Illinois Department of Transportation

To:	Jeffery P. Meyers	Attn: Greg Jamer	son
From:	Jack A. Elston	By: Mike Brand	Whel Bud
Subject:	Pavement Design Approval		
Date:	October 2, 2020		

Route:	I-57	Job No.:	
Section:	(15-22HB-4)BR (15-22)R	Contract No.:	74435
County:	Coles	Target Letting:	June 2022
Limits:	IL 16 Interchange East of Mattoo	on	

The Pavement Selection Committee has reviewed the pavement design for the above referenced project which was most recently submitted on July 20, 2020. The project will reconstruct the I-57/IL 16 interchange and the work will include: replacement of the I-57 structures over IL 16, raising them approximately 3 feet; and reconstruction of the clover leaf interchange to a diamond interchange with roundabout intersections on IL 16.

The design for the I-57 mainline pavement compared 16" full-depth HMA and 11" JPCP. The LCCA for these pavements showed the two options to be within 10% of each other; but in lieu of alternate bidding, the committee agreed with the choice of HMA to match the surface of the adjacent mainline pavement and to better facilitate construction of the grade raise to match the new bridges.

The design for the interchange ramp pavements compared 10.5" full depth HMA and 9" JCPC. The LCCA for these pavements showed the HMA options to be 14.6% less expensive and the committee agreed with this selection due to the cost and for continuity with the HMA pavement of the I-57 mainline.

The design for the IL 16 mainline pavement compared 11.25" full-depth HMA and 9" JPCP. The LCCA for these pavements showed the HMA option to be 13.6% less expensive but the committee agreed with the selection of JPCP due to the high stress of turning vehicles at the roundabouts.

In summary, the approved pavement designs are:

I-57 Mainline	Interchange Ramps	IL 16
16" Full-Depth HMA	10.5" Full-Depth HMA	9" JPCP
12" Improved Subgrade	12" Improved Subgrade	4" Stabilized Subbase 12" Improved Subgrade

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

Illinois Department of Transportation

To:	Jack Elston	Attn:	Michael Brand
From:	Jeffery P. Myers	By:	Kaleb Hirtzel
Subject:	Pavement Design		
Date:	July 20, 2020		

FAI-57 (I-57) Section (15-22HB-4)BR (15-22)R IL 16 Interchange East of Mattoon Coles County 74435

We have completed the pavement analysis of the above referenced project. Review by BDE is required since the total pavement area exceeds 4,750 Sq Yd and the pavement costs exceed \$500,000.

This project consists of the reconstruction of the I-57/IL 16 interchange located just east of Mattoon. Involved in this project is the replacement of the I-57 structures over IL 16 and raising them approximately 3 feet. As part of the reconstruction the clover leaf interchange, which does not meet current design policies, is proposed to be replaced with a diamond interchange and a raindrop roundabout on IL 16. This configuration change will require new ramps to be constructed and the IL 16 pavement to be re-aligned. For your reference a preliminary plan view of the new configuration has been attached. As a result, we are proposing new pavements for I-57, the interchange ramps and IL 16.

For this project the following pavement designs were considered:

- **<u>I-57:</u>** 16" Full-Depth Hot-Mix Asphalt Pavement 11" Jointed Plain Concrete Pavement
- Ramps:10 ½" Full-Depth Hot-Mix Asphalt Pavement9"Jointed Plain Concrete Pavement
- IL 16:11 ¼" Full-Depth Hot-Mix Asphalt Pavement9"Jointed Plain Concrete Pavement

Based on the economic analysis of the different pavements we are proposing to use the following pavement designs:

The overall cost of JPC pavement for I-57 is 8% higher than the cost of HMA. The purpose of the new pavement is to raise the profile of the I-57 structures over IL 16 to meet IDOT clearances. The adjacent pavement surface on I-57 is HMA. To preserve the continuity of the pavement, we propose to use the 16" Full-Depth Hot-Mix Asphalt Pavement on I-57.

The overall cost of JPC pavement for the ramps is 14.6% higher than the cost of HMA. Note, the traffic factor for the JPC pavement was manually adjusted to increase the design thickness from 8  $\frac{3}{4}$ " to 9". This alteration was made to have the JPC thickness of the ramps match that of IL 16. The cost difference between the two thicknesses of JPC was negligible and had minimal effect on the life cycle cost. With HMA being the less expensive option, we propose utilizing the 10  $\frac{1}{2}$ " Full-Depth Hot-Mix Asphalt Pavement on the ramps.

The overall cost of JPC pavement on IL 16 is 13.6% higher than the cost of HMA. The new IL 16 pavement consists of multiple horizontal curves with smaller radii to help limit the vehicle speeds approaching and traversing the raindrop roundabout. The raindrop roundabout will also have left turn movements under yield control which creates the possibility of large trucks having to come to a stop. Due to these factors and past experience the District 7 Materials Engineer has concerns that shoving of the HMA pavement is highly likely. Shoving of the pavement will increase the maintenance costs beyond those shown in the life cycle cost calculations, which would make the overall cost of JPC closer to that of HMA over the life of the pavement. Therefore our recommendation is to construct the 9" Jointed Plain Concrete Pavement on IL 16.

If you have any questions, please contact Kaleb Hirtzel at 217-342-8256. Currently my office hours are limited to Tuesday and Thursday. If you need to contact me on a different day please leave a message or contact me through email at Kaleb.Hirtzel@illinois.gov.



3/10/2020 c:\pw.work\pwidot\hirtzelk]\d0171403\D774435-design.dgn



### EX. & PR. I-57 (EX. PAV'T TO BE BROKEN)



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	DRAWN -	REVISED -	STATE OF ILLINOIS							57	(15-22HB-4)BR (15-22)R	Coles		
PLOT SCALE = 100.0000 ' / in.	CHECKED -	REVISED -	DEPARTMENT OF TRANSPORTATION				I-5/					CONTRAC	T NO. 744	<del>1</del> 35
PLOT DATE = 3/10/2020	DATE -	REVISED -		SCALE:	SHEET	OF	SHEETS	STA.	TO STA.		ILLINOIS FED. A	I ID PROJECT		



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HMA PAVEMENT (FULL-DEPTH), 101/2" - COMB. CONCRETE CURB AND GUTTER, TYPE B6.24



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# PROPOSED IL 16 (INCLUDES RAINDROP ROUNDABOUT SECTION)



DDEL: \$MODELN/

USER NAME = \$USER\$	DESIGNED -	REVISED -				ТҮР	ICAL SECTION		F.A.I. RTE	SECTION	COUNTY	TOTAL SHEET SHEETS NO.
	DRAWN -	REVISED -	STATE OF ILLINOIS				II 16		57	(15-22HB-4)BR (15-22)R	Coles	
PLOT SCALE = \$SCALE\$	CHECKED -	REVISED -	DEPARTMENT OF TRANSPORTATION				IL 10				CONTRACT	T NO. 74435
PLOT DATE = \$DATE\$	DATE -	REVISED -		SCALE:	SHEET	OF	SHEETS STA.	TO STA.		ILLINOIS FED. A	D PROJECT	

BDE 5401 Template (Rev. 11/22/2019) IDO	T MECHA	NISTIC PAVEN	IENT DE	ESIGN			Printed: 0	7/08/2020
	PROJECT	AND TRAFFI	C INPUT	S	(Enter Data i	n Gray Shad	ed Cells)	
Route: FAI 57	Comments:	I-57 Mainline Paver	nent					
Section: (15-22HB-4)BR (15-22)R								
County: COLES	Design Date:	02/28/2020	KLH	< BY			_	
Location: IL 16 Interchange East of Mattoon	Modify Date:			< BY	ADT	Year		
				Current:	16,700	2025		
Facility Type Interstate or Freeway		_		Future:	22,700	2045		
# of Lanes =	4						-	
				*	Structural D	esign Traffic		
				Minimum	Actual	Actual %of	% of AD	T in
Road Class:	I.	_		ADT	ADT	Total ADT	Design L	ane
			PV =	0	12,214	62.0%	P =	32%
Subgrade Support Rating (SSR):	Poor		SU =	500	1,005	5.1%	S =	45%
Construction Year:	2025		MU =	1500	6,481	32.9%	M =	45%
Design Period (DP) =	20	years	Struct. I	Design ADT =	19,700	(2035)		
		TRAFFIC FA	CTOR CA	LCULATION	1			
FLEXIBLE	PAVEMENT				RIGID F	PAVEMENT		
Cpv =	0.15				Cpv =	0.15		
Csu =	132.5				Csu =	143.81		
Cmu =	482.53				Cmu =	696.42		
TF flexible (Actual) =	29.36	(Actual ADT)		TF rid	gid (Actual) =	41.94	(Actual ADT)	
TF flexible (Min) =	7.11	(Min ADT Fig. 54-2.	C)	TF	riaid (Min) =	10.05	(Min ADT Fig. 54	1-2.C)
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		ISTRUCTION					NS	
		vement					nt	
	20.36	venient			lse TE rigid =	/1 0/		
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4 O)		Ed	ae Support =	Tied	Shoulder or C&C	3
Goto Map HMA Mixture Temp =	78.5	deg E (Fig 54-5 C	)	Rigid F	Pavt Thick =	11.00	in (Fig 54-4 F)	-
Design HMA Mixture Modulus (E <sub>HMA</sub> ) =	590	ksi (Fig. 54-5.D)	,				···· (· ·g· • · ··_)	
Design HMA Strain (ε <sub>ΗΜΑ</sub> ) =	46	(Fig. 54-5.E)				CRC Paver	nent	
Full Depth HMA Design Thickness =	16.00	in. (Fig. 54-5.F)		U	lse TF rigid =	41.94		
Goto Map Limiting Strain Criterion Thickness =	16.00	in. (Fig. 54-5.1)		Ĭ	IBR value =	3		
Use Full-Depth HMA Thickness =	16.00	inches		CRCP	Thickness =	11.00	in. (Fig. 54-4.M)	
					TF MUST	BE > 60 F	OR CRCP	

	RECONSTRUCTION ON	ILY (SU	PPLEMENTAL) PAVEN	IENT DESIGN CALCULATIONS	
	HMA Paveme	ent Over R	ubblized PCC	Unbonded Concrete Overlay	
	Use TF flexible =	29.36		Deview 54.4.02 for limitations and	
	HMA Overlay Design Thickness =	13.00	in. (Fig. 54-5.U)	Review 54-4.03 for limitations and	
Goto Map	Limiting Strain Criterion Thickness =		in. (Fig. 54-5.V)	special considerations.	
	Use HMA Overlay Thickness =	999.00	inches	JPCP Thickness = NA inches	

CONTACT RESEARCH FOR ASSISTANCE

Class   Roads		Class II Roads		C	lass III Roa	ds	Class IV	Road
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lar One way	nes with ADT > 20 Street with ADT ·	000 <= 3500	(A	2 Lanes \DT 750 -20	00)	2 Lane (ADT < 1	es 750)
	Min. Str. I	Design Traffic (Fig	g 54-2.C)			Class T	able for	
Facility Type	PV	SU	MÜ			One-Wa	/ Streets	
Interstate or Freeway	0	500	1500			ADT	Class	
Other Marked State Route	0	250	750			0 - 3500	11	
Unmarked State Route	No Min	No Min	No Min			>3501	1	
	Т	raffic Factor ESA	L Coefficients			Class T	able for	
	Rigid (F	ig. 54-4.C)	Flexible (F	ig. 54-5.B)		2 or 3	lanes	
Class	Csu	Cmu	Csu	Cmu		(not future	e 4 lane &	
	143.81	696.42	132.50	482.53		not one-w	ay street)	
11	135.78	567.21	112.06	385.44		ADT	Class	
111	129.58	562.47	109.14	384.35		0 - 749	IV	
IV	129.58	562.47	109.14	384.35		750 - 2000	III	
						>2000	II	
	Design La	ane Distribution F	actors For Stru	uctural Desigr	n Traffic (Fig	. 54-2.B)		
		Rural			Urban	,		
Number of Lanes	Р	S	М	Р	S	М		
1 Lane Ramp	100%	100%	100%	100%	100%	100%		
2 or 3	50%	50%	50%	50%	50%	50%		
4	32%	45%	45%	32%	45%	45%		
		1001	1 1	0.01	0 = 0 (	0 70/		

BDE 5401 Template (Rev. 11/22/2019) LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

SHOULDER REMOVAL

Note: \* Denotes User Supplied Quantity

Printed: 07/08/2020

0.21 Miles

16.00 IN MAX

HMA\_LSCD LSC Design

\$11.00 / SQ YD

FLEXIBLE CONSTRUC

\$43,219

\$873,433

ROUTE SECTION COUNTY LOCATION	FAI 57 (15-22HB-4 COLES IL 16 Interch	)BR (15-22)R nange East of M	Mattoon		
FACILITY TYPE			INTERSTATE		
PROJECT LENGTH # OF CENTERLINES # OF LANES # OF EDGES LANE WIDTH - AVERAGE SHOULDER WIDTH	HMA HMA Total Width	Inside Outside of Paved Shou	ılders	1105 FT 2 CL 4 LAN 4 EP 12 FT 6 FT 10 FT 32 FT	= = > IES
PAVEMENT THICKNESS SHOULDER THICKNESS HMA OVERLAY THICKNES	(FLEXIBLE)			16.00 IN 8.00 IN 2.00 IN	

FLEX PAVEMENT TRAFFIC FACTORS USE MINIMUM ACTUAL 29.36 29.36 7.11 Read Me! HMA COST PER TON UNIT PRICE HMA SURFACE \$130.00 / TON HMA TOP BINDER \$95.00 / TON HMA LOWER BINDER \$80.00 / TON HMA BINDER (IL-9.5FG or IL-4.75) \$85.00 / TON HMA SHOULDER \$85.00 / TON **INITIAL COSTS** THICKNESS UNIT PRICE ITEM 100% QUAI UNIT COST HMA PAVEMENT (FULL-DEPTH) (16.00") 5893 5,893 SQ YD \$83.23 / SQ YD \$490,515 ~ HMA SURFACE COURSE (2.00") 1.0069 665 TONS \$130.00 / TON \$0 HMA TOP BINDER COURSE (2.25") 759 TONS \$95.00 / TON \$0 1.0217 HMA LOWER BINDER COURSE 4,150 TONS \$80.00 / TON 1.0703 \$0 (11.75") HMA SHOULDER (8.00") 3929 1,760 TONS \$85.00 / TON \$149,612 ~ **CURB & GUTTER** \$30.00 / LIN F7 0 LIN FT \$0 SUBBASE GRAN MATL TY C (TONS) 1.477 TONS \$30.00 / TON \$44.310 IMPROVED SUBGRADE: Modified Soil Width = 87.3 \$7.00 / SQ YD 10.723 SQ YD \$75,061 0 UNITS \$0.00 / UNITS Reserved For User Supplied Item \$0 \$0.00 / UNITS Reserved For User Supplied Item 0 UNITS \$0 5,893 SQ YD PAVEMENT REMOVAL \$12.00 / SQ YD \$70,716

3,929 SQ YD

FLEXIBLE CONSTRUC \$170,217 MAINTENANCE COSTS: MATERIAL T UNIT COST THICKNESS ITEM ROUTINE MAINTENANCE ACTIVITY \$0.00 LANE-MILE / YEAR HMA OVERLAY PVMT SURF (2.00") 1.0069 \$14.66 / SQ YD Surface N 2.00 HMA OVERLAY PVMT (2.00") 1.0069 \$14.66 / SQ YD 2.00 HMA SURFACE MIX (2.00") 1.0069 Surface N 2.00 \$14.66 / SQ YD HMA BINDER MIX 1.0139 IL-9.5FG or I \$0.00 / SQ YD (0.00") 0.00 HMA OVERLAY SHLD (Year 30) (2.00") Shoulder \$9.52 / SQ YD 2.00 HMA OVERLAY SHLD Shoulder \$9.52 / SQ YD (2.00") 2.00 MILLING (2.00 IN) 2.00 \$4.00 / SQ YD PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf) \$85.56 / SQ YD Surface N 2.00 PARTIAL DEPTH SHLD PATCH \$80.52 / SQ YD (Mill & Fill Surf) Shoulder 2.00 PARTIAL DEPTH PVMT PATCH (Mill & Fill +2.00 ") 2.00 \$80.52 / SQ YD Binder Mix (Mill & Fill +2.00 ") PARTIAL DEPTH SHLD PATCH Shoulder \$80.52 / SQ YD 2.00

#### LSC Design

LONGITUDINAL SHOULDER JOINT ROUT & SEAL		\$2.00 / LIN FT
CENTERLINE JOINT ROUT & SEAL		\$2.00 / LIN FT
RANDOM / THERMAL CRACK ROUT & SEAL	(100% Ref	\$2.00 / LIN FT

FLEXIBLE TOTAL LIFE-<br/>FLEXIBLE TOTAL ANNI\$1,118,069<br/>\$217,893

PCC PAVEMENT

JPCP

ROUTE SECTION COUNTY LOCATION				FAI 57 (15-22HB-4)I COLES IL 16 Intercha	BR (15-22)F ange East c	R of Mattoon		
FACILITY TYPE				INTERSTATI	E			
PROJECT LENGTH # OF CENTERLINES # OF LANES # OF EDGES LANE WIDTH - AVERAGE SHOULDER WIDTH	PCC PCC Total Width o	Inside Outside of Paved Shoulders	5	1105 2 4 4 12 6 10 32	FT ==> CL LANES EP FT FT FT FT	0.21	Miles	
PAVEMENT THICKNESS (R SHOULDER THICKNESS	IGID)	JPC	Ρ	11.00 11.00	IN IN	TIED SHLD		
HMA OVERLAY THICKNESS	8			3.75	IN			
RIGID PAVEMENT TRAFF	IC FACTOR	S		MINIMUM		ACTUAL	L	JSE 41.94
Worksheet Construction Type	e is	Reconstruction		10.03		User Override	Pavemen J	PCP
INITIAL COSTS ITEM		THICKNESS		100% QUA	UNIT	UNIT PRICE		COST
JPC PAVEMENT PAVEMENT REINFORCEME STABILIZED SUBBASE	NT	( 11.00" ) ( 4.00" )		5,893 0 6,630	SQ YD SQ YD SQ YD	\$70.00 \$22.00 \$28.00	/ SQ YD / SQ YD / SQ YD	\$412,510 \$0 \$185,640
PCC SHOULDERS CURB & GUTTER		(11.00" to 11.00	")	3,929 0	SQ YD LIN FT	\$65.00 \$30.00	/ SQ YD / LIN F1	\$255,385 \$0
SUBBASE GRAN MATL TY ( IMPROVED SUBGRADE:	C	(~ 3.48") Modified Soil Widt	th = 82.0	462 10,068	TONS SQ YD	\$30.00 \$7.00	/ TON / SQ YD	\$13,860 \$70,476
Reserved For User Supplied Reserved For User Supplied	ltem Item			0 0	UNITS UNITS	\$0.00 \$0.00	/ UNITS / UNITS	\$0 \$0
PAVEMENT REMOVAL SHOULDER REMOVAL				5,893 3,929	SQ YD SQ YD	\$12.00 \$11.00	/ SQ YD / SQ YD	\$70,716 \$43,219
Note: * Denotes User Suppl	ied Quantity					RIGID CONST RIGID CONST	RUCTION	\$1,051,806 \$204,979
MAINTENANCE COSTS: ITEM		THICKNESS		MATERIAL	т	UNIT COST		
ROUTINE MAINTENANCE A	CTIVITY					\$0.00	/ LANE-M	ILE / YEAR
HMA OVERLAY HMA OVERLAY PAVEMENT HMA SURFACE MIX HMA BINDER MIX HMA OVERLAY SHOULDER		( 3.75" ) ( 3.75" ) ( 1.50" ) ( 2.25" ) ( 3.75" )	1.0130 1.0052 1.0182	Surface M Top Binder M Shoulder	3.75 3.75 1.50 2.25 3.75	\$23.17 \$10.98 \$12.19 \$17.85	/ SQ YD / SQ YD / SQ YD / SQ YD	
CLASS A PAVEMENT PATC CLASS B PAVEMENT PATC CLASS C SHOULDER PATC	HING HING HING					\$195.00 \$150.00 \$145.00	/ SQ YD / SQ YD / SQ YD	
PARTIAL DEPTH PVMT PA PARTIAL DEPTH PVMT PA	TCH (Mill & TCH (Mill &	Fill HMA Surf) Fill HMA 1.50")		Surface M Surface M	1.50 1.50	\$81.92 \$81.92	/ SQ YD / SQ YD	
LONGITUDINAL SHOULDER CENTERLINE JOINT ROUT REFLECTIVE TRANSVERSE RANDOM CRACK ROUT & S	R JOINT ROU & SEAL E CRACK RC SEAL	JT & SEAL DUT & SEAL		(100% Rehal	b = 100.00'	\$2.00 \$2.00 \$2.00 / \$2.00	/ LIN FT / LIN FT / LIN FT / LIN FT	

RIGID TOTAL LIFE-C \$1,207,261 RIGID TOTAL ANNUAL \$235,275

LIFE-CYCLE COST	ANALYSIS: NEW DESIGN	C	alculated / Re <sup>,</sup> ###	+###	
		J	PCP	HMA	
CONSTRUCTION	INITIAL COST	PRESENT ANNUAL C	\$1,051,806 \$204,979	\$873,433 \$170,217	
MAINTENANCE	LIFE-CYCLE COST	PRESENT ' ANNUAL C	\$155,455 \$30,296	\$244,636 \$47,675	
TOTAL	LIFE-CYCLE COST	PRESENT ' ANNUAL C	\$1,207,261 \$235,275	\$1,118,069 \$217,893	
LIFE-CYCLE COST	ANALYSIS: FINAL SUMMARY				
LOWEST COST OF	PTION	======= H	IMA	\$217,893	
OTHER OPTIONS	(LOWEST TO HIGHEST):	TYPE / PEJ	PCP	\$235,275	8.0%

S:\PROJECTS\74435\Pavt Designs\[revised 74435 I57pavt.xlsm]PDFSheets

07/08/20

#### FULL-DEPTH HMA PAVEMENT HMA PAVEMENT OVER RUBBLIZED PCC PAVEMENT Figure 54-7.C I MITING STRAIN CRITERION DESIGN

LIMITING STRAIN CRITERION DESI	J	ľ	ľ	۱			l
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MAINTEN	IANC ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR	5 LONG SHLD JT R&S CNTR LINE JOINT R&S RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF PWFn =	100.00% 100.00% 50.00% 0.10% 0.8626	4,420 2,210 2,431 6	LIN FT LIN FT LIN FT SQ YD PW =	\$2.00 \$2.00 \$2.00 \$85.56 0.8626 X	\$8,840 \$4,420 \$4,862 \$513 \$18,635	\$16,075
YEAR	10 LONG SHLD JT R&S CNTR LINE JOINT R&S RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF PWFn =	100.00% 100.00% 50.00% 0.50% 0.7441	4,420 2,210 2,431 29	LIN FT LIN FT LIN FT SQ YD PW =	\$2.00 \$2.00 \$85.56 0.7441 X	\$8,840 \$4,420 \$4,862 \$2,481 \$20,603	\$15,331
YEAR	15 MILL PVMT & SHLD 2.00" PD PVMT PATCH M&F ADD'L HMA OVERLAY PVMT 2.00" HMA OVERLAY SHLD 2.00 " PWFn =	100.00% 2.00" 1.00% 100.00% 100.00% 0.6419	9,822 59 5,893 3,929	SQ YD SQ YD SQ YD SQ YD PW =	\$4.00 \$80.52 \$14.66 \$9.52 0.6419 X	\$39,288 \$4,751 \$86,403 \$37,403 \$167,845	\$107,733
YEAR	20 LONG SHLD JT R&S CNTR LINE JOINT R&S RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF PWFn =	100.00% 100.00% 50.00% 0.10% 0.5537	4,420 2,210 2,431 6	LIN FT LIN FT LIN FT SQ YD PW =	\$2.00 \$2.00 \$85.56 0.5537 X	\$8,840 \$4,420 \$4,862 \$513 \$18,635	\$10,318
YEAR	25 LONG SHLD JT R&S CNTR LINE JOINT R&S RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF PWFn = HMA L SCD	100.00% 100.00% 50.00% 0.50% 0.4776	4,420 2,210 2,431 29	LIN FT LIN FT LIN FT SQ YD PW =	\$2.00 \$2.00 \$2.00 \$85.56 0.4776 X	\$8,840 \$4,420 \$4,862 \$2,481 \$20,603	\$9,840
YEAR	MILL SCOD 30 INTERSTATE MILL PVMT & SHLD 2.00" PD PVMT PATCH M&F ADD'L PD SHLD PATCH M&F ADD'L HMA OVERLAY PVMT 2.00" HMA OVERLAY SHLD 2.00 " PWFn =	100.00% 2.00" 2.00% 2.00" 1.00% 100.00% 0.4120	9,822 118 39 5,893 3,929	SQ YD SQ YD SQ YD SQ YD SQ YD PW =	\$4.00 \$80.52 \$80.52 \$14.66 \$9.52 0.4120 X	\$39,288 \$9,501 \$3,140 \$86,403 \$37,403 \$175,735	\$72,400
YEAR	35 LONG SHLD JT R&S CNTR LINE JOINT R&S RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF PWFn =	100.00% 100.00% 50.00% 0.10% 0.3554	4,420 2,210 2,431 6	LIN FT LIN FT LIN FT SQ YD PW =	\$2.00 \$2.00 \$2.00 \$85.56 0.3554 X	\$8,840 \$4,420 \$4,862 \$513 \$18,635	\$6,623
YEAR	40 LONG SHLD JT R&S CNTR LINE JOINT R&S RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF PWFn =	100.00% 100.00% 50.00% 0.50% 0.3066	4,420 2,210 2,431 29	LIN FT LIN FT LIN FT SQ YD PW =	\$2.00 \$2.00 \$2.00 \$85.56 0.3066 X	\$8,840 \$4,420 \$4,862 \$2,481 \$20,603	\$6,316
			0.04		0.00	0	¢244,636
	45 YEAR LIFE CYCLE	CRFn = 0.0407852	0.84		0.00	MAINTENANCI MAINTENANCI	\$0 \$244,636 \$47,675

07/08/20

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

MAINTENA	ANCITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR	10 PAVEMENT PATCH CLASS B PWFn =	0.10% 0.7441	6	SQ YD PW =	\$150.00 0.7441 X	\$900 \$900	\$670
YEAR	15 PAVEMENT PATCH CLASS B PWFn =	0.20% 0.6419	12	SQ YD PW =	\$150.00 0.6419 X	\$1,800 \$1,800	\$1,155
YEAR	20 PAVEMENT PATCH CLASS B SHOULDER PATCH CLASS C LONGITUDINAL SHLD JT R&S CENTERLINE JT R&S PWFn =	2.00% 0.50% 100.00% 100.00% 0.5537	118 20 4,420 2,210	SQ YD SQ YD LIN FT LIN FT PW =	\$150.00 \$145.00 \$2.00 \$2.00 0.5537 X	\$17,700 \$2,900 \$8,840 \$4,420 \$33,860	\$18,747
YEAR	25 PAVEMENT PATCH CLASS B SHOULDER PATCH CLASS C PWFn =	3.00% 1.00% 0.4776	177 39	SQ YD SQ YD PW =	\$150.00 \$145.00 0.4776 X	\$26,550 \$5,655 \$32,205	\$15,381
YEAR	30 INTERSTATE PAVEMENT PATCH CLASS B SHOULDER PATCH CLASS C HMA OVERLAY 3.75" (PVMT) HMA OVERLAY 3.75" (SHLD) PWFn =	4.00% 1.50% 100.00% 100.00% 0.4120	236 59 5,893 3,929	SQ YD SQ YD SQ YD SQ YD PW =	\$150.00 \$145.00 \$23.17 \$17.85 0.4120 X	\$35,400 \$8,555 \$136,519 \$70,131 \$250,605	\$103,246
YEAR	35 INTERSTATE LONGITUDINAL SHLD JT R&S CENTERLINE JT R&S RANDOM CRACK R&S REFLECTIVE TRANSVERSE CRACK R& PD PVMT PATCH M&F HMA SURF 1.5 PWFn =	100.00% 100.00% 50.00% \$\$ 40.00% 50" 0.10% 0.3554	4,420 2,210 2,210 1,421 6	LIN FT LIN FT LIN FT LIN FT SQ YD PW =	\$2.00 \$2.00 \$2.00 \$2.00 \$81.92 0.3554 X	\$8,840 \$4,420 \$4,420 \$2,842 \$492 \$21,014	\$7,468
YEAR	40 INTERSTATE PAVEMENT PATCH CLASS B LONGITUDINAL SHLD JT R&S CENTERLINE JT R&S REFLECTIVE TRANSVERSE CRACK R& RANDOM CRACK R&S PD PVMT PATCH M&F HMA SURF 1.5 PWFn =	0.50% 100.00% \$60.00% \$50.00% \$0" 0.50% 0.3066	29 4,420 2,210 2,131 2,210 29	SQ YD LIN FT LIN FT LIN FT LIN FT SQ YD PW =	\$150.00 \$2.00 \$2.00 \$2.00 \$2.00 \$81.92 0.3066 X	\$4,350 \$8,840 \$4,420 \$4,262 \$4,420 \$2,376 \$28,668	\$8,788 \$155,455
	ROUTINE MAINTENANCE ACTIVITY 45 YEAR LIFE CYCLE CRFn =	0.0407852	0.84	Lane Miles	\$0.00	\$0 MAINTENANC MAINTENANC	\$0 E \$155,455 E \$30,296

DE 5401 Template (Rev. 11/22/2019) IDO	T MECHA	NISTIC PAVE	MENT DE	SIGN			Printed:	07/08/2020
	PROJECT	AND TRAFF		S	(Enter Data	in Gray Shade	ed Cells)	
Route: FAI 57	Comments	Ramp Pavement						
Section: (15-22HB-4)BR (15-22)R								
County: COLES	Design Date:	02/28/2020	KLH	< BY				
Location: IL 16 Interchange East of Mattoon	Modify Date:	:		< BY	ADT	Year		
				Current:	2,800	2025		
Facility Type Interstate or Freeway		** Ramp Design F	ig. 54-1.B **	Future:	3,800	2045		
# of Lanes =	1 Lane Ramp	Crossroad?	Other Marke	d State Route	:			
		# of Lanes =	4		Structural D	esign Traffic		
				Minimum	Actual	Actual %of	% of A	DT in
Road Class:	i I			ADT	ADT	Total ADT	Design	Lane
			PV =	0	2,973	90.1%	P =	100%
Subgrade Support Rating (SSR):	Poor		SU =	250	149	4.5%	S =	100%
Construction Year:	2025		MU =	750	178	5.4%	M =	100%
Design Period (DP) =	20	years	Struct. D	)esign ADT =	3,300	(2035)		
				-		-		
		TRAFFIC F	ACTOR CAL					
FLEXIBLE	E PAVEMENT	RAMP DESIG	GN MIN		RIGID I	PAVEMENT	RAMP DE	SIGN MIN
Cpv =		0.15	32%		Cpv =	-	0.15	32%
Csu =	-	112.06	45%		Csu =	-	135.78	45%
Cmu =	-	385.44	45%		Cmu =	-	567.21	45%
TF flexible (Actual) =		(Actual ADT)	2.85	TF rig	id (Actual) =	-	(Actual ADT)	4.13
TF flexible (Min) =	-	(Min ADT Fig. 54-2	.C)	TF	rigid (Min) =	-	(Min ADT Fig.	54-2.C)
NEW CONSTRUCTIO	N / RECON	NSTRUCTION	PAVEME	INT DESI	GN CALC	CULATIO	<b>NS</b>	
Full-D	epth HMA Pa	vement			J	IPC Pavemer	nt	
Use TF flexible =	2.85			U	se TF rigid =	4.40		
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.O)		Edg	ge Support =	Tied	Shoulder or C	&G
Goto Map HMA Mixture Temp. =	78.5	deg. F (Fig. 54-5.0	C)	Rigid P	avt Thick. =	9.00	in. (Fig. 54-4.	Ξ)
Design HMA Mixture Modulus (E <sub>HMA</sub> ) =	590	ksi (Fig. 54-5.D)						
Design HMA Strain (ε <sub>ΗΜΑ</sub> ) =	89	(Fig. 54-5.E)				CRC Paver	ient	
Full Depth HMA Design Thickness =	10.50	in. (Fig. 54-5.F)		U	se TF rigid =	4.40		
Goto Map Limiting Strain Criterion Thickness =	16.00	in. (Fig. 54-5.I)			IBR value =	3		
Use Full-Depth HMA Thickness =	10.50	inches		CRCP 1	Thickness =	7.75	in. (Fig. 54-4.	VI)
					TF MUST	BE > 60 F	OR CRCP	
DECONSTRUCTION								
			FAVEIVI			od Conorata	Overlay	
	ment Over Ru				Unodnu	ieu Concrete	Overlay	
	Off Chart	in (Fig E4 E LI)			Review 5	4-4.03 for lim	tations and	
	On Chart	пп. (гту. э4-э.U)				aial aanaidara	41	
Goto Map		in (Fig E4 E )()			spe	cial considera	tions.	

CONTACT RESEARCH FOR ASSISTANCE

elace i i teado		Class II Roads		Class	III Roads	Class IV Roa	
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lar One way	nes with ADT > 2 Street with ADT	000 <= 3500	2 (ADT )	Lanes 750 -2000)	2 Lanes (ADT < 750	
	Min. Str. [	Design Traffic (Fi	g 54-2.C)		Class T	able for	
Facility Type	PV	SU*	MU*	]	One-Wa	/ Streets	
Interstate or Freeway	0	500	1500		ADT	Class	
Other Marked State Route Unmarked State Route	0 0	250 250	750 750		0 - 3500 >3501		
* Use marked route minimums for unmar	ked routes (Fig.	54-1.B)					
	Т	raffic Factor ESA	L Coefficients		Class T	able for	
	Rigid (F	ig. 54-4.C)	Flexible (F	-ig. 54-5.B)	2 or 3	lanes	
Class	Csu	Cmu	Csu	Cmu	(not future	e 4 Iane &	
	143.81	696.42	132.50	482.53	not one-w	ay street)	
l l		507.04	112.00	385.44	ADT	Class	
l II	135.78	567.21	112.00	000.11			
	135.78 129.58	567.21	109.14	384.35	0 - 749	IV	
         V	135.78 129.58 129.58	567.21 562.47 562.47	109.14 109.14	384.35 384.35	0 - 749 750 - 2000	IV III	

	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)							
		Rural			Urban			
Number of Lanes	Р	S	М	Р	S	М		
1 Lane Ramp	100%	100%	100%	100%	100%	100%		
2 or 3	50%	50%	50%	50%	50%	50%		
4	32%	45%	45%	32%	45%	45%		
6 or more	20%	40%	40%	8%	37%	37%		

BDE 5401 Template (Rev. 11/22/2019) LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

IMPROVED SUBGRADE:

07/08/2020 Printed:

FULL-DEPTH HMA PAVEM	ENT								Standard I
ROUTE SECTION COUNTY LOCATION	FAI 57 (15-22HB-4) COLES IL 16 Interch	BR (15-22)R ange East of Ma	attoon						
FACILITY TYPE		11	NTERSTATE	E					
PROJECT LENGTH # OF CENTERLINES # OF LANES # OF EDGES LANE WIDTH - AVERAGE SHOULDER WIDTH	HMA HMA Total Width	Left Right of Paved Should	lers	5410 FT 1 CL 1 LAN 2 EP 12 FT 6 FT 10 FT 16 FT	==> ES	1.02	Miles		
PAVEMENT THICKNESS SHOULDER THICKNESS HMA OVERLAY THICKNES	(FLEXIBLE) S			10.50 IN 8.00 IN 3.75 IN		16.00 HMA_SD	IN MAX Standard	d Design	
FLEX PAVEMENT TRAF	FIC FACTOR	S		MINIMUM		ACTUAL		USE -	
HMA COST PER TON HMA SURFACE HMA TOP BINDER HMA LOWER BINDER HMA BINDER (IL-9.5FG or HMA SHOULDER	IL-4.75)					UNIT PRIC \$110.00 \$95.00 \$80.00 \$85.00 \$85.00	E / TON / TON / TON / TON / TON		Read Me!
INITIAL COSTS ITEM		THICKNESS		100% QUAI UNI	Г	UNIT PRIC	E	COST	
HMA PAVEMENT (FULL-	DEPTH )	( 10.50" )	18670	18,670 SQ \	YD *	\$55.00	/ SQ YD	\$1,026,850	~
HMA SURFACE COURSE HMA TOP BINDER COURS HMA LOWER BINDER COU	E JRSE	(2.00") (2.25") (6.25")	1.0139 1.0434 1.1024	2,149 TON 2,557 TON 7,873 TON	IS * IS * IS *	\$110.00 \$95.00 \$80.00	/ TON / TON / TON	\$0 \$0 \$0	
HMA SHOULDER CURB & GUTTER		(8.00")	6518	2,920 TON 1,929 LIN	IS * FT *	\$85.00 \$30.00	/ TON / LIN F]	\$248,200 \$57,870	~
SUBBASE GRAN MATL TY	C (TONS)			889 TON	IS *	\$30.00	/ TON	\$26,670	

Standard Design

Reserved For User Supplied Item Reserved For User Supplied Item			0 L 0 L	JNITS JNITS	\$0.00 / UNITS \$0.00 / UNITS	\$0 \$0
PAVEMENT REMOVAL SHOULDER REMOVAL			28,186 S 22,970 S	SQ YD * SQ YD *	\$12.00 / SQ YD \$338,23 \$11.00 / SQ YD \$252,63	32 70
Note: * Denotes User Supplied Quantity	/				FLEXIBLE CONSTRUC\$2,147,84FLEXIBLE CONSTRUC\$85,49	43 95
MAINTENANCE COSTS: ITEM	THICKNESS	M	ATERIAL T	Г	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY					\$0.00 LANE-MILE / YEAR	
HMA OVERLAY PVMT SURF HMA OVERLAY PVMT HMA SURFACE MIX HMA BINDER MIX HMA OVERLAY SHLD (Year 30) HMA OVERLAY SHLD	( 2.00" ) ( 3.75" ) ( 1.50" ) ( 2.25" ) ( 1.75" ) ( 2.00" )	1.0139 1.0260 1.0104 1.0365 To	Surface N Surface N op Binder N Shoulder Shoulder	2.00 3.75 1.50 2.25 1.75 2.00	\$12.49 / SQ YD \$21.74 / SQ YD \$9.34 / SQ YD \$12.41 / SQ YD \$8.33 / SQ YD \$9.52 / SQ YD	
MILLING (2.00 IN)				2.00	\$3.00 / SQ YD	
PARTIAL DEPTH PVMT PATCH PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf) (Mill & Fill Surf)		Surface N Shoulder	2.00 2.00	\$82.32 / SQ YD \$79.52 / SQ YD	
PARTIAL DEPTH PVMT PATCH PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 (Mill & Fill +2.00	") Bii ")	nder Mix Shoulder	2.00 2.00	\$79.52 / SQ YD \$79.52 / SQ YD	

28,193 SQ YD \*

\$7.00 / SQ YD

\$197,351

Modified Soil Width = 46.9

LONGITUDINAL SHOULDER JOINT ROUT & SEAL CENTERLINE JOINT ROUT & SEAL RANDOM / THERMAL CRACK ROUT & SEAL \$2.00 / LIN FT \$2.00 / LIN FT (100% Reł \$2.00 / LIN FT

FLEXIBLE TOTAL LIFE\$2,763,666FLEXIBLE TOTAL ANN\$110,008

PCC PAVEMENT

ROUTE SECTION COUNTY LOCATION			FAI 57 (15-22HB-4) COLES IL 16 Interch	BR (15-22)I ange East c	R of Mattoon		
FACILITY TYPE			INTERSTAT	E			
PROJECT LENGTH # OF CENTERLINES # OF LANES # OF EDGES LANE WIDTH - AVERAGE SHOULDER WIDTH	PCC PCC Total Width	Left Right of Paved Shoulders	5410 1 2 12 6 10 16	FT ==> CL LANES EP FT FT FT FT	1.02	Miles	
PAVEMENT THICKNESS SHOULDER THICKNESS	(RIGID)	JPCP	9.00 9.00	) IN ) IN	TIED SHLD		
HMA OVERLAY THICKNES	SS		3.75	5 IN			
RIGID PAVEMENT TRAF	FIC FACTOR	RS	MINIMUM	l	ACTUAL	ι	JSE
Worksheet Construction Ty	vpe is	Reconstruction	-		- User Override	- Pavemer J	IPCP
INITIAL COSTS ITEM		THICKNESS	100% QU/	UNIT	UNIT PRICE		COST
		( 9.00" )	18,670	SQ YD *	\$50.00 \$22.00	/ SQ YD	\$933,500 \$0
STABILIZED SUBBASE		( 4.00" )	20,473	SQ YD *	\$22.00	/ SQ YD	\$573,244
PCC SHOULDERS CURB & GUTTER		(9.00" to 9.00")	6,517 1,929	SQ YD * LIN FT *	\$60.00 \$30.00	/ SQ YD / LIN F]	\$391,020 \$57,870
SUBBASE GRAN MATL TY IMPROVED SUBGRADE:	(C	(~1.74") Modified Soil Width = 46.9	646 28,193	TONS * SQ YD *	\$30.00 \$7.00	/ TON / SQ YD	\$19,380 \$197,351
Reserved For User Supplie Reserved For User Supplie	d Item d Item		0 0	UNITS UNITS	\$0.00 \$0.00	/ UNITS / UNITS	\$0 \$0
PAVEMENT REMOVAL SHOULDER REMOVAL			28,186 22,970	SQ YD * SQ YD *	\$12.00 \$11.00	/ SQ YD / SQ YD	\$338,232 \$252,670
Note: * Denotes User Sup	plied Quantity	,			RIGID CONST RIGID CONST	RUCTION RUCTION	\$2,763,267 \$109,992

MAINTENANCE COSTS: ITEM

THICKNESS

MATERIAL T

UNIT COST

JPCP

HMA OVERLAY	(3.75")		3.75	
HMA OVERLAY PAVEMENT	(3.75")	1.0260	3.75	\$21.74 / SQ YD
HMA SURFACE MIX	(1.50")	1.0104 Surface I	V 1.50	\$9.34 / SQ YD
HMA BINDER MIX	(2.25")	1.0365 Top Binder	N 2.25	\$12.41 / SQ YD
HMA OVERLAY SHOULDER	(3.75")	Shoulder	3.75	\$17.85 / SQ YD
CLASS A PAVEMENT PATCHING CLASS B PAVEMENT PATCHING CLASS C SHOULDER PATCHING				\$195.00 / SQ YD \$150.00 / SQ YD \$145.00 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill &	Fill HMA Surf)	Surface	V 1.50	\$79.24 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill &	Fill HMA 1.50 <sup>"</sup> )	Surface I	V 1.50	\$79.24 / SQ YD
LONGITUDINAL SHOULDER JOINT RO CENTERLINE JOINT ROUT & SEAL REFLECTIVE TRANSVERSE CRACK RO RANDOM CRACK ROUT & SEAL	UT & SEAL OUT & SEAL	(100% Reha	ab = 100.00' /	\$2.00 / LIN FT \$2.00 / LIN FT \$2.00 / LIN FT \$2.00 / LIN FT

RIGID TOTAL LIFE-C	\$3,167,322
RIGID TOTAL ANNUAL	\$126,076

LIFE-CYCLE COST ANALYSIS: NEW DESIGN		C	Calculated / Re <sup>,</sup> ######			
		J	PCP	HMA		
CONSTRUCTION	INITIAL COST	PRESENT	\$2,763,267	\$2,147,843		
		ANNUAL C	\$109,992	\$85,495		
MAINTENANCE	LIFE-CYCLE COST	PRESENT	\$404,055	\$615,823		
		ANNUAL C	\$16,083	\$24,513		
TOTAL	LIFE-CYCLE COST	PRESENT '	\$3,167,322	\$2,763,666		
		ANNUAL C	\$126,076	\$110,008		

# LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	====== HMA	\$110,008	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PEJPCP	\$126,076	14.6%

S:\PROJECTS\74435\Pavt Designs\[revised 74435 Ramppavt.xlsm]PDFSheets

HMA_SD		MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 07/08/20						
		FULL-DEP HMA PAVE Figure 54-7 STANDAR	TH HMA PA' EMENT OVE 7.C D DESIGN	VEMENT R RUBBLI	ZED PCC PAVEME	NT	DRESENT	
MAINTENANCITEM		%	QUANTITY	UNIT	UNIT COST	COST	WORTH	
YEAR	5 LONG SHLD JT R&S CNTR LINE JOINT R&S RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF PWFn =	100.00% 100.00% 50.00% 0.10% 0.8626	10,820 5,410 2,976 19	LIN FT LIN FT LIN FT SQ YD PW =	\$2.00 \$2.00 \$2.00 \$82.32 0.8626 X	\$21,640 \$10,820 \$5,952 \$1,564 \$39,976	\$34,484	
YEAR	10 LONG SHLD JT R&S CNTR LINE JOINT R&S RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF PWFn =	100.00% 100.00% 50.00% 0.50% 0.7441	10,820 5,410 2,976 93	LIN FT LIN FT LIN FT SQ YD PW =	\$2.00 \$2.00 \$2.00 \$82.32 0.7441 X	\$21,640 \$10,820 \$5,952 \$7,656 \$46,068	\$34,279	
YEAR	15 MILL PVMT & SHLD 2.00" PD PVMT PATCH M&F ADD'L 2.00" HMA OVERLAY PVMT 2.00"	100.00% 1.00% 100.00%	25,188 187 18,670	SQ YD SQ YD SQ YD	\$3.00 \$79.52 \$12.49	\$75,564 \$14,870 \$233,209		

\$9.52 0.6419 X \$62,050 \$385,693

\$247,562

\$22,134

\$22,002

\$227,033

RNDM / THRM CRACK R&S	50.00%	2,976	LIN FT
PD PVMT PATCH M&F SURF	0.50%	93	SQ YD
PWFn =	0.7441		PW =
15			
MILL PVMT & SHLD 2.00"	100.00%	25,188	SQ YD
PD PVMT PATCH M&F ADD'L 2.00"	1.00%	187	SQ YD
HMA OVERLAY PVMT 2.00"	100.00%	18,670	SQ YD
HMA OVERLAY SHLD 2.00 "	100.00%	6,518	SQ YD
PWFn =	0.6419		PW =
20			
LONG SHLD JT R&S	100.00%	10,820	LIN FT
CNTR LINE JOINT R&S	100.00%	5,410	LIN FT

	LONG SHLD JT R&S	100.00%	10,820	LIN FT	\$2.00	\$21,640
	CNTR LINE JOINT R&S	100.00%	5,410	LIN FT	\$2.00	\$10,820
	RNDM / THRM CRACK R&S	50.00%	2,976	LIN FT	\$2.00	\$5,952
	PD PVMT PATCH M&F SURF	0.10%	19	SQ YD	\$82.32	\$1,564
	PWFn =	0.5537		PW =	0.5537 X	\$39,976
YEAR	25					
	LONG SHLD JT R&S	100.00%	10,820	LIN FT	\$2.00	\$21,640
	CNTR LINE JOINT R&S	100.00%	5,410	LIN FT	\$2.00	\$10,820
	RNDM / THRM CRACK R&S	50.00%	2,976	LIN FT	\$2.00	\$5,952
	PD PVMT PATCH M&F SURF	0.50%	93	SQ YD	\$82.32	\$7,656
	PWFn =	0.4776		PW =	0.4776 X	\$46,068
	HMA_SD					
YEAR	30 INTERSTATE					
	MILL PVMT ONLY 2.00"	100.00%	18,670	SQ YD	\$3.00	\$56,010
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	373	SQ YD	\$79.52	\$29,661
	PD SHLD PATCH M&F SURF 2.00"	1.00%	65	SQ YD	\$79.52	\$5,169
	HMA OVERLAY PVMT 3.75 "	100.00%	18,670	SQ YD	\$21.74	\$405,935
	HMA OVERLAY SHLD 1.75 "	100.00%	6,518	SQ YD	\$8.33	\$54,294
	PWFn =	0.4120		PW =	0.4120 X	\$551,069

YEAR 35

YEAR

LONG SHLD JT R&S 100.00% 10,820 LIN FT \$2.00 \$21,640 CNTR LINE JOINT R&S 100.00% 5,410 LIN FT \$2.00 \$10,820

	RNDM / THRM CRACK R&S	S	50.00%	2,976	LIN FT	\$2.00	\$5,952	
	PD PVMT PATCH M&F SU	RF	0.10%	19	SQ YD	\$82.32	\$1,564	
	PWFn =		0.3554		PW =	0.3554 X	\$39,976	\$14,207
YEAR	40							
	LONG SHLD JT R&S		100.00%	10,820	LIN FT	\$2.00	\$21,640	
	CNTR LINE JOINT R&S		100.00%	5,410	LIN FT	\$2.00	\$10,820	
	RNDM / THRM CRACK R&S	6	50.00%	2,976	LIN FT	\$2.00	\$5,952	
	PD PVMT PATCH M&F SU	RF	0.50%	93	SQ YD	\$82.32	\$7,656	
	PWFn =		0.3066		PW =	0.3066 X	\$46,068	\$14,122
								\$615,823
	ROUTINE MAINTENANCE	ACTIVITY		1.02	Lane Miles	0.00	\$0	\$0
							MAINTENANCE	\$615,823
	45 YEAR LIFE CYCLE	CRFn = 0.04078	352				MAINTENANCE	\$24,513

07/08/20

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

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MAINTEN	JANCITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YFAR	10						
,	PAVEMENT PATCH CLASS B	0.10%	19	SQ YD	\$150.00	\$2,850	
	PWFn =	0.7441		PW =	0.7441 X	\$2,850	\$2,121
YEAR	15						
	PAVEMENT PATCH CLASS B	0.20%	37	SQ YD	\$150.00	\$5,550	
	PWFn =	0.6419		PW =	0.6419 X	\$5,550	\$3,562
YEAR	20						
	PAVEMENT PATCH CLASS B	2.00%	373	SQ YD	\$150.00	\$55,950	
	SHOULDER PATCH CLASS C	0.50%	33	SQ YD	\$145.00	\$4,785	
	LONGITUDINAL SHLD JT R&S	100.00%	10,820	LIN FT	\$2.00	\$21,640	
	CENTERLINE JT R&S	100.00%	5,410	LIN FT	\$2.00	\$10,820	
	PWFn =	0.5537		PW =	0.5537 X	\$93,195	\$51,600
YEAR	25						
	PAVEMENT PATCH CLASS B	3.00%	560	SQ YD	\$150.00	\$84,000	
	SHOULDER PATCH CLASS C	1.00%	65	SQ YD	\$145.00	\$9,425	• · · · • • •
	PWFn =	0.4776		PW =	0.4776 X	\$93,425	\$44,620
YEAR	30 INTERSTATE						
	PAVEMENT PATCH CLASS B	4.00%	747	SQ YD	\$150.00	\$112,050	
	SHOULDER PATCH CLASS C	1.50%	98	SQ YD	\$145.00	\$14,210	
	HMA OVERLAY 3.75" (PVMT)	100.00%	18,670	SQ YD	\$21.74	\$405,935	
	HMA OVERLAY 3.75"(SHLD)	100.00%	6,518	SQ YD	\$17.85	\$116,344	
	PWFn =	0.4120		PW =	0.4120 X	\$648,539	\$267,189
YEAR	35 INTERSTATE						
	LONGITUDINAL SHLD JT R&S	100.00%	10,820	LIN FT	\$2.00	\$21,640	
	CENTERLINE JT R&S	100.00%	5,410	LIN FT	\$2.00	\$10,820	
	RANDOM CRACK R&S	50.00%	2,705	LIN FT	\$2.00	\$5,410	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	1,733	LIN FT	\$2.00	\$3,466	
	PD PVMT PATCH M&F HMA SURF 1.50"	0.10%	19	SQ YD	\$79.24	\$1,506	
	PWFn =	0.3554		PW =	0.3554 X	\$42,842	\$15,225
YEAR	40 INTERSTATE						
	PAVEMENT PATCH CLASS B	0.50%	93	SQ YD	\$150.00	\$13,950	
	LONGITUDINAL SHLD JT R&S	100.00%	10,820	LIN FT	\$2.00	\$21,640	
	CENTERLINE JT R&S	100.00%	5,410	LIN FT	\$2.00	\$10,820	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	2,599	LIN FT	\$2.00	\$5,198	
	RANDOM CRACK R&S	50.00%	2,705	LIN FT	\$2.00	\$5,410	
	PD_PVMT PATCH_M&F HMA_SURF 1.50"	0.50%	93	SQ YD	\$79.24	\$7,369	<b>.</b>
	PWFn =	0.3066		PW =	0.3066 X	\$64,387	\$19,738 \$404,055
	ROUTINE MAINTENANCE ACTIVITY		1.02	Lane Miles	\$0.00	\$0	\$0

45 YEAR LIFE CYCLE

	MAINTENANCE	\$404,055
CRFn = 0.0407852	MAINTENANCE	\$16,083

E 5401 Template (Rev. 11/22/2019)	ОТ МЕСНА	NISTIC PAVI	EMENT D	ESIGN			Printed: 0	7/08/20
	PROJECT	AND TRAF	FIC INPUT	ſS	(Enter Data	n Gray Shad	ed Cells)	
Route: FAI 57	Comments	IL 16 Pavement						
Section: (15-22HB-4)BR (15-22)R								
County: COLES	Design Date	02/28/2020	KLH	< BY			_	
Location: IL 16 Interchange East of Mattoon	Modify Date	:		< BY	ADT	Year		
				Current:	18,100	2025		
Facility Type Other Marked State Route				Future:	22,800	2045	T	
# of Lanes	= 4						_	
					Structural D	esign Traffic		
				Minimum	Actual	Actual %of	% of AD	DT in
Road Clas	s:			ADT	ADT	Total ADT	Design L	ane
			PV =	0	18,753	91.7%	P =	32%
Subgrade Support Rating (SSR	): Poor		SU =	250	1,125	5.5%	S =	45%
Construction Yea	r: 2025		MU =	750	573	2.8%	M =	45%
Design Period (DP)	= 20	vears	Struct.	Design ADT =	20.450	(2035)		
				-				
		TRAFFIC	FACTOR CA					
FLEXIBL	E PAVEMENT	-		RIGID PAVEMENT				
Сру	= 0.15				Cpv =	0.15		
Csu	= 132.5				Csu =	143.81		
Cmu	= 482.53				Cmu =	696.42		
TF flexible (Actual)	= 3.85	(Actual ADT)		TF rig	gid (Actual) =	5.06	(Actual ADT)	
TF flexible (Min)	= 3.56	(Min ADT Fig. 54	4-2.C)	TF	rigid (Min) =	5.02	(Min ADT Fig. 5	4-2.C)
	ON / RECOI	NSTRUCTIO	N PAVEM	ENT DESI	GN CALC	ULATIO	NS	
Full	-Depth HMA Pa	vement			J	PC Paveme	nt	
Use TF flexible	= 3.85	_		U	se TF rigid =	5.06	_	
PG Grade Lower Binder Lifts	= PG 64-22	(Fig. 53-4.O)		Ed	ge Support =	Tied	Shoulder or C&	G
Goto Map HMA Mixture Temp.	= 78.5	deg. F (Fig. 54-	5.C)	Rigid P	avt Thick. =	9.00	in. (Fig. 54-4.E)	
Design HMA Mixture Modulus (E <sub>HMA</sub> )	= 590	ksi (Fig. 54-5.D)	)					
Design HMA Strain (ε <sub>ΗΜΑ</sub> )	= 82	(Fig. 54-5.E)				CRC Paver	nent	
Full Depth HMA Design Thickness	= 11.25	in. (Fig. 54-5.F)		U	se TF rigid =	5.06		
Goto Map Limiting Strain Criterion Thickness	= 16.00	in. (Fig. 54-5.I)			IBR value =	3		
Use Full-Depth HMA Thickness	= 11.25	inches		CRCP	Thickness =	8.00	in. (Fig. 54-4.M	)
					TF MUST	BE > 60 F	OR CRCP	
	<u></u>							
RECONSTRUCTION	ONLY (SUP	PLEMENTA	L) PAVEN	IENT DES	IGN CAL	CULATIC	DNS	
LIMA Day					امصحا ما ا	ad Camarata		

	HMA Pavement Over Rubblized PCC			Unbonded Concrete Overlay				
	Use TF flexible =	3.85		Deview 54.4.02 for limitations and				
	HMA Overlay Design Thickness =	8.00	in. (Fig. 54-5.U)	special considerations				
Goto Map	Limiting Strain Criterion Thickness =		in. (Fig. 54-5.V)					
	Use HMA Overlay Thickness =	999.00	inches	JPCP Thickness = NA inches				

CONTACT RESEARCH FOR ASSISTANCE

Class I Roads		Class II Roads		0	lass III Roa	ds	Class IV	Road
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500		000 <= 3500	2 Lanes (ADT 750 -2000)			2 Lane (ADT < 1	es 750)
	Min. Str. I	Design Traffic (Fig	g 54-2.C)	1		Class Ta	able for	
Facility Type	PV	SU	MÜ	1		One-Way	/ Streets	
Interstate or Freeway	0	500	1500	1		ADT	Class	
Other Marked State Route	0	250	750			0 - 3500	11	
Unmarked State Route	No Min	No Min	No Min			>3501	1	
Class	Rigid (F	ig. 54-4.C)	Flexible (F	ig. 54-5.B)		2 or 3	lanes	
Class	Csu	Cmu	Csu	Cmu		(not future	e 4 lane &	
1	143.81	696.42	132.50	482.53		not one-w	ay street)	
II	135.78	567.21	112.06	385.44		ADT	Class	
III N/	129.58	562.47	109.14	384.35		0 - 749	IV	
IV	129.56	302.47	109.14	364.30		>2000		
	Design La	ane Distribution F	actors For Stru	uctural Desig	∎ n Traffic (Fig	. 54-2.B)		
		Rural			Urban			
Number of Lanes	Р	S	М	Р	S	М		
1 Lane Ramp	100%	100%	100%	100%	100%	100%		
2 or 3	50%	50%	50%	50%	50%	50%		
4	32%	45%	45%	32%	45%	45%		
6 or moro	20%	40%	40%	Q 0/_	37%	37%		

BDE 5401 Template (Rev. 11/22/2019) LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

07/08/2020 Printed:

#### ROUTE FAI 57 SECTION (15-22HB-4)BR (15-22)R COUNTY COLES LOCATION IL 16 Interchange East of Mattoon FACILITY TYPE NON-INTERSTATE 0.77 Miles PROJECT LENGTH 4077 FT ==> **# OF CENTERLINES** 2 CL **# OF LANES** 4 LANES **# OF EDGES** 4 EP LANE WIDTH - AVERAGE 12 FT SHOULDER WIDTH 4 FT HMA Inside 10 FT HMA Outside **Total Width of Paved Shoulders** 28 FT PAVEMENT THICKNESS (FLEXIBLE) 11.25 IN 16.00 IN MAX SHOULDER THICKNESS 8.00 IN HMA\_SD Standard Design 2.00 IN HMA OVERLAY THICKNESS FLEX PAVEMENT TRAFFIC FACTORS MINIMUM ACTUAL USE 3.56 3.85 HMA COST PER TON UNIT PRICE HMA SURFACE \$110.00 / TON HMA TOP BINDER \$95.00 / TON HMA LOWER BINDER \$80.00 / TON HMA BINDER (IL-9.5FG or IL-4.75) \$85.00 / TON HMA SHOULDER \$85.00 / TON **INITIAL COSTS** THICKNESS UNIT PRICE COST ITEM 100% QUALUNIT 27,310 SQ YD \* HMA PAVEMENT (FULL-DEPTH) (11.25") 27310 \$60.00 / SQ YD \$1,638,606 ~ HMA SURFACE COURSE (2.00") 1.0069 3,144 TONS \* \$110.00 / TON 3,740 TONS \* HMA TOP BINDER COURSE (2.25) 1.0217 \$95.00 / TON HMA LOWER BINDER COURSE (7.00") 1.0538 12,899 TONS \* \$80.00 / TON HMA SHOULDER (8.00") 2,540 TONS \* \$85.00 / TON \$215,892 ~ 5669 7,489 LIN FT \* \$30.00 / LIN F \$224,670

CURB & GUTTER

SUBBASE GRAN MATL TY C (TONS) IMPROVED SUBGRADE: Modified Soil Width = 77.8 Standard Design

Read Me!

3.85

\$0

\$0

\$0

\$30,447

\$246,711

Reserved For User Supplied Item Reserved For User Supplied Item			0 0	UNITS UNITS	\$0.00 \$0.00	/ UNITS / UNITS	\$0 \$0
PAVEMENT REMOVAL SHOULDER REMOVAL			27,310 5,669	SQ YD * SQ YD *	\$12.00 \$11.00	/ SQ YD / SQ YD	\$327,721 \$62,362
Note: * Denotes User Supplied Quantity	y				FLEXIBLE CO FLEXIBLE CO	NSTRUC NSTRUC	\$2,746,409 \$145,064
MAINTENANCE COSTS: ITEM	THICKNESS	N	IATERIAL	т	UNIT COST		
ROUTINE MAINTENANCE ACTIVITY					\$0.00	LANE-MIL	E / YEAR
HMA OVERLAY PVMT SURF HMA OVERLAY PVMT HMA SURFACE MIX HMA BINDER MIX HMA OVERLAY SHLD (Year 30) HMA OVERLAY SHLD	( 2.00" ) ( 2.00" ) ( 2.00" ) ( 0.00" ) ( 2.00" ) ( 2.00" )	1.0069 1.0069 1.0069 1.0139 IL	Surface N Surface N -9.5FG or I Shoulder Shoulder	2.00 2.00 2.00 0.00 2.00 2.00	\$12.41 \$12.41 \$12.41 \$0.00 \$9.52 \$9.52	/ SQ YD / SQ YD / SQ YD / SQ YD / SQ YD / SQ YD	
MILLING (2.00 IN)				2.00	\$3.00	/ SQ YD	
PARTIAL DEPTH PVMT PATCH PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf) (Mill & Fill Surf)		Surface M Shoulder	2.00 2.00	\$82.32 \$79.52	/ SQ YD / SQ YD	
PARTIAL DEPTH PVMT PATCH PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 (Mill & Fill +2.00	") B	inder Mix Shoulder	2.00 2.00	\$79.52 \$79.52	/ SQ YD / SQ YD	

1,015 TONS \*

35,244 SQ YD \*

\$30.00 / TON

\$7.00 / SQ YD

LONGITUDINAL SHOULDER JOINT ROUT & SEAL CENTERLINE JOINT ROUT & SEAL RANDOM / THERMAL CRACK ROUT & SEAL \$2.00 / LIN FT \$2.00 / LIN FT (100% Reł \$2.00 / LIN FT

FLEXIBLE TOTAL LIFE\$3,540,099FLEXIBLE TOTAL ANN\$186,987

PCC PAVEMENT

ROUTE SECTION COUNTY LOCATION		FAI 57 (15-22HB-4)BR (15-22)I COLES IL 16 Interchange East o	२ of Mattoon		
FACILITY TYPE		NON-INTERSTATE			
PROJECT LENGTH # OF CENTERLINES # OF LANES # OF EDGES LANE WIDTH - AVERAGE SHOULDER WIDTH PCC PCC Total Width	Inside Outside of Paved Shoulders	4077 FT ==> 2 CL 4 LANES 4 EP 12 FT 4 FT 10 FT 28 FT	0.77	Miles	
PAVEMENT THICKNESS (RIGID) SHOULDER THICKNESS	JPCP	9.00 IN 9.00 IN	TIED SHLD		
HMA OVERLAY THICKNESS		2.75 IN			
RIGID PAVEMENT TRAFFIC FACTO	RS		ACTUAL	l	JSE
Worksheet Construction Type is	Reconstruction	5.02	The Pavement	Type is 、	JPCP
INITIAL COSTS ITEM	THICKNESS	100% QUA UNIT	UNIT PRICE		COST
JPC PAVEMENT PAVEMENT REINFORCEMENT STABILIZED SUBBASE	( 9.00" ) ( 4.00" )	27,310 SQ YD * 0 SQ YD 28,669 SQ YD *	\$55.00 \$22.00 \$28.00	/ SQ YD / SQ YD / SQ YD	\$1,502,056 \$0 \$802,735
PCC SHOULDERS CURB & GUTTER	(9.00" to 9.00")	5,669 SQ YD * 7,489 LIN FT *	\$60.00 \$30.00	/ SQ YD / LIN F]	\$340,158 \$224,670
SUBBASE GRAN MATL TY C IMPROVED SUBGRADE:	(~ 3.37") Modified Soil Width = 77.8	1,088 TONS * 35,244 SQ YD *	\$30.00 \$7.00	/ TON / SQ YD	\$32,640 \$246,711
Reserved For User Supplied Item Reserved For User Supplied Item		0 UNITS 0 UNITS	\$0.00 \$0.00	/ UNITS / UNITS	\$0 \$0
PAVEMENT REMOVAL SHOULDER REMOVAL		27,310 SQ YD * 5,669 SQ YD *	\$12.00 \$11.00	/ SQ YD / SQ YD	\$327,721 \$62,362
Note: * Denotes User Supplied Quantit	у		RIGID CONST RIGID CONST	RUCTION RUCTION	\$3,539,053 \$186,932

MAINTENANCE COSTS: ITEM

THICKNESS

MATERIAL T

UNIT COST

JPCP

HMA OVERLAY	(2.75")			2.75		
HMA OVERLAY PAVEMENT	(2.75")	1.0095		2.75	\$15.33	/ SQ YD
HMA SURFACE MIX	(1.50")	1.0052	Surface N	1.50	\$9.29	/ SQ YD
HMA BINDER MIX	(1.25")	1.0148 IL	-9.5FG or I	1.25	\$6.04	/ SQ YD
HMA OVERLAY SHOULDER	(2.75")		Shoulder	2.75	\$13.09	/ SQ YD
CLASS A PAVEMENT PATCHING CLASS B PAVEMENT PATCHING CLASS C SHOULDER PATCHING					\$195.00 \$150.00 \$145.00	/ SQ YD / SQ YD / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill &	Fill HMA Surf)		Surface N	1.50	\$79.24	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill &	Fill HMA 2.75 <sup>"</sup> )		Surface N	2.75	\$86.94	/ SQ YD
LONGITUDINAL SHOULDER JOINT ROU CENTERLINE JOINT ROUT & SEAL REFLECTIVE TRANSVERSE CRACK RO RANDOM CRACK ROUT & SEAL	JT & SEAL DUT & SEAL	(1	00% Rehab =	100.00' /	\$2.00 \$2.00 \$2.00 \$2.00	/ LIN FT / LIN FT / LIN FT / LIN FT

RIGID TOTAL LIFE-C \$4,022,719 RIGID TOTAL ANNUAL \$212,479

Calculated / Re<sup>,</sup> ######

		J	PCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT '	\$3,539,053	\$2,746,409
		ANNUAL C	\$186,932	\$145,064
MAINTENANCE	LIFE-CYCLE COST	PRESENT '	\$483,666	\$793,690
		ANNUAL C	\$25,547	\$41,922
TOTAL	LIFE-CYCLE COST	PRESENT	\$4,022,719	\$3,540,099
		ANNUAL C	\$212,479	\$186,987

# LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	====== HMA	\$186,987	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PEJPCP	\$212,479	13.6%

S:\PROJECTS\74435\Pavt Designs\[revised 74435 IL16pavt.xlsm]PDFSheets

HMA_SD		MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE							
		FULL-DEP HMA PAVE Figure 54-7 STANDAR	FULL-DEPTH HMA PAVEMENT HMA PAVEMENT OVER RUBBLIZED PCC PAVEMENT Figure 54-7.C STANDARD DESIGN						
MAINTENANCITEM		%	QUANTITY	UNIT	UNIT COST	COST	WORTH		
YEAR	5 LONG SHLD JT R&S CNTR LINE JOINT R&S RNDM / THRM CRACK R&S PD PVMT PATCH M&F SURF	100.00% 100.00% 50.00% 0.10%	16,308 8,154 8,969 27	LIN FT LIN FT LIN FT SQ YD	\$2.00 \$2.00 \$2.00 \$82.32	\$32,616 \$16,308 \$17,938 \$2,223			

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	PD PVMT PATCH M&F SURF PWFn =	0.10% 0.8626	27	SQ YD PW =	\$82.32 0.8626 X	\$2,223 \$69,085	\$59,593
	10						
ILAN	LONG SHID JT R&S	100.00%	16,308	LIN FT	\$2.00	\$32 616	
	CNTR LINE JOINT R&S	100.00%	8,154		\$2.00	\$16,308	
	RNDM / THRM CRACK R&S	50.00%	8,969	LIN FT	\$2.00	\$17,938	
	PD PVMT PATCH M&F SURF	0.50%	137	SQ YD	\$82.32	\$11.278	
	PWFn =	0.7441		PW =	0.7441 X	\$78,140	\$58,143
YEAR	15						
	MILL PVMT & SHLD 2.00"	100.00%	32,980	SQ YD	\$3.00	\$98,940	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	273	SQ YD	\$79.52	\$21,709	
	HMA OVERLAY PVMT 2.00"	100.00%	27,310	SQ YD	\$12.41	\$338,797	
	HMA OVERLAY SHLD 2.00 "	100.00%	5,669	SQ YD	\$9.52	\$53,973	
	PWFn =	0.6419		PW =	0.6419 X	\$513,419	\$329,544
YEAR	20						
	LONG SHLD JT R&S	100.00%	16,308	LIN FT	\$2.00	\$32,616	
	CNTR LINE JOINT R&S	100.00%	8,154	LIN FT	\$2.00	\$16,308	
	RNDM / THRM CRACK R&S	50.00%	8,969	LIN FT	\$2.00	\$17,938	
	PD PVMT PATCH M&F SURF	0.10%	27	SQ YD	\$82.32	\$2,223	
	PWFn =	0.5537		PW =	0.5537 X	\$69,085	\$38,251
YEAR	25						
	LONG SHLD JT R&S	100.00%	16,308	LIN FT	\$2.00	\$32,616	
	CNTR LINE JOINT R&S	100.00%	8,154	LIN FT	\$2.00	\$16,308	
	RNDM / THRM CRACK R&S	50.00%	8,969	LIN FT	\$2.00	\$17,938	
	PD PVMT PATCH M&F SURF	0.50%	137	SQ YD	\$82.32	\$11,278	•
	PWFn = HMA_SD	0.4776		PW =	0.4776 X	\$78,140	\$37,320
YEAR	30 NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	32,980	SQ YD	\$3.00	\$98,940	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	546	SQ YD	\$79.52	\$43,418	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	57	SQ YD	\$79.52	\$4,533	
	HMA OVERLAY PVMT 2.00 "	100.00%	27,310	SQ YD	\$12.41	\$338,797	
	HMA OVERLAY SHLD 2.00 "	100.00%	5,669	SQ YD	\$9.52	\$53,973	
	PWFn =	0.4120		PW =	0.4120 X	\$539,661	\$222,333
YEAR	35						

	55							
	LONG SHLD JT R&S	100.00%	16,308	LIN FT	\$2.00	\$32,616		
	CNTR LINE JOINT R&S	100.00%	8,154	LIN FT	\$2.00	\$16,308		
	RNDM / THRM CRACK R&S	50.00%	8,969	LIN FT	\$2.00	\$17,938		
	PD PVMT PATCH M&F SURF	0.10%	27	SQ YD	\$82.32	\$2,223		
	PWFn =	0.3554		PW =	0.3554 X	\$69,085	\$24,552	
YEAR	40							
	LONG SHLD JT R&S	100.00%	16,308	LIN FT	\$2.00	\$32,616		
	CNTR LINE JOINT R&S	100.00%	8,154	LIN FT	\$2.00	\$16,308		
	RNDM / THRM CRACK R&S	50.00%	8,969	LIN FT	\$2.00	\$17,938		
	PD PVMT PATCH M&F SURF	0.50%	137	SQ YD	\$82.32	\$11,278		
	PWFn =	0.3066		PW =	0.3066 X	\$78,140	\$23,954	
							\$793,690	
	ROUTINE MAINTENANCE ACTIVITY		3.09 Lane Miles	Lane Miles	0.00	\$0	\$0	
	45 YEAR LIFE CYCLE	CRFn = 0.0407852				MAINTENANCE	\$793,690 \$41,922	

07/08/20

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

-

MAINTEN	JANCITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR	10 PAVEMENT PATCH CLASS B	0.10%	27	SQ YD	\$150.00	\$4,050	<b>\$</b> 0.044
	PVVFN =	0.7441		PVV =	0.7441 X	\$4,050	\$3,014
YEAR	15 PAVEMENT PATCH CLASS B	0.20%	55	SO YD	\$150.00	\$8 250	
	PWFn =	0.6419	00	PW =	0.6419 X	\$8,250	\$5,295
YEAR	20						
	PAVEMENT PATCH CLASS B	2.00%	546	SQ YD	\$150.00	\$81,900	
	SHOULDER PATCH CLASS C	0.50%	28	SQ YD	\$145.00	\$4,060	
	LONGITUDINAL SHLD JT R&S	100.00%	16,308	LIN FT	\$2.00	\$32,616	
	CENTERLINE JT R&S	100.00%	8,154	LIN FT	\$2.00	\$16,308	
	PWFn =	0.5537		PW =	0.5537 X	\$134,884	\$74,682
YEAR	25				• • • • • •	• · · · · · ·	
	PAVEMENT PATCH CLASS B	3.00%	819	SQ YD	\$150.00	\$122,850	
	SHOULDER PATCH CLASS C	1.00%	57	SQ YD	\$145.00	\$8,265	<b>*</b> • • • • • •
	PWFn =	0.4776		PW =	0.4776 X	\$131,115	\$62,621
YEAR	30 NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	4.00%	1,092	SQ YD	\$150.00	\$163,800	
	SHOULDER PATCH CLASS C	1.50%	85	SQ YD	\$145.00	\$12,325	
	HMA OVERLAY 2.75" (PVMT)	100.00%	27,310	SQ YD	\$15.33	\$418,553	
	HMA OVERLAY 2.75" (SHLD)	100.00%	5,669	SQ YD	\$13.09	\$74,213	
	PWFn =	0.4120		PW =	0.4120 X	\$668,891	\$275,574
YEAR	35 NON-INTERSTATE						
	LONGITUDINAL SHLD JT R&S	100.00%	16,308	LIN FT	\$2.00	\$32,616	
	CENTERLINE JT R&S	100.00%	8,154	LIN FT	\$2.00	\$16,308	
	RANDOM CRACK R&S	50.00%	8,154	LIN FT	\$2.00	\$16,308	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	5,222	LIN FT	\$2.00	\$10,444	
	PD PVMT PATCH M&F HMA 2.75"	0.10%	27	SQ YD	\$86.94	\$2,347	
	PWFn =	0.3554		PW =	0.3554 X	\$78,023	\$27,728
YEAR	40 NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	0.50%	137	SQ YD	\$150.00	\$20,550	
	LONGITUDINAL SHLD JT R&S	100.00%	16,308	LIN FT	\$2.00	\$32,616	
	CENTERLINE JT R&S	100.00%	8,154	LIN FT	\$2.00	\$16,308	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	7,834	LIN FT	\$2.00	\$15,668	
	RANDOM CRACK R&S	50.00%	8,154	LIN FT	\$2.00	\$16,308	
	PD PVMT PATCH M&F HMA 2.75"	0.50%	137	SQ YD	\$86.94	\$11,911	
	PWFn =	0.3066		PW =	0.3066 X	\$113,361	\$34,752 \$483,666
	ROUTINE MAINTENANCE ACTIVITY		3.09	Lane Miles	\$0.00	\$0	\$0

45 YEAR LIFE CYCLE

	MAINTENANCE	\$483,666
CRFn = 0.0407852	MAINTENANCE	\$25,547