



# Illinois Department of Transportation

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To: Anthony J. Quigley                      Attn: John Baczek  
From: Jack Elston                              By: Michael Brand *MAB*  
Subject: Pavement Design Approval  
Date: April 5, 2018

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Route: Joliet Road                              Job No.: D-91-221-12  
Section: (430V-X)N                              Contract No.: 60X71  
County: Cook                                      Target Letting: 6-2018  
Limits: at 55<sup>th</sup> Street

We have reviewed the pavement design for the above referenced project which was submitted on February 14, 2018. The scope of the project is to reconstruct the intersection due to the closure of Joliet Road.

We concur with the District's determination this is a "special design" as the intersection is "high-stress; and as such, a life cycle cost analysis is not required. We also concur with the District's selection of full-depth HMA for this short section of pavement for uniformity with adjoining sections of pavement.

In summary, the approved pavement designs are as follows:

Joliet Road / 55<sup>th</sup> Street  
11.5" Full-Depth HMA Pavement with PCC Curb & Gutter  
12" Aggregate Subgrade Improvement

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



# Illinois Department of Transportation

## Memorandum

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To: Maureen Addis

Attn: Michael Brand

From: Jose A. Dominguez

By: Ojas Patel

Subject: Pavement Analysis\*

Date: February 14, 2018

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\*Route: Joliet Road  
Limits: at 55<sup>th</sup> Street  
Section: (430V-X)N  
Current target: 06CY18

County: Cook  
Contract No.: 60X71  
Job No.: D-91-221-12

We have completed the pavement analysis for the above captioned location. Review by the Central Office is required since the total pavement area for reconstruction exceeds 4,750 Square Yards. The following is the scope of the project:

***Joliet Road/55<sup>th</sup> Street – Reconstruction to modify the horizontal curve at the intersection due to closure of Joliet Road.***

A 20-year pavement analysis was performed for the above roadway segments. This intersection is a "High Stress" location since the design lane as well as turning MU ADT exceeds 200 vehicles. As such, the pavement design will be classified as a "Special Design" per BDE Figure 54-1.A. A mechanistic-flexible pavement design is recommended for uniformity for this relatively short segment as the existing roadway network is full depth HMA. In addition, Stone Matrix Asphalt is recommended for this high stress location. The recommended pavement is:

### **Joliet Road/55<sup>th</sup> Street**

Reconstruction

PCC Curb and Gutter

11 ½" Full Depth HMA<sup>1,3</sup>

2" Polymerized HMA Surface Course, SMA, IL-9.5, N80

2 ¼" Polymerized HMA Binder Course, IL-19.0, N90

7 ¼" HMA Binder Course, IL-19.0, N90

12" Aggregate Subgrade Improvement<sup>2</sup>

M. Addis  
February 14, 2018  
Page Two

<sup>1</sup>Designer Note 1: Use pay item 40701911, **HOT-MIX ASPHALT PAVEMENT (FULL-DEPTH), 11 ½"**, paid for in square yards.

<sup>2</sup>Designer Note 2: Use pay item 30300112, **AGGREGATE SUBGRADE IMPROVEMENT, 12"**, paid in square yards.

<sup>3</sup>Designer Note 3: Refer to the District One, Bureau of Materials' "Hot-Mix Asphalt – Mix Selection" tables to determine the corresponding HMA mix table requirements for the plans.

If you have any questions or need additional information, please contact Ojas Patel, Pavement Design Engineer, at (847)705-4550.

By:   
José A. Dominguez, P.E.  
Project Support Engineer

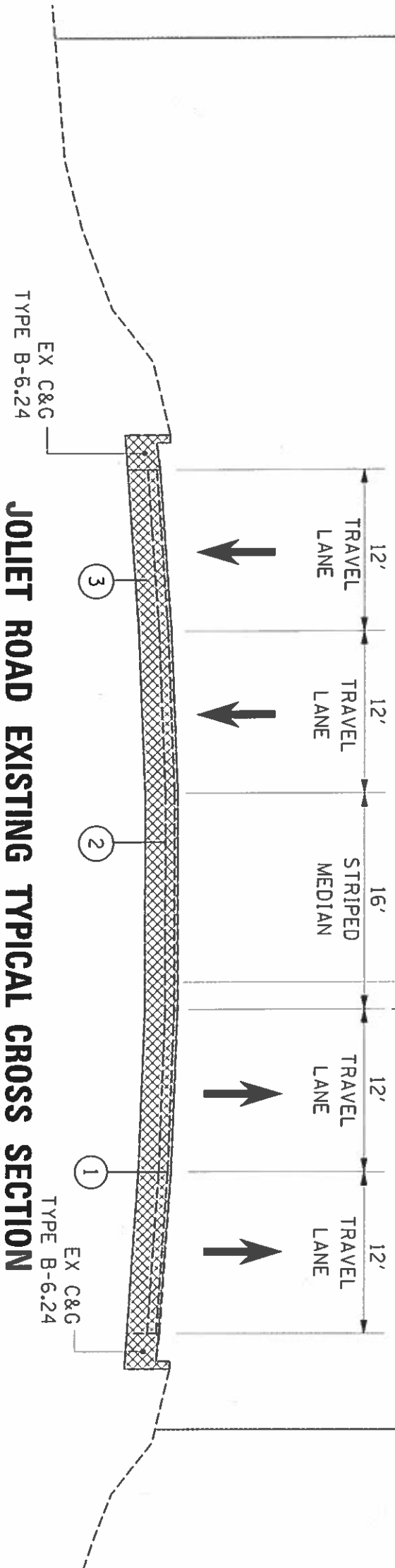
EXISTING  
R.O.W.

70'

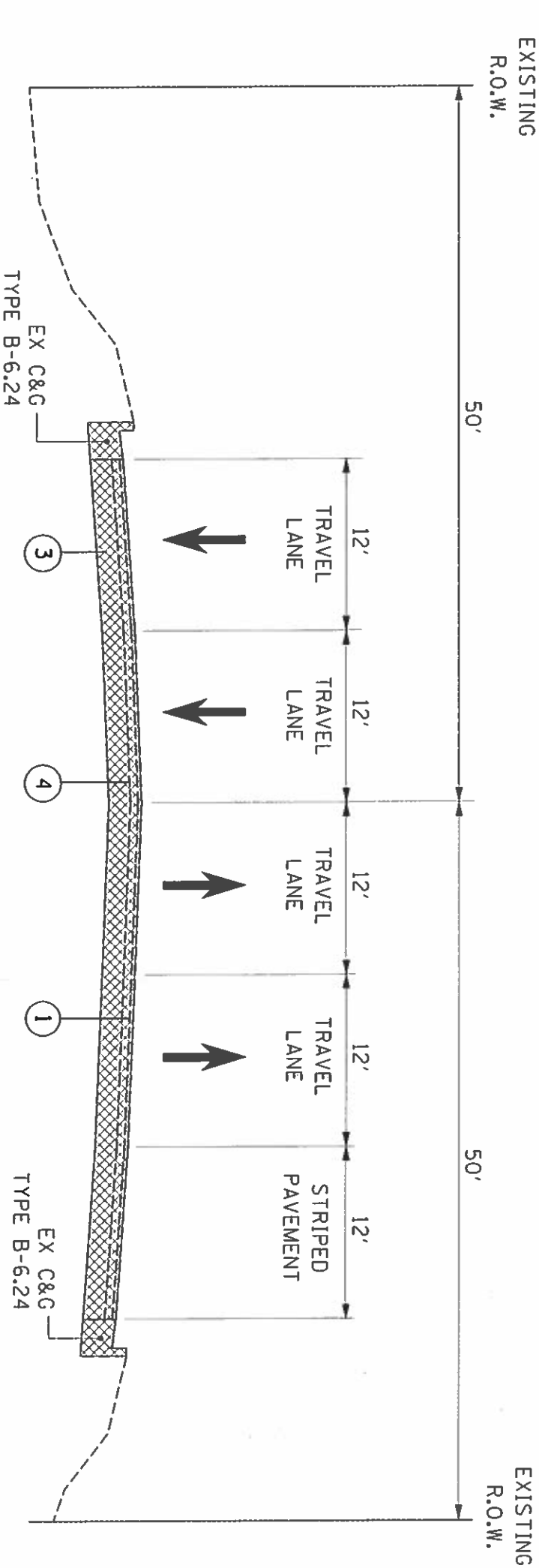
EXISTING  
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EXISTING  
R.O.W.

33'



### JOLIET ROAD EXISTING TYPICAL CROSS SECTION



### 55TH STREET EXISTING TYPICAL CROSS SECTION



EXISTING PAVEMENT TO BE REMOVED

#### LEGEND

- ① EXISTING HMA SURFACE COURSE, 1 1/2"
- ② EXISTING HMA BINDER COURSE, ±4"
- ③ EXISTING PCC PAVEMENT, 9"
- ④ EXISTING HMA BINDER COURSE, ±3 1/4"

FILE NAME	DESIGNED	REVISIONS	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	TYPICAL CROSS SECTIONS JOLIET ROAD AT 55th STREET	FAUL RTE. 3562	SECTION 1430V-XIM	COUNTY COOK	TOTAL SHEETS NO.
PROJECT NO. 10848B0001	CHECKED	DATE	SCALE: NONE	SHEET OF SHEETS	TO STA.	ILLINOIS FED. AID PROJECT	CONTRACT NO. 60X71	
DESIGNED BY: [Name]	REVISIONS	DATE	SCALE: NONE	SHEET	OF SHEETS	ILLINOIS FED. AID PROJECT	CONTRACT NO. 60X71	



FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE Job Route  
 SECTION Job Section  
 COUNTY Job County  
 LOCATION Job Location

FACILITY TYPE INTERSTATE

PROJECT LENGTH 1000 FT ==> 0.19 Miles  
 # OF CENTERLINES 2 CL  
 # OF LANES 4 LANES  
 # OF EDGES 4 EP  
 LANE WIDTH - AVERAGE 12 FT  
 SHOULDER WIDTH HMA Inside 6 FT  
 HMA Outside 10 FT  
 Total Width of Paved Shoulders 32 FT

PAVEMENT THICKNESS (FLEXIBLE) 12.00 IN 17.00 IN MAX  
 SHOULDER THICKNESS 8.00 IN HMA\_SD Standard Design  
 POLICY OVERLAY THICKNESS 3.75 IN

FLEX PAVEMENT TRAFFIC FACTORS MINIMUM ACTUAL USE  
 7.11 1.00 7.11

Read Me!

HMA COST PER TON UNIT PRICE  
 HMA SURFACE \$95.00 / TON  
 HMA TOP BINDER \$95.00 / TON  
 HMA LOWER BINDER \$80.00 / TON  
 HMA BINDER (LEVELING) \$85.00 / TON  
 HMA SHOULDER \$72.00 / TON

INITIAL COSTS ITEM	THICKNESS	100% QUAI UNIT	UNIT PRICE	COST
HMA PAVEMENT ( FULL-DEPTH )	( 12.00" )	5333 5,333 SQ YD	\$59.62 / SQ YD	\$317,988 ~
HMA SURFACE COURSE	( 2.00" )	1.0069 601 TONS	\$95.00 / TON	\$0
HMA TOP BINDER COURSE	( 2.25" )	1.0217 687 TONS	\$95.00 / TON	\$0
HMA LOWER BINDER COURSE	( 7.75" )	1.0564 2,445 TONS	\$80.00 / TON	\$0
HMA SHOULDER CURB & GUTTER	( 8.00" )	3556 1,593 TONS 0 LIN FT	\$72.00 / TON \$30.00 / LIN FT	\$114,688 ~ \$0
SUBBASE GRAN MATL TY C (TONS) IMPROVED SUBGRADE:	Modified Soil Width = 86.0	499 TONS 9,556 SQ YD	\$25.00 / TON \$7.00 / SQ YD	\$12,475 \$66,892
Reserved For User Supplied Item		0 UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item		0 UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL		5,333 SQ YD	\$0.00 / SQ YD	\$0
SHOULDER REMOVAL		3,556 SQ YD	\$0.00 / SQ YD	\$0

Note: \* Denotes User Supplied Quantity  
 FLEXIBLE CONSTRUCT \$512,043  
 FLEXIBLE CONSTRUCT \$110,266

MAINTENANCE COSTS: ITEM	THICKNESS	MATERIAL T	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			\$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	( 2.00" )	1.0069 Surface I 2.00	\$10.71 / SQ YD
HMA OVERLAY PVMT	( 3.75" )	1.0130 3.75	\$20.21 / SQ YD
HMA SURFACE MIX	( 1.50" )	1.0052 Surface I 1.50	\$8.02 / SQ YD
HMA BINDER MIX	( 2.25" )	1.0182 Top Binder I 2.25	\$12.19 / SQ YD
HMA OVERLAY SHLD (Year 30)	( 1.75" )	Shoulder I 1.75	\$7.06 / SQ YD
HMA OVERLAY SHLD	( 2.00" )	Shoulder I 2.00	\$8.06 / SQ YD
MILLING (2.00 IN)		2.00	\$3.00 / SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill Surf)	Surface I 2.00	\$80.64 / SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder I 2.00	\$78.06 / SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00 ")	Leveling Binc 2.00	\$79.52 / SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")	Shoulder I 2.00	\$78.06 / 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- \$711,101  
FLEXIBLE TOTAL ANNI \$153,133

PCC PAVEMENT

JPCP

ROUTE  
SECTION  
COUNTY  
LOCATION

Job Route  
Job Section  
Job County  
Job Location

FACILITY TYPE

INTERSTATE

PROJECT LENGTH 1000 FT ==> 0.19 Miles  
 # OF CENTERLINES 2 CL  
 # OF LANES 4 LANES  
 # OF EDGES 4 EP  
 LANE WIDTH - AVERAGE 12 FT  
 SHOULDER WIDTH PCC Inside 6 FT  
 PCC Outside 10 FT  
 Total Width of Paved Shoulders 32 FT

PAVEMENT THICKNESS (RIGID) JPCP 10.00 IN TIED SHLD  
 SHOULDER THICKNESS 10.00 IN

POLICY OVERLAY THICKNESS 3.75 IN

RIGID PAVEMENT TRAFFIC FACTORS MINIMUM ACTUAL USE  
 10.05 1.00 10.05  
 Worksheet Construction Type is New Construction The Pavement Type is JPCP

INITIAL COSTS ITEM	THICKNESS	100% QUA UNIT	UNIT PRICE	COST
JPC PAVEMENT	( 10.00" )	5,333 SQ YD	\$50.00 /SQ YD	\$266,650
PAVEMENT REINFORCEMENT		0 SQ YD	\$22.00 /SQ YD	\$0
STABILIZED SUBBASE	( 4.00" )	6,000 SQ YD	\$19.00 /SQ YD	\$114,000
PCC SHOULDERS	( 10.00" to 10.00" )	3,556 SQ YD	\$40.00 /SQ YD	\$142,240
CURB & GUTTER		0 LIN FT	\$30.00 /LIN FT	\$0
SUBBASE GRAN MATL TY C	( ~ 3.48" )	418 TONS	\$25.00 /TON	\$10,450
IMPROVED SUBGRADE:	Modified Soil Width = 82.0	9,111 SQ YD	\$7.00 /SQ YD	\$63,777
Reserved For User Supplied Item		0 UNITS	\$0.00 /UNITS	\$0
Reserved For User Supplied Item		0 UNITS	\$0.00 /UNITS	\$0
PAVEMENT REMOVAL		5,333 SQ YD	\$0.00 /SQ YD	\$0
SHOULDER REMOVAL		3,556 SQ YD	\$0.00 /SQ YD	\$0

Note: \* Denotes User Supplied Quantity  
 RIGID CONSTRUCTION \$597,117  
 RIGID CONSTRUCTION \$128,587

MAINTENANCE COSTS: ITEM	THICKNESS	MATERIAL	T	UNIT COST
ROUTINE MAINTENANCE ACTIVITY				\$0.00 /LANE-MILE / YEAR
HMA POLICY OVERLAY	( 3.75" )		3.75	
HMA POLICY OVERLAY PVMT	( 3.75" )	1.0130	3.75	\$20.21 /SQ YD
HMA SURFACE MIX	( 1.50" )	1.0052	Surface M 1.50	\$8.02 /SQ YD
HMA BINDER MIX	( 2.25" )	1.0182	Top Binder M 2.25	\$12.19 /SQ YD
HMA POLICY OVERLAY SHLD	( 3.75" )		Shoulder M 3.75	\$15.12 /SQ YD
CLASS A PAVEMENT PATCHING				\$195.00 /SQ YD
CLASS B PAVEMENT PATCHING				\$150.00 /SQ YD
CLASS C SHOULDER PATCHING				\$145.00 /SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface M	1.50	\$77.98 /SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 1.50")		Surface M	1.50	\$77.98 /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 \$727,263  
 RIGID TOTAL ANNUAL \$156,613



LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Re #####

		JPCP		HMA
CONSTRUCTION	INITIAL COST	PRESENT '1	\$597,117	\$512,043
		ANNUAL C	\$128,587	\$110,266
MAINTENANCE	LIFE-CYCLE COST	PRESENT '1	\$130,146	\$199,058
		ANNUAL C	\$28,026	\$42,866
TOTAL	LIFE-CYCLE COST	PRESENT '1	\$727,263	\$711,101
		ANNUAL C	\$156,613	\$153,133

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	===== HMA	\$153,133	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PE JPCP	\$156,613	2.3%

S:\GENWPDOCS\Pavement Designs\ID-1\Joliet Rd at 55th St - 60X71\IDOT Mechanistic Joliet Road.xlsm]PDFSheets

FULL-DEPTH HMA PAVEMENT  
HMA OVERLAY OF 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%	4,000	LIN FT	\$2.00	\$8,000	
CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	\$2.00	\$4,000	
RNDM / THRM CRACK R&S	50.00%	2,200	LIN FT	\$2.00	\$4,400	
PD PVMT PATCH M&F SURF	0.10%	5	SQ YD	\$80.64	\$403	
PWFn =	0.8626		PW =	0.8626 X	\$16,803	\$14,494
YEAR 10						
LONG SHLD JT R&S	100.00%	4,000	LIN FT	\$2.00	\$8,000	
CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	\$2.00	\$4,000	
RNDM / THRM CRACK R&S	50.00%	2,200	LIN FT	\$2.00	\$4,400	
PD PVMT PATCH M&F SURF	0.50%	27	SQ YD	\$80.64	\$2,177	
PWFn =	0.7441		PW =	0.7441 X	\$18,577	\$13,823
YEAR 15						
MILL PVMT & SHLD 2.00"	100.00%	8,889	SQ YD	\$3.00	\$26,667	
PD PVMT PATCH M&F ADD'L 2.00"	1.00%	53	SQ YD	\$79.52	\$4,215	
HMA OVERLAY PVMT 2.00"	100.00%	5,333	SQ YD	\$10.71	\$57,141	
HMA OVERLAY SHLD 2.00 "	100.00%	3,556	SQ YD	\$8.06	\$28,672	
PWFn =	0.6419		PW =	0.6419 X	\$116,695	\$74,902
YEAR 20						
LONG SHLD JT R&S	100.00%	4,000	LIN FT	\$2.00	\$8,000	
CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	\$2.00	\$4,000	
RNDM / THRM CRACK R&S	50.00%	2,200	LIN FT	\$2.00	\$4,400	
PD PVMT PATCH M&F SURF	0.10%	5	SQ YD	\$80.64	\$403	
PWFn =	0.5537		PW =	0.5537 X	\$16,803	\$9,303
YEAR 25						
LONG SHLD JT R&S	100.00%	4,000	LIN FT	\$2.00	\$8,000	
CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	\$2.00	\$4,000	
RNDM / THRM CRACK R&S	50.00%	2,200	LIN FT	\$2.00	\$4,400	
PD PVMT PATCH M&F SURF	0.50%	27	SQ YD	\$80.64	\$2,177	
PWFn =	0.4776		PW =	0.4776 X	\$18,577	\$8,872
YEAR 30 INTERSTATE						
MILL PVMT ONLY 2.00"	100.00%	5,333	SQ YD	\$3.00	\$15,999	
PD PVMT PATCH M&F ADD'L 2.00"	2.00%	107	SQ YD	\$79.52	\$8,509	
PD SHLD PATCH M&F SURF 2.00"	1.00%	36	SQ YD	\$78.06	\$2,810	
HMA OVERLAY PVMT 3.75 "	100.00%	5,333	SQ YD	\$20.21	\$107,785	
HMA OVERLAY SHLD 1.75 "	100.00%	3,556	SQ YD	\$7.06	\$25,088	
PWFn =	0.4120		PW =	0.4120 X	\$160,191	\$65,997
YEAR 35						
LONG SHLD JT R&S	100.00%	4,000	LIN FT	\$2.00	\$8,000	
CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	\$2.00	\$4,000	
RNDM / THRM CRACK R&S	50.00%	2,200	LIN FT	\$2.00	\$4,400	
PD PVMT PATCH M&F SURF	0.10%	5	SQ YD	\$80.64	\$403	
PWFn =	0.3554		PW =	0.3554 X	\$16,803	\$5,972
YEAR 40						
LONG SHLD JT R&S	100.00%	4,000	LIN FT	\$2.00	\$8,000	
CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	\$2.00	\$4,000	
RNDM / THRM CRACK R&S	50.00%	2,200	LIN FT	\$2.00	\$4,400	
PD PVMT PATCH M&F SURF	0.50%	27	SQ YD	\$80.64	\$2,177	
PWFn =	0.3066		PW =	0.3066 X	\$18,577	\$5,695
						\$199,058
ROUTINE MAINTENANCE ACTIVITY		0.76	Lane Miles	0.00	\$0	\$0
45 YEAR LIFE CYCLE	CRFn = 0.0407852				MAINTENANCE MAINTENANCE	\$199,058 \$42,866

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%	5	SQ YD	\$150.00	\$750	
PWF <sub>n</sub> =	0.7441		PW =	0.7441 X	\$750	\$558
YEAR 15						
PAVEMENT PATCH CLASS B	0.20%	11	SQ YD	\$150.00	\$1,650	
PWF <sub>n</sub> =	0.6419		PW =	0.6419 X	\$1,650	\$1,059
YEAR 20						
PAVEMENT PATCH CLASS B	2.00%	107	SQ YD	\$150.00	\$16,050	
SHOULDER PATCH CLASS C	0.50%	18	SQ YD	\$145.00	\$2,610	
LONGITUDINAL SHLD JT R&S	100.00%	4,000	LIN FT	\$2.00	\$8,000	
CENTERLINE JT R&S	100.00%	2,000	LIN FT	\$2.00	\$4,000	
PWF <sub>n</sub> =	0.5537		PW =	0.5537 X	\$30,660	\$16,976
YEAR 25						
PAVEMENT PATCH CLASS B	3.00%	160	SQ YD	\$150.00	\$24,000	
SHOULDER PATCH CLASS C	1.00%	36	SQ YD	\$145.00	\$5,220	
PWF <sub>n</sub> =	0.4776		PW =	0.4776 X	\$29,220	\$13,956
YEAR 30 INTERSTATE						
PAVEMENT PATCH CLASS B	4.00%	213	SQ YD	\$150.00	\$31,950	
SHOULDER PATCH CLASS C	1.50%	53	SQ YD	\$145.00	\$7,685	
HMA POLICY OVERLAY 3.75" (PVMT)	100.00%	5,333	SQ YD	\$20.21	\$107,785	
HMA POLICY OVERLAY 3.75" (SHLD)	100.00%	3,556	SQ YD	\$15.12	\$53,760	
PWF <sub>n</sub> =	0.4120		PW =	0.4120 X	\$201,180	\$82,883
YEAR 35 INTERSTATE						
LONGITUDINAL SHLD JT R&S	100.00%	4,000	LIN FT	\$2.00	\$8,000	
CENTERLINE JT R&S	100.00%	2,000	LIN FT	\$2.00	\$4,000	
RANDOM CRACK R&S	50.00%	2,000	LIN FT	\$2.00	\$4,000	
REFLECTIVE TRANSVERSE CRACK R&S	40.00%	1,286	LIN FT	\$2.00	\$2,572	
PD PVMT PATCH M&F HMA SURF 1.50"	0.10%	5	SQ YD	\$77.98	\$390	
PWF <sub>n</sub> =	0.3554		PW =	0.3554 X	\$18,962	\$6,739
YEAR 40 INTERSTATE						
PAVEMENT PATCH CLASS B	0.50%	27	SQ YD	\$150.00	\$4,050	
LONGITUDINAL SHLD JT R&S	100.00%	4,000	LIN FT	\$2.00	\$8,000	
CENTERLINE JT R&S	100.00%	2,000	LIN FT	\$2.00	\$4,000	
REFLECTIVE TRANSVERSE CRACK R&S	60.00%	1,930	LIN FT	\$2.00	\$3,860	
RANDOM CRACK R&S	50.00%	2,000	LIN FT	\$2.00	\$4,000	
PD PVMT PATCH M&F HMA SURF 1.50"	0.50%	27	SQ YD	\$77.98	\$2,105	
PWF <sub>n</sub> =	0.3066		PW =	0.3066 X	\$26,015	\$7,975
						\$130,146
ROUTINE MAINTENANCE ACTIVITY		0.76	Lane Miles	\$0.00	\$0	\$0
45 YEAR LIFE CYCLE	CRF <sub>n</sub> = 0.0407852				MAINTENANCE	\$130,146
					MAINTENANCE	\$28,026