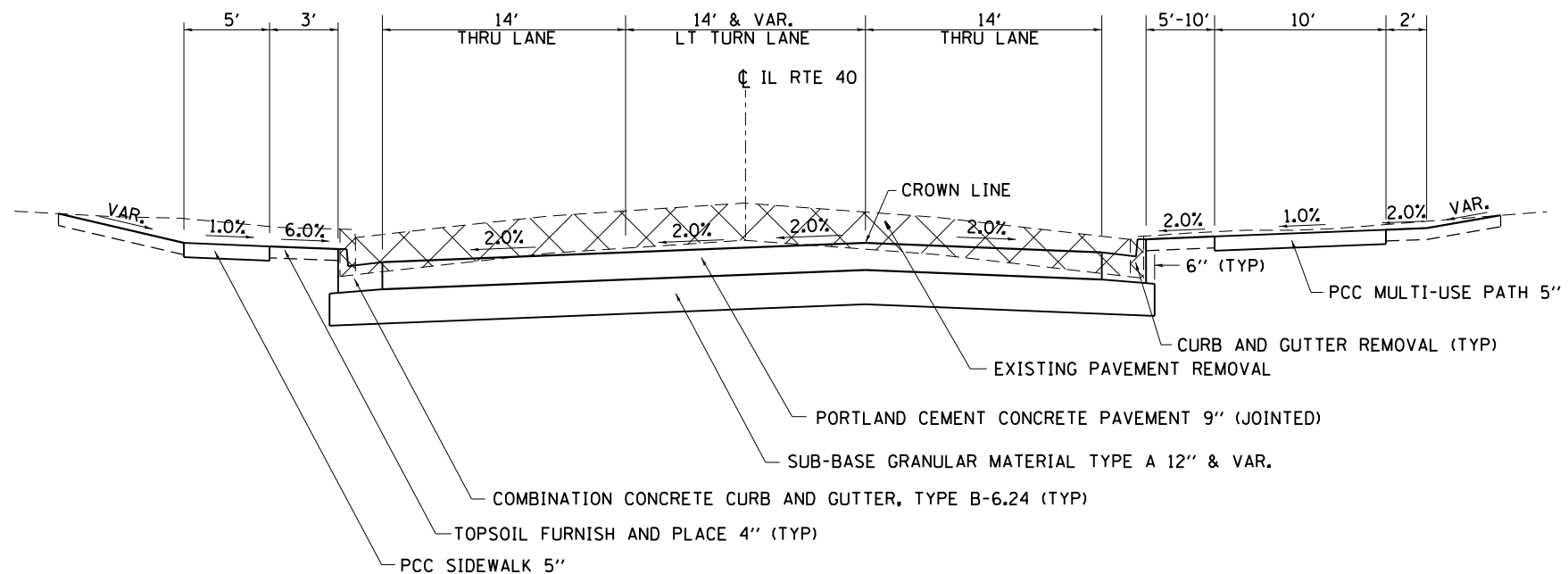
STA. 802+10.21 - 805+05.82



PROTECTIVE COAT:

IF CURB AND GUTTER OR PCC PAVEMENT IS CONSTRUCTED AFTER OCTOBER 15TH AND THE ROAD WILL BE OPEN TO TRAFFIC PRIOR TO THE FOLLOWING APRIL 15TH, PROTECTIVE COAT SHALL BE INSTALLED.

STA. 805+05.82 - 825+80.56



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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

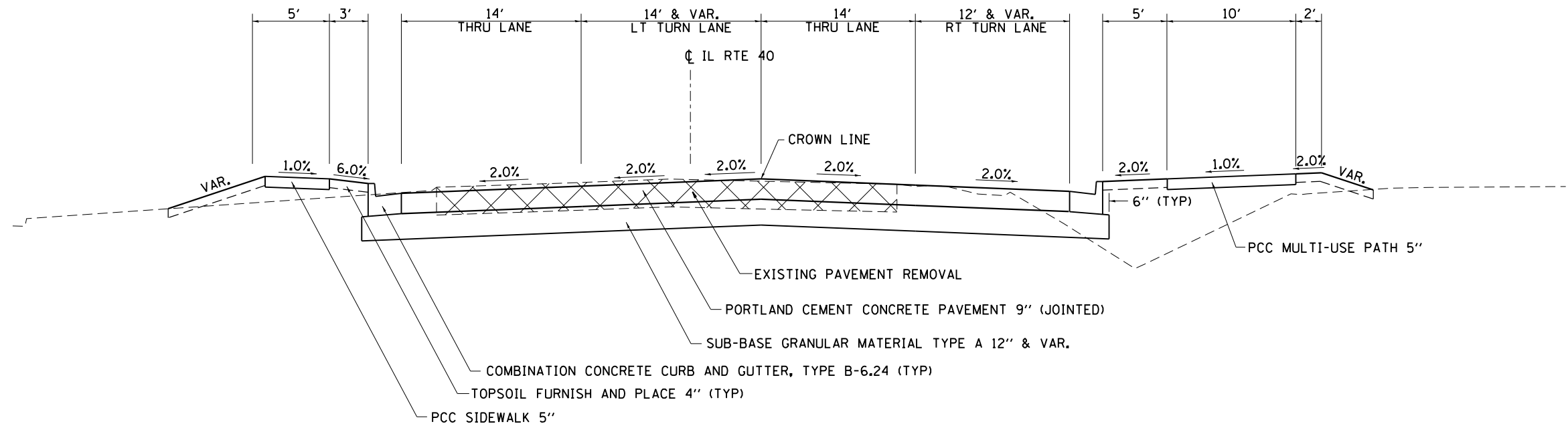
TYPICAL SECTIONS

SCALE: SHEET NO. OF SHEETS STA. TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

TYPICAL SECTIONS

STA. 825+80.56 - 829+40



PROTECTIVE COAT:

IF CURB AND GUTTER OR PCC PAVEMENT IS CONSTRUCTED AFTER OCTOBER 15TH AND THE ROAD WILL BE OPEN TO TRAFFIC PRIOR TO THE FOLLOWING APRIL 15TH, PROTECTIVE COAT SHALL BE INSTALLED.

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

TYPICAL SECTIONS

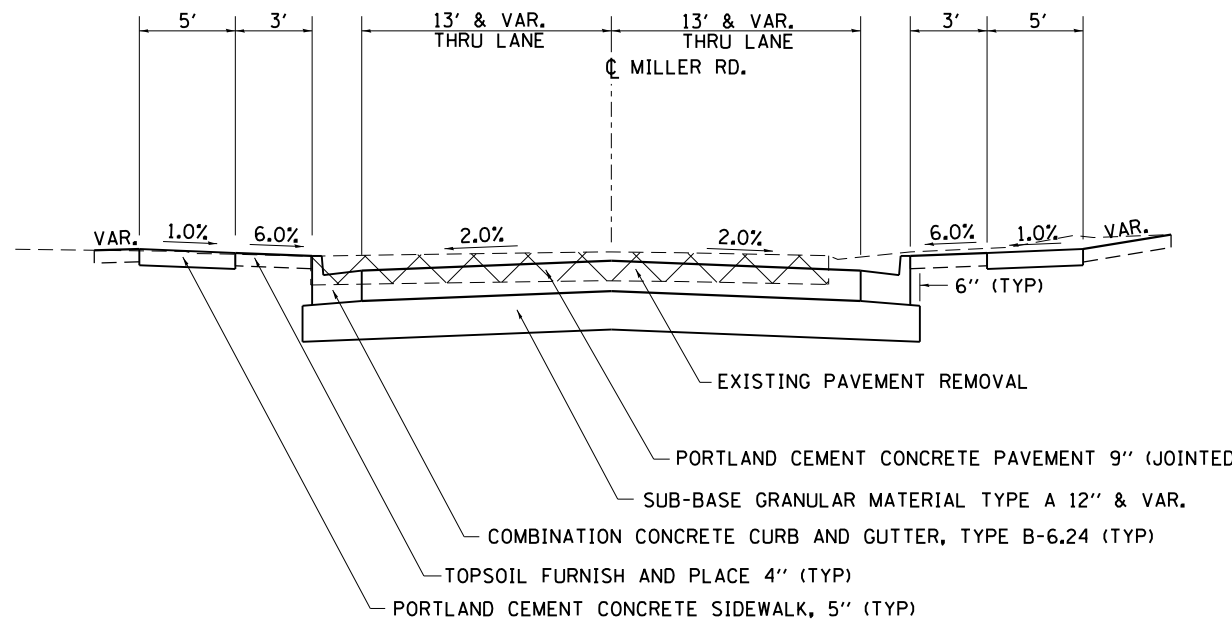
SCALE: SHEET NO. OF SHEETS STA. TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

TYPICAL SECTIONS

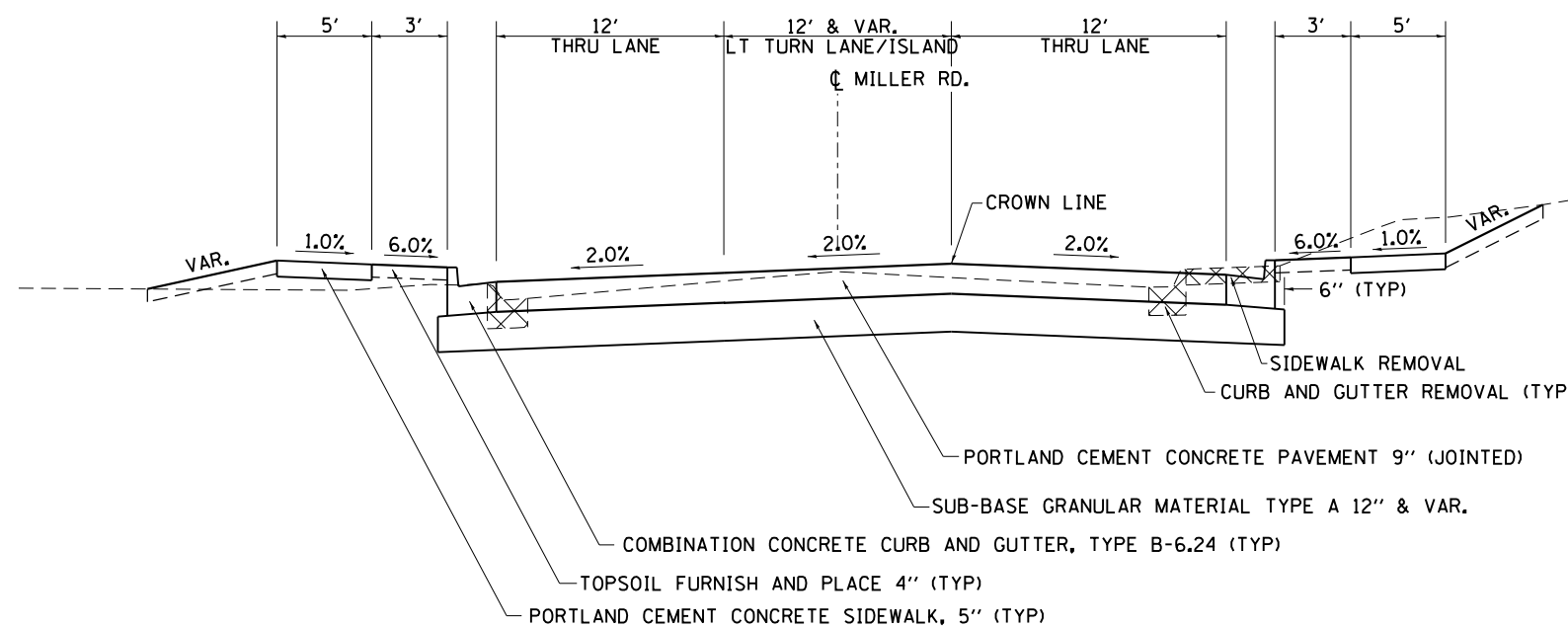
MILLER RD.

STA. 998+09.71 - 999+40.93



MILLER RD.

STA. 1001+33.69 - 1002+49.71



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		CHECKED -	REVISED -
		DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

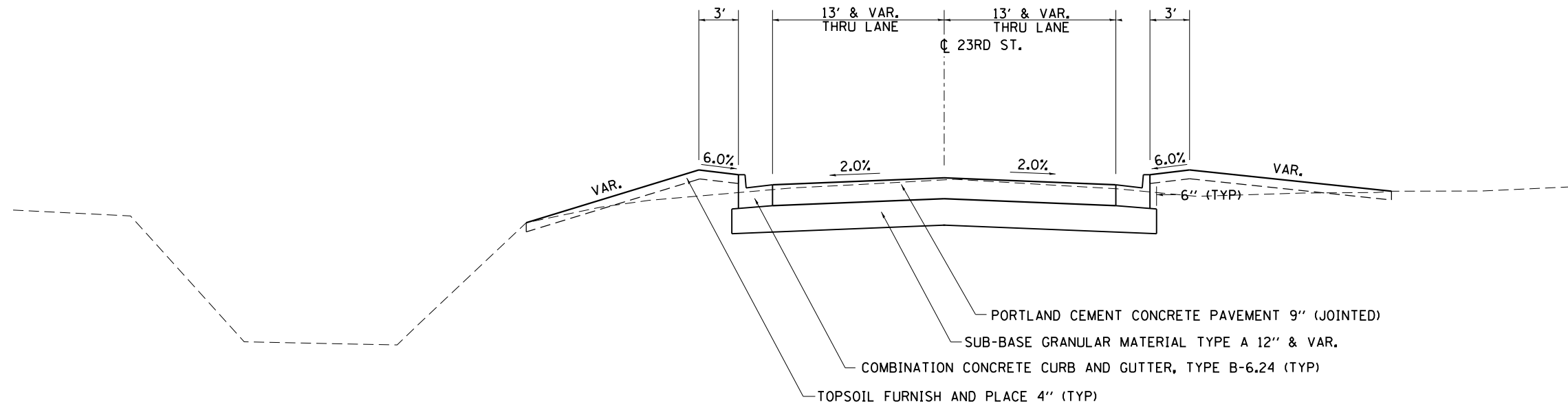
TYPICAL SECTIONS

SCALE: SHEET NO. OF SHEETS STA. TO STA.

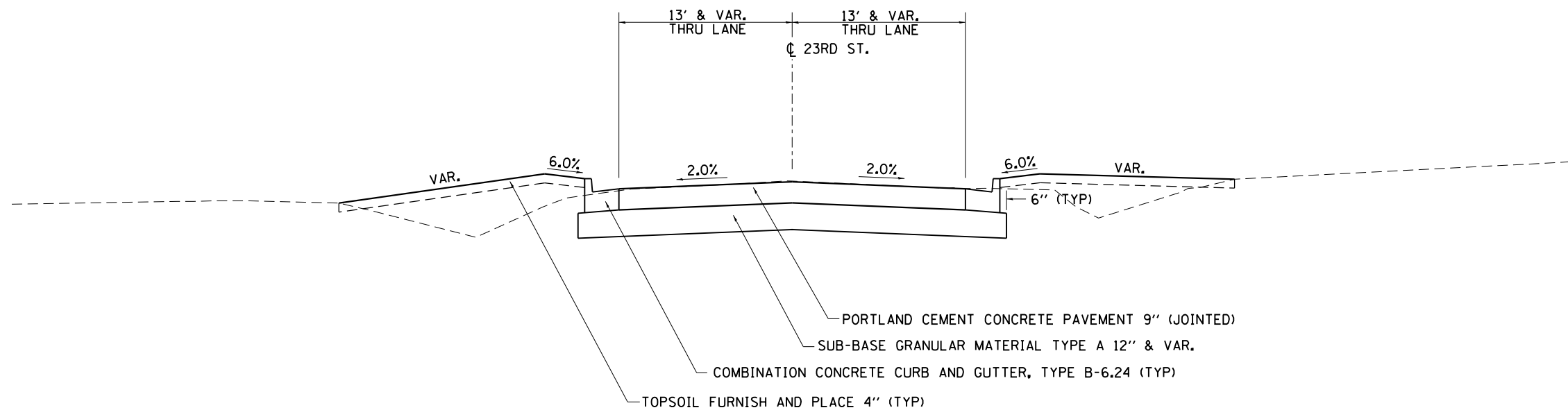
F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

TYPICAL SECTIONS

WEST 23RD ST.
STA. 1198+31.53 - 1199+31.52



EAST 23RD ST.
STA. 1200+69.02 - 1202+00



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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

TYPICAL SECTIONS

SCALE: SHEET NO. OF SHEETS STA. TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE FAP 646 (IL 40)
 SECTION 9R & 9RS-3
 COUNTY Whiteside
 LOCATION Sterling

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 2830 FT ==> 0.54 Miles
 # OF CENTERLINES 1 CL
 # OF LANES 3 LANES
 # OF EDGES 2 EP
 LANE WIDTH - AVERAGE 12 FT
 SHOULDER WIDTH HMA Left 0 FT
 HMA Right 0 FT
 Total Width of Paved Shoulders 0 FT

PAVEMENT THICKNESS (FLEXIBLE) 10.00 IN 14.75 IN MAX
 SHOULDER THICKNESS 8.00 IN HMA_SD Standard Design
 HMA OVERLAY THICKNESS 2.00 IN

FLEX PAVEMENT TRAFFIC FACTORS MINIMUM ACTUAL USE
 3.17 2.27 3.17

Read Me!

HMA COST PER TON UNIT PRICE
 HMA SURFACE \$111.00 / TON
 HMA TOP BINDER \$92.00 / TON
 HMA LOWER BINDER \$92.00 / TON
 HMA BINDER (IL-9.5FG or IL-4.75) \$92.00 / TON
 HMA SHOULDER / TON

INITIAL COSTS ITEM	THICKNESS	100% QUAI UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(10.00")	16250 16,250 SQ YD *	\$54.85 / SQ YD	\$0
HMA SURFACE COURSE	(2.00")	1,0046 1,820 TONS *	\$111.00 / TON	\$202,020 ~
HMA TOP BINDER COURSE	(2.25")	1,0145 2,048 TONS *	\$92.00 / TON	\$188,416 ~
HMA LOWER BINDER COURSE	(5.75")	1,0330 5,233 TONS *	\$92.00 / TON	\$481,436 ~
HMA SHOULDER CURB & GUTTER	(8.00")	0 0 TONS * 6,926 LIN FT *	\$0.00 / TON \$33.00 / LIN FT	\$0 ~ \$228,558
SUBBASE GRAN MATL TY C (TONS) IMPROVED SUBGRADE:	Aggregate Width = 51.7	30 TONS 16,250 SQ YD *	\$0.00 / TON \$20.00 / SQ YD	\$0 \$325,000
Reserved For User Supplied Item		0 UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item		0 UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL		7,232 SQ YD *	\$11.00 / SQ YD	\$79,552
SHOULDER REMOVAL		0 SQ YD *	\$0.00 / SQ YD	\$0

Note: * Denotes User Supplied Quantity
 FLEXIBLE CONSTRUC' \$1,504,982
 FLEXIBLE CONSTRUC' \$114,520

MAINTENANCE COSTS: ITEM	THICKNESS	MATERIAL T	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			\$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	1,0046 Surface Iv 2.00	\$111.00 / TON
HMA OVERLAY PVMT	(2.00")	1,0046 2.00	\$111.00 / TON
HMA SURFACE MIX	(2.00")	1,0046 Surface Iv 2.00	\$111.00 / TON
HMA BINDER MIX	(0.00")	1,0093 IL-9.5FG or I 0.00	\$92.00 / TON
HMA OVERLAY SHLD (Year 30)	(2.00")	Shoulder 2.00	\$0.00 / TON
HMA OVERLAY SHLD	(2.00")	Shoulder 2.00	\$0.00 / TON
MILLING (2.00 IN)		2.00	\$2.25 / SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill Surf)	Surface Iv 2.00	\$81.68 / SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder 2.00	\$69.25 / SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00 ")	Binder Mix 2.00	\$79.55 / SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")	Shoulder 2.00	\$69.25 / SQ YD

LONGITUDINAL SHOULDER JOINT ROUT & SEAL
CENTERLINE JOINT ROUT & SEAL
RANDOM / THERMAL CRACK ROUT & SEAL

(100% Ref \$2.00 / LIN FT
\$2.00 / LIN FT
\$2.00 / LIN FT

FLEXIBLE TOTAL LIFE- \$1,875,652
FLEXIBLE TOTAL ANNI \$142,726

PCC PAVEMENT

JPCP

ROUTE FAP 646 (IL 40)
 SECTION 9R & 9RS-3
 COUNTY Whiteside
 LOCATION Sterling

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 2830 FT ==> 0.54 Miles
 # OF CENTERLINES 1 CL
 # OF LANES 3 LANES
 # OF EDGES 2 EP
 LANE WIDTH - AVERAGE 12 FT
 SHOULDER WIDTH PCC Left 0 FT
 PCC Right 0 FT
 Total Width of Paved Shoulders 0 FT

PAVEMENT THICKNESS (RIGID) JPCP 9.00 IN TIED SHLD
 SHOULDER THICKNESS 9.00 IN

HMA OVERLAY THICKNESS 2.75 IN

RIGID PAVEMENT TRAFFIC FACTORS MINIMUM ACTUAL USE
 4.59 3.15 4.59

Worksheet Construction Type is New Construction The Pavement Type is JPCP

INITIAL COSTS ITEM	THICKNESS	100% QUA UNIT	UNIT PRICE	COST
JPC PAVEMENT	(9.00")	16,250 SQ YD *	\$65.00 / SQ YD	\$1,056,250
PAVEMENT REINFORCEMENT		0 SQ YD	\$0.00 / SQ YD	\$0
STABILIZED SUBBASE	(4.00")	0 SQ YD *	\$0.00 / SQ YD	\$0
PCC SHOULDERS	(9.00" to 9.00")	0 SQ YD *	\$0.00 / SQ YD	\$0
CURB & GUTTER		6,926 LIN FT *	\$33.00 / LIN FT	\$228,558
SUBBASE GRAN MATL TY C	(~ 0.00")	0 TONS *	\$0.00 / TON	\$0
IMPROVED SUBGRADE:	Aggregate Width = 51.7	16,250 SQ YD *	\$20.00 / SQ YD	\$325,000
Reserved For User Supplied Item		0 UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item		0 UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL		7,232 SQ YD *	\$11.00 / SQ YD	\$79,552
SHOULDER REMOVAL		0 SQ YD *	\$0.00 / SQ YD	\$0

Note: * Denotes User Supplied Quantity
 RIGID CONSTRUCTION \$1,689,360
 RIGID CONSTRUCTION \$128,550

MAINTENANCE COSTS: ITEM	THICKNESS	MATERIAL	T	UNIT COST
ROUTINE MAINTENANCE ACTIVITY				\$0.00 / LANE-MILE / YEAR
HMA OVERLAY	(2.75")		2.75	
HMA OVERLAY PAVEMENT	(2.75")	1.0064	2.75	\$15.86 / SQ YD
HMA SURFACE MIX	(1.50")	1.0035	Surface M 1.50	\$9.36 / SQ YD
HMA BINDER MIX	(1.25")	1.0098	IL-9.5FG or I 1.25	\$6.50 / SQ YD
HMA OVERLAY SHOULDER	(2.75")		Shoulder 2.75	\$0.00 / SQ YD
CLASS A PAVEMENT PATCHING				\$0.00 / SQ YD
CLASS B PAVEMENT PATCHING				\$165.00 / SQ YD
CLASS C SHOULDER PATCHING				\$0.00 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface M	1.50	\$78.57 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.75")		Surface M	2.75	\$86.34 / SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				\$2.00 / LIN FT
CENTERLINE JOINT ROUT & SEAL				\$2.00 / LIN FT
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL				\$2.00 / LIN FT
RANDOM CRACK ROUT & SEAL		(100% Rehab = 100.00' /		\$2.00 / LIN FT

RIGID TOTAL LIFE-C \$1,950,760
 RIGID TOTAL ANNUAL \$148,441

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Re #####

		JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT ' \$1,689,360	\$1,504,982
		ANNUAL C \$128,550	\$114,520
MAINTENANCE	LIFE-CYCLE COST	PRESENT ' \$261,400	\$370,670
		ANNUAL C \$19,891	\$28,206
TOTAL	LIFE-CYCLE COST	PRESENT ' \$1,950,760	\$1,875,652
		ANNUAL C \$148,441	\$142,726

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	===== HMA	\$142,726	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PE JPCP	\$148,441	4.0%

FULL-DEPTH HMA PAVEMENT
 HMA PAVEMENT OVER RUBBLIZED PCC PAVEMENT
 Figure 54-7.C
 STANDARD DESIGN

MAINTENANCE ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 5						
LONG SHLD JT R&S	100.00%	5,660	LIN FT	\$2.00	\$11,320	
CNTR LINE JOINT R&S	100.00%	2,830	LIN FT	\$2.00	\$5,660	
RNDM / THRM CRACK R&S	50.00%	4,670	LIN FT	\$2.00	\$9,340	
PD PVMT PATCH M&F SURF	0.10%	16	SQ YD	\$81.68	\$1,307	
PWFn =	0.8626		PW =	0.8626 X	\$27,627	\$23,831
YEAR 10						
LONG SHLD JT R&S	100.00%	5,660	LIN FT	\$2.00	\$11,320	
CNTR LINE JOINT R&S	100.00%	2,830	LIN FT	\$2.00	\$5,660	
RNDM / THRM CRACK R&S	50.00%	4,670	LIN FT	\$2.00	\$9,340	
PD PVMT PATCH M&F SURF	0.50%	81	SQ YD	\$81.68	\$6,616	
PWFn =	0.7441		PW =	0.7441 X	\$32,936	\$24,507
YEAR 15						
MILL PVMT & SHLD 2.00"	100.00%	16,250	SQ YD	\$2.25	\$36,563	
PD PVMT PATCH M&F ADD'L 2.00"	1.00%	163	SQ YD	\$79.55	\$12,967	
HMA OVERLAY PVMT 2.00"	100.00%	1,828	TON	\$111.00	\$202,955	
HMA OVERLAY SHLD 2.00 "	100.00%	0	TON	\$0.00	\$0	
PWFn =	0.6419		PW =	0.6419 X	\$252,485	\$162,061
YEAR 20						
LONG SHLD JT R&S	100.00%	5,660	LIN FT	\$2.00	\$11,320	
CNTR LINE JOINT R&S	100.00%	2,830	LIN FT	\$2.00	\$5,660	
RNDM / THRM CRACK R&S	50.00%	4,670	LIN FT	\$2.00	\$9,340	
PD PVMT PATCH M&F SURF	0.10%	16	SQ YD	\$81.68	\$1,307	
PWFn =	0.5537		PW =	0.5537 X	\$27,627	\$15,296
YEAR 25						
LONG SHLD JT R&S	100.00%	5,660	LIN FT	\$2.00	\$11,320	
CNTR LINE JOINT R&S	100.00%	2,830	LIN FT	\$2.00	\$5,660	
RNDM / THRM CRACK R&S	50.00%	4,670	LIN FT	\$2.00	\$9,340	
PD PVMT PATCH M&F SURF	0.50%	81	SQ YD	\$81.68	\$6,616	
PWFn =	0.4776		PW =	0.4776 X	\$32,936	\$15,730
YEAR 30						
NON-INTERSTATE						
MILL PVMT & SHLD 2.00"	100.00%	16,250	SQ YD	\$2.25	\$36,563	
PD PVMT PATCH M&F ADD'L 2.00"	2.00%	325	SQ YD	\$79.55	\$25,855	
PD SHLD PATCH M&F ADD'L 2.00"	1.00%	0	SQ YD	\$69.25	\$0	
HMA OVERLAY PVMT 2.00 "	100.00%	1,828	TON	\$111.00	\$202,955	
HMA OVERLAY SHLD 2.00 "	100.00%	0	TON	\$0.00	\$0	
PWFn =	0.4120		PW =	0.4120 X	\$265,373	\$109,330
YEAR 35						
LONG SHLD JT R&S	100.00%	5,660	LIN FT	\$2.00	\$11,320	
CNTR LINE JOINT R&S	100.00%	2,830	LIN FT	\$2.00	\$5,660	
RNDM / THRM CRACK R&S	50.00%	4,670	LIN FT	\$2.00	\$9,340	
PD PVMT PATCH M&F SURF	0.10%	16	SQ YD	\$81.68	\$1,307	
PWFn =	0.3554		PW =	0.3554 X	\$27,627	\$9,818
YEAR 40						
LONG SHLD JT R&S	100.00%	5,660	LIN FT	\$2.00	\$11,320	
CNTR LINE JOINT R&S	100.00%	2,830	LIN FT	\$2.00	\$5,660	
RNDM / THRM CRACK R&S	50.00%	4,670	LIN FT	\$2.00	\$9,340	
PD PVMT PATCH M&F SURF	0.50%	81	SQ YD	\$81.68	\$6,616	
PWFn =	0.3066		PW =	0.3066 X	\$32,936	\$10,097
						\$370,670
ROUTINE MAINTENANCE ACTIVITY		1.61	Lane Miles	0.00	\$0	\$0
45 YEAR LIFE CYCLE	CRFn = 0.0407852				MAINTENANCE MAINTENANCE	\$370,670 \$28,206

JOINTED PLAIN CONCRETE PAVEMENT
 UNBONDED JOINTED PLAIN CONCRETE OVERLAY
 Figure 54-7.A

MAINTENANCE ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 10						
PAVEMENT PATCH CLASS B	0.10%	16	SQ YD	\$165.00	\$2,640	
PWF _n =	0.7441		PW =	0.7441 X	\$2,640	\$1,964
YEAR 15						
PAVEMENT PATCH CLASS B	0.20%	33	SQ YD	\$165.00	\$5,445	
PWF _n =	0.6419		PW =	0.6419 X	\$5,445	\$3,495
YEAR 20						
PAVEMENT PATCH CLASS B	2.00%	325	SQ YD	\$165.00	\$53,625	
SHOULDER PATCH CLASS C	0.50%	0	SQ YD	\$0.00	\$0	
LONGITUDINAL SHLD JT R&S	100.00%	5,660	LIN FT	\$2.00	\$11,320	
CENTERLINE JT R&S	100.00%	2,830	LIN FT	\$2.00	\$5,660	
PWF _n =	0.5537		PW =	0.5537 X	\$70,605	\$39,092
YEAR 25						
PAVEMENT PATCH CLASS B	3.00%	488	SQ YD	\$165.00	\$80,520	
SHOULDER PATCH CLASS C	1.00%	0	SQ YD	\$0.00	\$0	
PWF _n =	0.4776		PW =	0.4776 X	\$80,520	\$38,457
YEAR 30						
NON-INTERSTATE						
PAVEMENT PATCH CLASS B	4.00%	650	SQ YD	\$165.00	\$107,250	
SHOULDER PATCH CLASS C	1.50%	0	SQ YD	\$0.00	\$0	
HMA OVERLAY 2.75" (PVMT)	100.00%	16,250	SQ YD	\$15.86	\$257,721	
HMA OVERLAY 2.75" (SHLD)	100.00%	0	SQ YD	\$0.00	\$0	
PWF _n =	0.4120		PW =	0.4120 X	\$364,971	\$150,363
YEAR 35						
NON-INTERSTATE						
LONGITUDINAL SHLD JT R&S	100.00%	5,660	LIN FT	\$2.00	\$11,320	
CENTERLINE JT R&S	100.00%	2,830	LIN FT	\$2.00	\$5,660	
RANDOM CRACK R&S	50.00%	4,245	LIN FT	\$2.00	\$8,490	
REFLECTIVE TRANSVERSE CRACK R&S	40.00%	2,722	LIN FT	\$2.00	\$5,444	
PD PVMT PATCH M&F HMA 2.75"	0.10%	16	SQ YD	\$86.34	\$1,382	
PWF _n =	0.3554		PW =	0.3554 X	\$32,296	\$11,477
YEAR 40						
NON-INTERSTATE						
PAVEMENT PATCH CLASS B	0.50%	81	SQ YD	\$165.00	\$13,365	
LONGITUDINAL SHLD JT R&S	100.00%	5,660	LIN FT	\$2.00	\$11,320	
CENTERLINE JT R&S	100.00%	2,830	LIN FT	\$2.00	\$5,660	
REFLECTIVE TRANSVERSE CRACK R&S	60.00%	4,082	LIN FT	\$2.00	\$8,164	
RANDOM CRACK R&S	50.00%	4,245	LIN FT	\$2.00	\$8,490	
PD PVMT PATCH M&F HMA 2.75"	0.50%	81	SQ YD	\$86.34	\$6,994	
PWF _n =	0.3066		PW =	0.3066 X	\$53,993	\$16,552
						\$261,400
ROUTINE MAINTENANCE ACTIVITY		1.61	Lane Miles	\$0.00	\$0	\$0
45 YEAR LIFE CYCLE	CRF _n = 0.0407852				MAINTENANCE	\$261,400
					MAINTENANCE	\$19,891