



Illinois Department of Transportation

To: Kensil A. Garnett Attn: Karen Dvorsky
From: Jack A. Elston By: Michael Brand *Michael Brand*
Subject: Pavement Design Approval
Date: February 2, 2021

Route: US 24/IL 9 Job No.: D-94-045-16
Section: (43-BR) BR Contract No.: 68D34
County: Fulton Target Letting:
Limits: 5-lane section through Banner, IL

We have reviewed the pavement design for the above referenced project which was most recently submitted on January 22, 2021. The project will replace the Copperas Creek bridge and 1.1 miles of pavement beginning just west of and continuing east through Banner, IL. The new pavement will provide a 5-lane cross section including a bi-directional turn lane west of the new structure.

The pavement design resulted in two options: 10.75" full-depth HMA and 9" JPCP. The LCCA showed the two options to be within 10% of each other and thus alternate bidding will be used.

In summary, the approved pavement design is:

US 24/IL 9 - Pavement Replacement - Alternate Bid

Flexible Alternate

10.75" Full-Depth HMA
12" Agg. Subgrade Improvement

Rigid Alternate

9" JPCP w/ tied Shlds.
4" Stabilized Subbase
12" Agg. Subgrade Improvement

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

RECOMMENDATION

The full length proposed improvement consists of reconstructing 8.4 miles of US Route 24 between Banner and Kingston Mines from 2 lanes to a 4-lane divided highway. The eastern 7.3 miles, from east of Banner heading east toward Kingston Mines, will consist of constructing 2 new lanes on the north side of the existing US 24 pavement for accommodation of proposed westbound (WB) traffic. The existing 2 lane pavement will remain in place and be rehabilitated to accommodate proposed eastbound (EB) traffic. Pavement for the contract containing the 7.3 miles of new 2 lane pavement for the proposed 4-lane divided highway from east of Banner to Kingston Mines will be addressed in a separate pavement design.

This pavement design addresses the 1.1 mile reconstruction segment in Banner, IL to replace the Copperas Creek bridge which is 320' of the total length. Contract (68D34). Beginning just west of and continuing east through Banner for 1.1 miles, the existing pavement will be removed and replaced with 5 new lanes including a bi-directional turn lane west of the new structure.

The present construction cost for the mechanistic rigid pavement design for the 5-lane section according to the construction cost analysis is \$4,392,551. The present construction cost for the mechanistic flexible pavement is \$3,652,205 making full-depth HMA cheaper by approximately 20%. The present life-cycle cost for the mechanistic rigid pavement is \$4,900,469 and the life-cycle cost for the mechanistic flexible pavement is \$4,571,899. This equates to a **7.2%** higher cost for jointed pcc pavement **life cycle cost**.

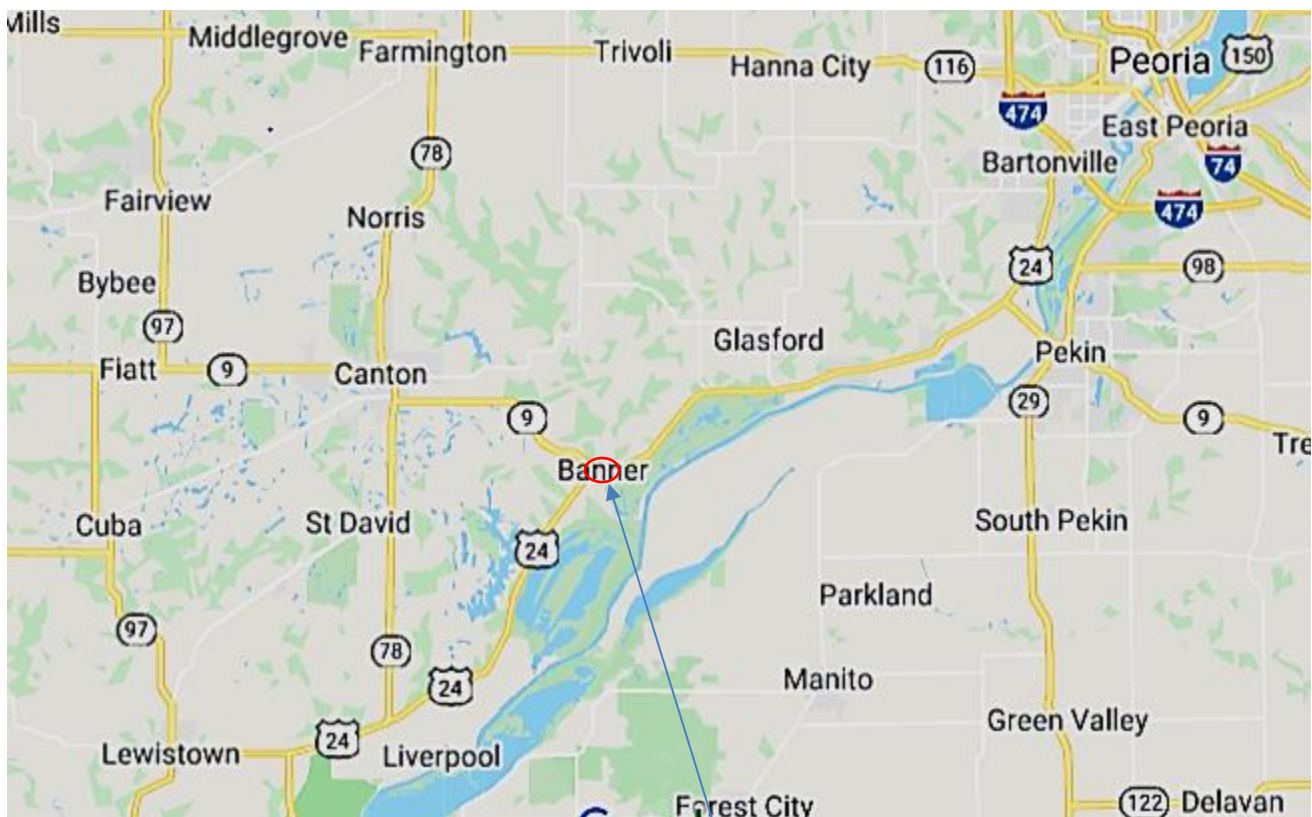
Per BDE Manual section 54-1.04, since the life-cycle cost difference between HMA and concrete pavement is less than 10%, the selection is to be based on an alternate pavement bidding process.

The District recommends using the design of either 9" Jointed PCC or 10 3/4" HMA Full Depth pavement. The HMA pavement would be placed directly on 12" of sub-base granular material, Ty A for this short segment. The Jointed PCC pavement would be placed on a 4" stabilized sub-base and 12" of sub-base granular material. Due to the short segments of pavement, limited working room, and immediately adjacent residences lime or cement modified soil is not feasible to incorporate into the subgrade.

Finally, existing sideroads are either HMA or tar and chip. The proposed improvement will include reconstructing sideroads due to geometric or grade changes. Pavement type for the sideroad approaches will be dictated by the local agency in order to facilitate the jurisdiction of the approaches remaining with the local agency.

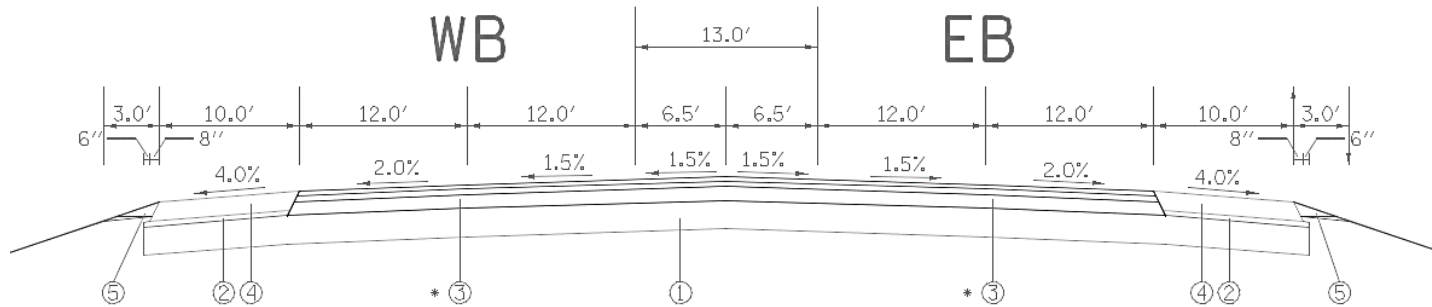
EXHIBIT A

LOCATION MAP

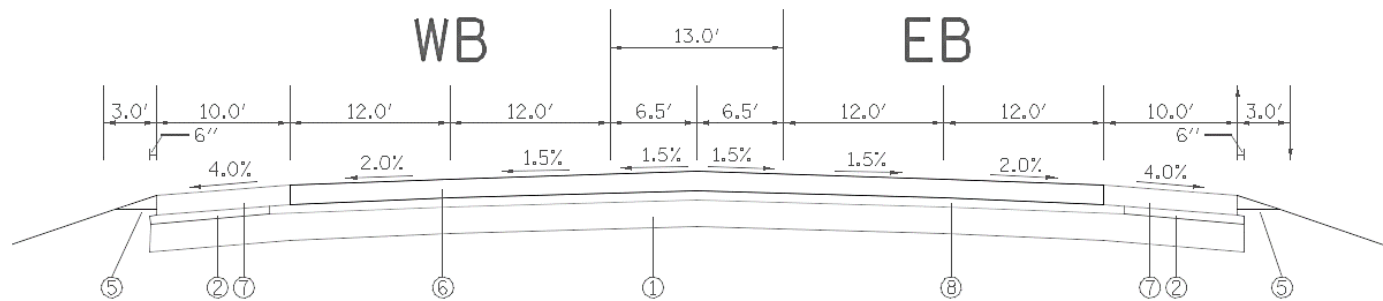


PROJECT LOCATION

5-LANE SECTION



HMA FULL DEPTH PAVEMENT 10 3/4"



PCC PAVEMENT 9" (JOINTED)

- ① SUBBASE GRANULAR MATERIAL, TYPE A, 12"
- ② SUBBASE GRANULAR MATERIAL, TYPE C
- ③ HOT-MIX ASPHALT PAVEMENT (FULL DEPTH), 10 3/4"
- ④ HOT-MIX ASPHALT SHOULDERS, 8"
- ⑤ AGGREGATE SHOULDERS, TY B
- ⑥ PORTLAND CEMENT CONCRETE PAVEMENT, 9" (JOINTED)
- ⑦ PORTLAND CEMENT CONCRETE SHOULDERS, 9"
- ⑧ STABILIZED SUBBASE, 4"

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: **US 24/ IL 9** Comments: **5-LANE SECTION THROUGH BANNER. LENGTH = 5700 FEET**

Section: _____

County: **FULTON/ PEORIA** Design Date: **06/18/2020** **CRO** <-- BY _____

Location: **BANNER TO KINGSTON MINES** Modify Date: _____ <-- BY _____

	ADT	Year
Current:	7,850	2019
Future:	9,771	2041

Facility Type: **Other Marked State Route**

of Lanes = **4**

Road Class: **I**

Subgrade Support Rating (SSR): **Poor**

Construction Year: **2021**

Design Period (DP) = **20** years

Structural Design Traffic			
Minimum ADT	Actual ADT	Actual % of Total ADT	% of ADT in Design Lane
PV = 0	7,695	86.5%	P = 32%
SU = 250	643	7.2%	S = 45%
MU = 750	560	6.3%	M = 45%
Struct. Design ADT = 8,898		(2031)	

RESET

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT		RIGID PAVEMENT	
Cpv = 0.15		Cpv = 0.15	
Csu = 132.5		Csu = 143.81	
Cmu = 482.53		Cmu = 696.42	
TF flexible (Actual) = 3.21	(Actual ADT)	TF rigid (Actual) = 4.35	(Actual ADT)
TF flexible (Min) = 3.56	(Min ADT Fig. 54-2.C)	TF rigid (Min) = 5.02	(Min ADT Fig. 54-2.C)



NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement	JPC Pavement
Use TF flexible = 3.56	Use TF rigid = 5.02
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.O)	Edge Support = Tied Shoulder or C&G
HMA Mixture Temp. = 77.0 deg. F (Fig. 54-5.C)	Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)
Design HMA Mixture Modulus (E _{HMA}) = 630 ksi (Fig. 54-5.D)	
Design HMA Strain (ε _{HMA}) = 84 (Fig. 54-5.E)	
Full Depth HMA Design Thickness = 10.75 in. (Fig. 54-5.F)	CRC Pavement
Limiting Strain Criterion Thickness = 15.50 in. (Fig. 54-5.I)	Use TF rigid = 5.02
Use Full-Depth HMA Thickness = 10.75 inches	IBR value = 3
	CRCP Thickness = 8.00 in. (Fig. 54-4.M)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Pavement Over Rubblized PCC	Unbonded Concrete Overlay
Use TF flexible = 3.56	Review 54-4.03 for limitations and special considerations.
HMA Overlay Design Thickness = 7.75 in. (Fig. 54-5.U)	
Limiting Strain Criterion Thickness = 11.25 in. (Fig. 54-5.V)	
Use HMA Overlay Thickness = 7.75 inches	JPCP Thickness = NA inches

CONTACT RESEARCH FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
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	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

Facility Type	Min. Str. Design Traffic (Fig 54-2.C)		
	PV	SU	MU
Interstate or Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

Class	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
I	Csu	Cmu	Csu	Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

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

Class Table for One-Way Streets	
ADT	Class
0 - 3500	II
>3501	I

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

PLEASE READ

Standard Design

Reset / Setup Worksheet

Print Menu

ROUTE US 24/ IL 9
 SECTION
 COUNTY FULTON/ PEORIA
 LOCATION BANNER TO KINGSTON MINES

FACILITY TYPE I/N NON-INTERSTATE

PROJECT LENGTH 5709 FT ==> 1.08 Miles
 # OF CENTERLINES 1 CL
 # OF LANES 5 LANES
 # OF EDGES 2 EP
 LANE WIDTH - AVERAGE 12.2 FT
 SHOULDER WIDTH HMA Left 10 FT
 HMA Right 10 FT
 Total Width of Paved Shoulders 20 FT

USER OVERRIDE COLUMN

Override Column Show / Hide

Override On / Off

PAVEMENT THICKNESS (FLEXIBLE) 10.75 IN 15.50 IN MAX
 SHOULDER THICKNESS 8.00 IN HMA_SD Standard Design
 HMA OVERLAY THICKNESS 2.00 IN

On User Override

FLEX PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		2.85	2.41	2.85

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	\$102.10 /TON
HMA TOP BINDER	\$91.25 /TON
HMA LOWER BINDER	\$81.50 /TON
HMA BINDER (IL-9.5FG or IL-4.75)	/TON
HMA SHOULDER	/TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST	USER SUPPLIED QUANTITY	USER SUPPLIED UNIT PRICE
HMA PAVEMENT (FULL-DEPTH)	(10.75")	38694	38,694 SQ YD	\$53.34 /SQ YD	\$0		
HMA SURFACE COURSE	(2.00")	1,0027	4,348 TONS	\$102.10 /TON	\$443,931	4,348	
HMA TOP BINDER COURSE	(2.25")	1,0085	4,924 TONS	\$91.25 /TON	\$449,315	4,924	
HMA LOWER BINDER COURSE	(6.50")	1,0205	14,385 TONS	\$81.50 /TON	\$1,172,378	14,385	
HMA SHOULDER	(8.00")	12687	12,687 SQ YD	\$40.00 /SQ YD	\$507,480	12,687	\$40.00
CURB & GUTTER			0 LIN FT	\$30.00 /LIN FT	\$0		
SUBBASE GRAN MATL TY C (TONS)			1,895 TONS	\$28.70 /TON	\$54,387	1,895	
IMPROVED SUBGRADE:	Modified Soil Width = 83.8'		53,152 SQ YD		\$0		
SUBBASE GRANULAR MATERIAL, TY A, 12"			53,094 SQ YD	\$19.30 /SQ YD	\$1,024,714	53,094	
Reserved For User Supplied Item			0 UNITS	\$0.00 /UNITS	\$0		
PAVEMENT REMOVAL			38,694 SQ YD	\$0.00 /SQ YD	\$0		
SHOULDER REMOVAL			12,687 SQ YD	\$0.00 /SQ YD	\$0		
Note: * Denotes User Supplied Quantity					FLEXIBLE CONSTRUCTION INITIAL COST	\$3,652,205	
					FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	\$137,763	

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	T	UNIT COST	Schedule Quantity	Unit Cost Override
ROUTINE MAINTENANCE ACTIVITY				\$0.00 LANE-MILE / YEAR		
HMA OVERLAY PVMT SURF	(2.00")	1,0027	Surface Mix 2.00	\$11.47 /SQ YD	38694	
HMA OVERLAY PVMT	(2.00")	1,0027	Surface Mix 2.00	\$11.47 /SQ YD	38694	
HMA SURFACE MIX	(2.00")	1,0027	Surface Mix 2.00	\$11.47 /SQ YD	38694	
HMA BINDER MIX	(0.00")	1,0055	-4.75 Binder Mix 0.00	\$0.00 /SQ YD	38694	
HMA OVERLAY SHLD (Year 30)	(2.00")		Shoulder Mix 2.00	\$0.00 /SQ YD	12687	
HMA OVERLAY SHLD	(2.00")		Shoulder Mix 2.00	\$0.00 /SQ YD	12687	
MILLING (2.00 IN)			2.00	\$3.00 /SQ YD		
PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf)			Surface Mix 2.00	\$81.44 /SQ YD		
PARTIAL DEPTH SHLD PATCH (Mill & Fill Surf)			Shoulder Mix 2.00	\$70.00 /SQ YD		
PARTIAL DEPTH PVMT PATCH (Mill & Fill +2.00')			Binder Mix 2.00	\$70.00 /SQ YD		
PARTIAL DEPTH SHLD PATCH (Mill & Fill +2.00')			Shoulder Mix 2.00	\$70.00 /SQ YD		
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				\$2.00 /LIN FT		
CENTERLINE JOINT ROUT & SEAL				\$2.00 /LIN FT		
RANDOM / THERMAL CRACK ROUT & SEAL (100% Rehab = 110.00' / Station / Lane)				\$2.00 /LIN FT		

FLEXIBLE TOTAL LIFE-CYCLE COST \$4,571,899
 FLEXIBLE TOTAL ANNUAL COST PER MILE \$172,454

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

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 5							
	LONG SHLD JT R&S	100.00%	11,418	LIN FT	\$2.00	\$22,836	
	CNTR LINE JOINT R&S	100.00%	5,709	LIN FT	\$2.00	\$11,418	
	RNDM / THRM CRACK R&S	50.00%	15,700	LIN FT	\$2.00	\$31,400	
	PD PVMT PATCH M&F SURF	0.10%	39	SQ YD	\$81.44	\$3,176	
	PWFn =	0.8626		PW =	0.8626 X	\$68,830	\$59,373
YEAR 10							
	LONG SHLD JT R&S	100.00%	11,418	LIN FT	\$2.00	\$22,836	
	CNTR LINE JOINT R&S	100.00%	5,709	LIN FT	\$2.00	\$11,418	
	RNDM / THRM CRACK R&S	50.00%	15,700	LIN FT	\$2.00	\$31,400	
	PD PVMT PATCH M&F SURF	0.50%	193	SQ YD	\$81.44	\$15,717	
	PWFn =	0.7441		PW =	0.7441 X	\$81,371	\$60,548
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	51,381	SQ YD	\$3.00	\$154,143	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	387	SQ YD	\$70.00	\$27,090	
	HMA OVERLAY PVMT 2.00"	100.00%	38,694	SQ YD	\$11.47	\$443,686	
	HMA OVERLAY SHLD 2.00 "	100.00%	12,687	SQ YD	\$0.00	\$0	
	PWFn =	0.6419		PW =	0.6419 X	\$624,919	\$401,112
YEAR 20							
	LONG SHLD JT R&S	100.00%	11,418	LIN FT	\$2.00	\$22,836	
	CNTR LINE JOINT R&S	100.00%	5,709	LIN FT	\$2.00	\$11,418	
	RNDM / THRM CRACK R&S	50.00%	15,700	LIN FT	\$2.00	\$31,400	
	PD PVMT PATCH M&F SURF	0.10%	39	SQ YD	\$81.44	\$3,176	
	PWFn =	0.5537		PW =	0.5537 X	\$68,830	\$38,110
YEAR 25							
	LONG SHLD JT R&S	100.00%	11,418	LIN FT	\$2.00	\$22,836	
	CNTR LINE JOINT R&S	100.00%	5,709	LIN FT	\$2.00	\$11,418	
	RNDM / THRM CRACK R&S	50.00%	15,700	LIN FT	\$2.00	\$31,400	
	PD PVMT PATCH M&F SURF	0.50%	193	SQ YD	\$81.44	\$15,717	
	PWFn =	0.4776		PW =	0.4776 X	\$81,371	\$38,863
HMA_SD							
YEAR 30							
	NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	51,381	SQ YD	\$3.00	\$154,143	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	774	SQ YD	\$70.00	\$54,180	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	127	SQ YD	\$70.00	\$8,890	
	HMA OVERLAY PVMT 2.00 "	100.00%	38,694	SQ YD	\$11.47	\$443,686	
	HMA OVERLAY SHLD 2.00 "	100.00%	12,687	SQ YD	\$0.00	\$0	
	PWFn =	0.4120		PW =	0.4120 X	\$660,899	\$272,282
YEAR 35							
	LONG SHLD JT R&S	100.00%	11,418	LIN FT	\$2.00	\$22,836	
	CNTR LINE JOINT R&S	100.00%	5,709	LIN FT	\$2.00	\$11,418	
	RNDM / THRM CRACK R&S	50.00%	15,700	LIN FT	\$2.00	\$31,400	
	PD PVMT PATCH M&F SURF	0.10%	39	SQ YD	\$81.44	\$3,176	
	PWFn =	0.3554		PW =	0.3554 X	\$68,830	\$24,461
YEAR 40							
	LONG SHLD JT R&S	100.00%	11,418	LIN FT	\$2.00	\$22,836	
	CNTR LINE JOINT R&S	100.00%	5,709	LIN FT	\$2.00	\$11,418	
	RNDM / THRM CRACK R&S	50.00%	15,700	LIN FT	\$2.00	\$31,400	
	PD PVMT PATCH M&F SURF	0.50%	193	SQ YD	\$81.44	\$15,717	
	PWFn =	0.3066		PW =	0.3066 X	\$81,371	\$24,945
							\$919,694
ROUTINE MAINTENANCE ACTIVITY				5.41 Lane Miles	0.00	\$0	\$0
						MAINTENANCE LIFE-CYCLE COST	\$919,694
45	YEAR LIFE CYCLE	CRFn = 0.0407852				MAINTENANCE ANNUAL COST PER MILE	\$34,691

PCC PAVEMENT

JPCP

ROUTE **US 24/ IL 9**
 SECTION **0**
 COUNTY **FULTON/ PEORIA**
 LOCATION **BANNER TO KINGSTON MINES**

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **5709 FT ==>** 1.08 Miles
 # OF CENTERLINES **1 CL**
 # OF LANES **5 LANES**
 # OF EDGES **2 EP**
 LANE WIDTH - AVERAGE **12.2 FT**
 SHOULDER WIDTH **PCC Left 10 FT**
 PCC Right 10 FT
 Total Width of Paved Shoulders **20 FT**

**USER
 OVERRIDE
 COLUMN**

Override Column
 Show / Hide

Override
 On / Off

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

HMA OVERLAY THICKNESS **2.75 IN**

**On
 User
 Override**

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	4.13	3.38	4.13
Worksheet Construction Type is New Construction	The Pavement Type is		JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST	USER SUPPLIED QUANTITY
JPC PAVEMENT	(9.00")	38,694	SQ YD	\$50.00 /SQ YD	\$1,934,700	38,694
PAVEMENT REINFORCEMENT		0	SQ YD		\$0	
STABILIZED SUBBASE	(4.00")	40,597	SQ YD	\$19.30 /SQ YD	\$783,522	
PCC SHOULDERS		12,687	SQ YD	\$47.00 /SQ YD	\$596,289	
CURB & GUTTER		0	LIN FT		\$0	
SUBBASE GRAN MATL TY C	(~ 1.66")	2,361	TONS	\$27.00 /TON	\$63,747	2,361
IMPROVED SUBGRADE:	Modified Soil Width = 82.0'	52,015	SQ YD		\$0	
SUBBASE GRANULAR MATERIAL, TY A, 12"		52,015	SQ YD	\$19.50 /SQ YD	\$1,014,293	52,015
Reserved For User Supplied Item		0	UNITS	\$0.00 /UNITS	\$0	
PAVEMENT REMOVAL		38,694	SQ YD	\$0.00 /SQ YD	\$0	
SHOULDER REMOVAL		12,687	SQ YD	\$0.00 /SQ YD	\$0	
Note: * Denotes User Supplied Quantity					RIGID CONSTRUCTION INITIAL COST	\$4,392,551
					RIGID CONSTRUCTION ANNUAL COST PER MILE	\$165,689

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	T	UNIT COST	Schedule Quantity	Unit Cost Override
ROUTINE MAINTENANCE ACTIVITY				\$0.00 /LANE-MILE / YEAR		
HMA OVERLAY	(2.75")		2.75			
HMA OVERLAY PAVEMENT	(2.75")	1.0038	2.75	\$8.59 /SQ YD	38694	
HMA SURFACE MIX	(1.50")	1.0020	1.50	\$8.59 /SQ YD	38694	
HMA BINDER MIX	(1.25")	1.0058	1.25	\$0.00 /SQ YD	38694	
HMA OVERLAY SHOULDER	(2.75")	Shoulder Mix	2.75	\$0.00 /SQ YD	12687	
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 Mix	1.50	\$78.58 /SQ YD		
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.75")		Surface Mix	2.75	\$85.72 /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' / Station / Lane)			\$2.00 /LIN FT		

RIGID TOTAL LIFE-CYCLE COST **\$4,900,469**
 RIGID TOTAL ANNUAL COST PER MILE **\$184,848**

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

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 10	PAVEMENT PATCH CLASS B						
		0.10%	39	SQ YD	\$150.00	\$5,850	
		PWFn = 0.7441			PW = 0.7441 X	\$5,850	\$4,353
YEAR 15	PAVEMENT PATCH CLASS B						
		0.20%	77	SQ YD	\$150.00	\$11,550	
		PWFn = 0.6419			PW = 0.6419 X	\$11,550	\$7,414
YEAR 20	PAVEMENT PATCH CLASS B						
		2.00%	774	SQ YD	\$150.00	\$116,100	
	SHOULDER PATCH CLASS C	0.50%	63	SQ YD	\$145.00	\$9,135	
	LONGITUDINAL SHLD JT R&S	100.00%	11,418	LIN FT	\$2.00	\$22,836	
	CENTERLINE JT R&S	100.00%	5,709	LIN FT	\$2.00	\$11,418	
		PWFn = 0.5537			PW = 0.5537 X	\$159,489	\$88,305
YEAR 25	PAVEMENT PATCH CLASS B						
		3.00%	1,161	SQ YD	\$150.00	\$174,150	
	SHOULDER PATCH CLASS C	1.00%	127	SQ YD	\$145.00	\$18,415	
		PWFn = 0.4776			PW = 0.4776 X	\$192,565	\$91,970
YEAR 30	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	4.00%	1,548	SQ YD	\$150.00	\$232,200	
	SHOULDER PATCH CLASS C	1.50%	190	SQ YD	\$145.00	\$27,550	
	HMA OVERLAY 2.75" (PVMT)	100.00%	38,694	SQ YD	\$8.59	\$332,538	
	HMA OVERLAY 2.75" (SHLD)	100.00%	12,687	SQ YD	\$0.00	\$0	
		PWFn = 0.4120			PW = 0.4120 X	\$592,288	\$244,015
YEAR 35	NON-INTERSTATE						
	LONGITUDINAL SHLD JT R&S	100.00%	11,418	LIN FT	\$2.00	\$22,836	
	CENTERLINE JT R&S	100.00%	5,709	LIN FT	\$2.00	\$11,418	
	RANDOM CRACK R&S	50.00%	14,273	LIN FT	\$2.00	\$28,546	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	9,296	LIN FT	\$2.00	\$18,592	
	PD PVMT PATCH M&F HMA 2.75"	0.10%	39	SQ YD	\$85.72	\$3,343	
		PWFn = 0.3554			PW = 0.3554 X	\$84,735	\$30,113
YEAR 40	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	0.50%	193	SQ YD	\$150.00	\$28,950	
	LONGITUDINAL SHLD JT R&S	100.00%	11,418	LIN FT	\$2.00	\$22,836	
	CENTERLINE JT R&S	100.00%	5,709	LIN FT	\$2.00	\$11,418	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	13,945	LIN FT	\$2.00	\$27,890	
	RANDOM CRACK R&S	50.00%	14,273	LIN FT	\$2.00	\$28,546	
	PD PVMT PATCH M&F HMA 2.75"	0.50%	193	SQ YD	\$85.72	\$16,545	
		PWFn = 0.3066			PW = 0.3066 X	\$136,185	\$41,748
							\$507,918
	ROUTINE MAINTENANCE ACTIVITY		5.41	Lane Miles	\$0.00	\$0	\$0
							MAINTENANCE LIFE-CYCLE COST \$507,918
45	YEAR LIFE CYCLE	CRFn = 0.0407852					MAINTENANCE ANNUAL COST PER MILE \$19,159

Date Stamp

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 1/5/21 7:05 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$4,392,551	\$3,652,205
		ANNUAL COST PER MILE	\$165,689	\$137,763
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$507,918	\$919,694
		ANNUAL COST PER MILE	\$19,159	\$34,691
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$4,900,469	\$4,571,899
		ANNUAL COST PER MILE	\$184,848	\$172,454

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	=====>	HMA	\$172,454	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	JPCP	\$184,848	7.2%

S:\GENEXCEL\Studies & Plans\Squad 6\68D34_Copperas\Revised Pavt Design\PAVEMENT DESIGN 5-lane REVISED 1-4-21 .xism]LifeCycleCost