Illinois Department of Transportation

To:	Jeffrey Keirn	Attn: District Nine
From:	John Baranzelli	
Subject:	Pavement Design	
Date:	August 19, 2013	

FAP Route 332 (US 45)
Section (29,30)R-1 & 100(R-1),29(R-2)
Saline, Gallatin and White Counties
From north of IL 142 in Eldorado to north of Texas City &
From north of Texas City to north of IL 145

We have reviewed the pavement selection for the above captioned section, which was submitted with your memorandum dated May 20, 2013. The Life Cycle Cost Analysis [LCCA] for this project did not favor either the rigid or flexible option by more than 10%, and will utilize the alternate bidding procedure. However, the district has requested that the urban section [approximately 1 mile of the entire 4.5 mile project] be constructed using the flexible option due to the ability to utilize the existing two-lane pavement during staging operations. This will allow shorter disruptions to adjacent businesses and aid in traffic control staging.

The Pavement Selection Committee has discussed the request for the flexible design within the urban limits and concurs with the district proposal.

The approved pavement design is as follows:

US 45 [Rural Pavement Construction]

Option 1
11.5 inches Full Depth with HMA Shoulders
- 2.25 inches of HMA Surface Course, Mix "D", N90
- 9 inches of HMA Binder Course, N90, IL-19.0

12 inches Lime Modified Soil

Option 2
9 inches of Jointed PCC Pavement with tied PC Shoulders
12 inches Lime Modified Soil

US 45 [Urban Pavement Construction]

11.5 inches Full Depth with PCCC Curb & Gutter
2.25 inches of HMA Surface Course, Mix "D", N90
9 inches of HMA Binder Course, N90, IL-19.0
12 inches Lime Modified Soil

If you have any questions, please contact Paul Niedernhofer at (217) 524-1651.

Illinois Department of Transportation

Memorandum

To:	Paul Niedernhofer
From:	Charles Stein
Subject:	Pavement Design
Date:	August 22, 2012

Route	US 45 (FAP 332)
Section	(29,30)R-1 & 100(R-1),29(R-2)
County	Saline, Gallatin, White
Contract	78077 & 78345

This project involves the expansion of approximately 9.0 miles of US 45. The first project begins in Eldorado just north of the US 45 and IL 142 intersection and continues to just north of Texas City. The second project begins just north of Texas City and continues to just north of the US 45 and IL 141 intersection (see attached map). The proposed work consists of resurfacing the existing two-lane pavement and building two new lanes to provide four lanes, two in each direction. In the urban section, the two-lane pavement will be widened and resurfaced to provide four travel lanes and a bi-directional center left turn lane along with curb and gutter. The first project is scheduled for the June 2014 letting. The second project is not currently scheduled for letting. According to the life cycle cost analysis the PCC and HMA costs are within 10% with the HMA being cheaper. The district proposes to use full-depth HMA pavement for the new lanes and HMA resurfacing on the existing lanes. The mechanistic pavement design and life cycle cost analysis are attached.

Pavement Selection Committee Summary

August 15, 2013

D-9

US 45 from north of IL 142 to north of Texas City & North of Texas City to north of IL 145

Life Cycle Costs for this project were within 10% of each other and this project was discussed by the Pavement Section Committee. The rural cross-section of this project will use the alternate bid process. This will encompass approximately 3.5 miles of the total 4.5 mile project. Attending were:

D-9 – Charles Stein

D-9 – Joe Zdankiewicz

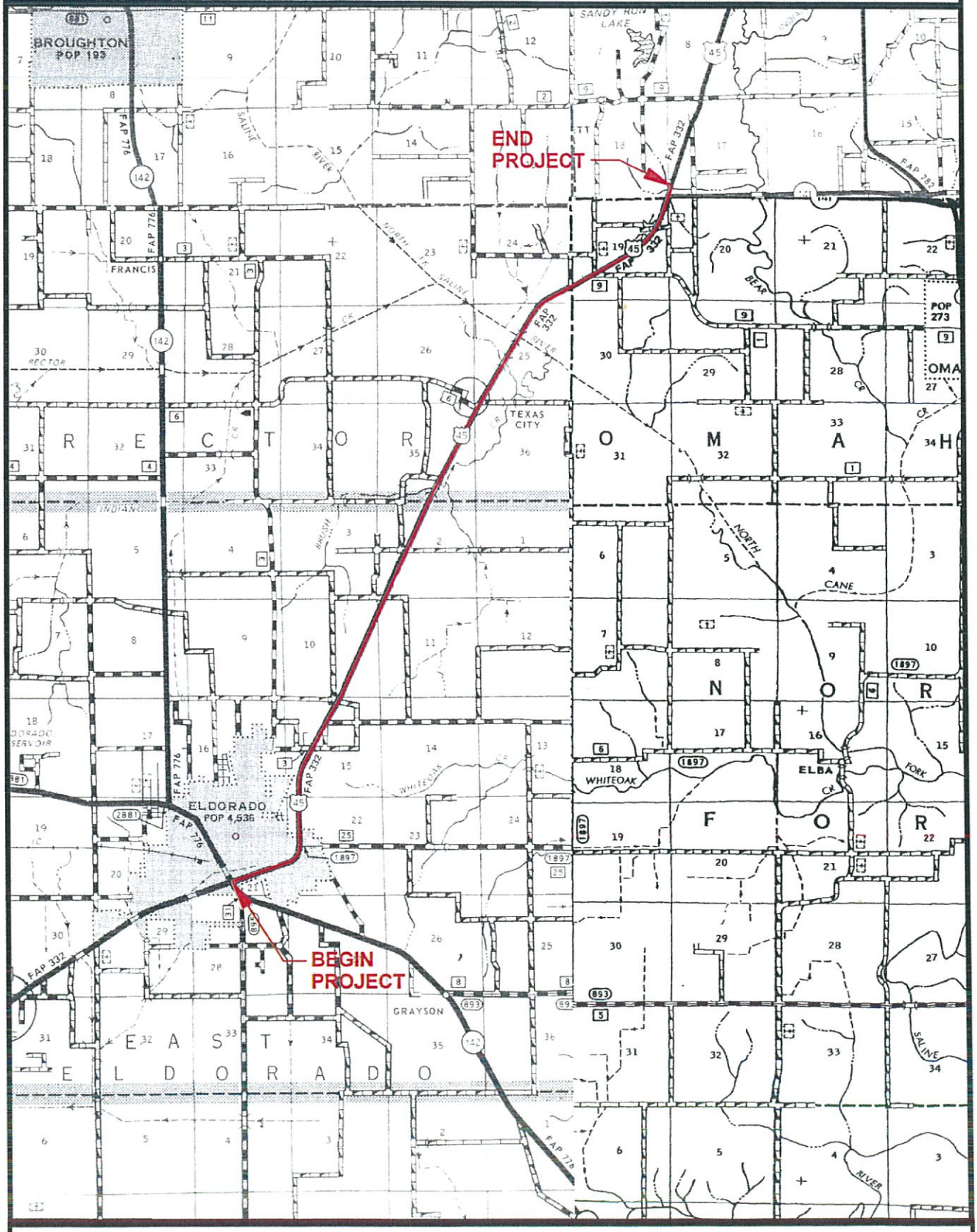
BMPR – LaDonna Rowden

CON – Jeff Harpring

BDE – Paul Niedernhofer

For the two-lane urban section of this project, which constitutes approximately 1 mile of the total 4.5 mile project, the district indicated that they would prefer to use a flexible design. This will allow the district to utilize the existing two-lane pavement for staging purposes and keep traffic disruptions to a minimum. After discussion, the Pavement Selection Committee concurred with the use of a slightly less expensive flexible design for the urban portion of this project.

PROPOSED US 45 EXPANSION



FROM JUST NORTH OF IL 142 TO JUST NORTH OF IL 141

SALINE, GALLATIN AND WHITE COUNTIES

BDE 5401 Template (Rev. 08/14/2012)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 01/31/2014

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: US 45
Section:
County: Saline, Gallitin, White
Location: Eldorado to IL 141
Facility Type: Other Marked State Route
# of Lanes = 4
Road Class: I
Subgrade Support Rating (SSR): Poor
Construction Year: 2014
Design Period (DP) = 20 years

Comments:
Design Date:
Modify Date:

<-- BY
<-- BY

	ADT	Year
Current:	-	-
Future:	-	-

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	11,545	94.7%	P = 32%
SU =	250	295	2.4%	S = 45%
MU =	750	355	2.9%	M = 45%
Struct. Design ADT =		12,195	(2024)	

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) =	1.90	(Actual ADT)	TF rigid (Actual) =	2.62	(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

Use TF flexible = 3.56
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)
Goto Map
HMA Mixture Temp. = 80.4 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 550 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 84 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 11.25 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 16.70 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 11.25 inches

JPC Pavement

Use TF rigid = 5.02
Edge Support = Tied Shoulder or C.&G.

Rigid Pavt Thick. = #VALUE! in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 5.02
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 Overlay of Rubblized PCC

Use TF flexible = 3.56
District = 3,4,5,6

HMA Overlay Design Thickness = 8.00 in. (Fig. 54-5.U)

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

JPCP Thickness = NA inches

CONTACT BMPR 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 Supplemental Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

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

Class	Traffic Factor ESAL Coefficients: Rigid (Fig. 54-4.C) Csu	Cmu	Flexible (Fig. 54-5.B) 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

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

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B): Rural P	S	M	Urban P	S	M
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. 10/05/2012) Printed: 01/31/2014

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE		US 45	
SECTION			
COUNTY		Saline, Gallatin,White	
LOCATION		Eldorado to IL 141	
FACILITY TYPE		NON-INTERSTATE	
PROJECT LENGTH		47520 FT = = >	9.00 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	

USER OVERRIDE COLUMN

PAVEMENT THICKNESS (FLEXIBLE)	11.25 IN	16.75 IN MAX
SHOULDER THICKNESS	8.00 IN	HMA_SD Standard Design
POLICY OVERLAY THICKNESS	2.25 IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE	Off User Override
	3.56	1.90	3.56	

Read Me!

HMA COST PER TON	UNIT PRICE	
HMA SURFACE	$83.00	/ TON
HMA TOP BINDER	$74.00	/ TON
HMA LOWER BINDER	$72.00	/ TON
HMA BINDER (LEVELING)	$75.00	/ TON
HMA SHOULDER	$72.00	/ TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE		COST		USER SUPPLIED QUANTITY	USER SUPPLIED UNIT PRICE
HMA PAVEMENT (FULL-DEPTH)	(11.25")	253,440	SQ YD	$48.63	/ SQ YD	$0			
HMA SURFACE COURSE	(2.00")	253,440	SQ YD	$9.36	/ SQ YD	$2,372,198	~		
HMA TOP BINDER COURSE	(2.25")	253,440	SQ YD	$9.53	/ SQ YD	$2,415,283	~		
HMA LOWER BINDER COURSE	(7.00")	253,440	SQ YD	$29.74	/ SQ YD	$7,537,306	~		
HMA SHOULDER	(8.00")	75,694	TONS	$72.00	/ TON	$5,449,974	~		
CURB & GUTTER		0	LIN FT	$0.00	/ LIN FT	$0			
SUBBASE GRAN MATL TY C (TONS)		16,232	TONS	$18.00	/ TON	$292,176			
IMPROVED SUBGRADE:	Modified Soil	452,760	SQ YD	$3.00	/ SQ YD	$1,358,280			
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0			
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0			
PAVEMENT REMOVAL		253,440	SQ YD	$5.50	/ SQ YD	$1,393,920			
SHOULDER REMOVAL		168,960	SQ YD	$4.50	/ SQ YD	$760,320			

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST $19,425,217

FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE $88,029

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")	Surface Mix	2.00	$9.30	/ SQ YD	253440	
HMA OVERLAY PVMT	(2.25")		2.25	$10.12	/ SQ YD	253440	
HMA SURFACE MIX	(1.50")	Surface Mix	1.50	$6.97	/ SQ YD	253440	
HMA BINDER MIX	(0.75")	aling Binder Mix	0.75	$3.15	/ SQ YD	253440	
HMA OVERLAY SHLD (Year 30)	(2.25")	Shoulder Mix	2.25	$9.07	/ SQ YD	168960	
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	2.00	$8.06	/ SQ YD	168960	
MILLING (2.00 IN)			2.00	$2.00	/ SQ YD		
PARTIAL DEPTH PVMT PATCH	(Mill & Fill Surf)	Surface Mix	2.00	$78.30	/ SQ YD		
PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder Mix	2.00	$77.06	/ SQ YD		

PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00 ")	Leveling Binder Mix	2.00	$77.40 / SQ YD	
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")	Shoulder Mix	2.00	$77.06 / 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	$27,490,677
FLEXIBLE TOTAL ANNUAL COST PER MILE	$124,579

PCC PAVEMENT

JPCP

ROUTE		US 45	
SECTION		0	
COUNTY		Saline, Gallatin,White	
LOCATION		Eldorado to IL 141	
FACILITY TYPE		NON-INTERSTATE	
PROJECT LENGTH		47520 FT = = >	9.00 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	

USER OVERRIDE COLUMN

PAVEMENT THICKNESS (RIGID)	JPCP	9.00 IN	TIED SHLD
SHOULDER THICKNESS		9.00 IN	
POLICY OVERLAY THICKNESS		2.50 IN	

Off
User Override

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	5.02	2.62	5.02
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")	253,440	SQ YD	$43.00 / SQ YD	$10,897,920	
PAVEMENT REINFORCEMENT		0	SQ YD	$22.00 / SQ YD	$0	
STABILIZED SUBBASE	(4.00")	285,120	SQ YD	$16.00 / SQ YD	$4,561,920	
PCC SHOULDERS	(9.00" to 9.00")	168,960	SQ YD	$34.00 / SQ YD	$5,744,640	
CURB & GUTTER		0	LIN FT	$0.00 / LIN FT	$0	
SUBBASE GRAN MATL TY C	(~ 3.48")	19,880	TONS	$18.00 / TON	$357,840	
IMPROVED SUBGRADE:	Modified Soil Width = 82.0'	432,960	SQ YD	$3.00 / SQ YD	$1,298,880	
Reserved For User Supplied Item		0	UNITS	$0.00 / UNITS	$0	
Reserved For User Supplied Item		0	UNITS	$0.00 / UNITS	$0	
PAVEMENT REMOVAL		253,440	SQ YD	$0.00 / SQ YD	$0	
SHOULDER REMOVAL		168,960	SQ YD	$0.00 / SQ YD	$0	

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$22,861,200
RIGID CONSTRUCTION ANNUAL COST PER MILE	$103,600

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL		UNIT COST	Schedule Quantity	Unit Cost Override
ROUTINE MAINTENANCE ACTIVITY				$0.00 / LANE-MILE / YEAR		
HMA POLICY OVERLAY	(2.50")		2.50			
HMA POLICY OVERLAY PVMT	(2.50")		2.50	$11.17 / SQ YD		
HMA SURFACE MIX	(1.50")	Surface Mix	1.50	$6.97 / SQ YD		
HMA BINDER MIX	(1.00")	aling Binder Mix	1.00	$4.20 / SQ YD		
HMA POLICY OVERLAY SHLD	(2.50")	Shoulder Mix	2.50	$10.08 / 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 Mix	1.50	$75.97 / SQ YD		
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	2.50	$80.62 / 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	$27,749,662
RIGID TOTAL ANNUAL COST PER MILE	$125,753

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : **10/11/12 11:15 AM**

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$22,861,200	$19,425,217
		ANNUAL COST PER MILE	$103,600	$88,029
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$4,888,462	$8,065,460
		ANNUAL COST PER MILE	$22,153	$36,550
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$27,749,662	$27,490,677
		ANNUAL COST PER MILE	$125,753	$124,579

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**HMA**	**$124,579**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**JPCP**	**$125,753**	0.9%

P:\Pavement Design Stuff\D-9\US 45 from Eldorado to Texas City 08-22-12\[US 45 from Eldorado to IL 141 BDE calculations.xlsm]LifeCycleCost

FULL-DEPTH HMA PAVEMENT
HMA OVERLAY OF 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%	190,080 LIN FT	$2.00		$380,160	
	CNTR LINE JOINT R&S		100.00%	95,040 LIN FT	$2.00		$190,080	
	RNDM / THRM CRACK R&S		50.00%	104,544 LIN FT	$2.00		$209,088	
	PD PVMT PATCH M&F SURF		0.10%	253 SQ YD	$78.30		$19,809	
		PWFn =	0.8626	PW =	0.8626	X	$799,137	$689,343
YEAR 10								
	LONG SHLD JT R&S		100.00%	190,080 LIN FT	$2.00		$380,160	
	CNTR LINE JOINT R&S		100.00%	95,040 LIN FT	$2.00		$190,080	
	RNDM / THRM CRACK R&S		50.00%	104,544 LIN FT	$2.00		$209,088	
	PD PVMT PATCH M&F SURF		0.50%	1,267 SQ YD	$78.30		$99,201	
		PWFn =	0.7441	PW =	0.7441	X	$878,529	$653,708
YEAR 15								
	MILL PVMT & SHLD 2.00"		100.00%	422,400 SQ YD	$2.00		$844,800	
	PD PVMT PATCH M&F ADD'L 2.00"		1.00%	2,534 SQ YD	$77.40		$196,132	
	HMA OVERLAY PVMT 2.00"		100.00%	253,440 SQ YD	$9.30		$2,356,992	
	HMA OVERLAY SHLD 2.00 "		100.00%	168,960 SQ YD	$8.06		$1,362,493	
		PWFn =	0.6419	PW =	0.6419	X	$4,760,417	$3,055,531
YEAR 20								
	LONG SHLD JT R&S		100.00%	190,080 LIN FT	$2.00		$380,160	
	CNTR LINE JOINT R&S		100.00%	95,040 LIN FT	$2.00		$190,080	
	RNDM / THRM CRACK R&S		50.00%	104,544 LIN FT	$2.00		$209,088	
	PD PVMT PATCH M&F SURF		0.10%	253 SQ YD	$78.30		$19,809	
		PWFn =	0.5537	PW =	0.5537	X	$799,137	$442,463
YEAR 25								
	LONG SHLD JT R&S		100.00%	190,080 LIN FT	$2.00		$380,160	
	CNTR LINE JOINT R&S		100.00%	95,040 LIN FT	$2.00		$190,080	
	RNDM / THRM CRACK R&S		50.00%	104,544 LIN FT	$2.00		$209,088	
	PD PVMT PATCH M&F SURF		0.50%	1,267 SQ YD	$78.30		$99,201	
		PWFn =	0.4776	PW =	0.4776	X	$878,529	$419,590
	HMA_SD							
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"		100.00%	422,400 SQ YD	$2.00		$844,800	
	PD PVMT PATCH M&F ADD'L 2.00"		2.00%	5,069 SQ YD	$77.40		$392,341	
	PD SHLD PATCH M&F ADD'L 2.00"		1.00%	1,690 SQ YD	$77.06		$130,238	
	HMA OVERLAY PVMT 2.25 "		100.00%	253,440 SQ YD	$10.12		$2,564,813	
	HMA OVERLAY SHLD 2.25 "		100.00%	168,960 SQ YD	$9.07		$1,532,805	
		PWFn =	0.4120	PW =	0.4120	X	$5,464,997	$2,251,506
YEAR 35								
	LONG SHLD JT R&S		100.00%	190,080 LIN FT	$2.00		$380,160	
	CNTR LINE JOINT R&S		100.00%	95,040 LIN FT	$2.00		$190,080	
	RNDM / THRM CRACK R&S		50.00%	104,544 LIN FT	$2.00		$209,088	
	PD PVMT PATCH M&F SURF		0.10%	253 SQ YD	$78.30		$19,809	
		PWFn =	0.3554	PW =	0.3554	X	$799,137	$284,000
YEAR 40								
	LONG SHLD JT R&S		100.00%	190,080 LIN FT	$2.00		$380,160	
	CNTR LINE JOINT R&S		100.00%	95,040 LIN FT	$2.00		$190,080	
	RNDM / THRM CRACK R&S		50.00%	104,544 LIN FT	$2.00		$209,088	
	PD PVMT PATCH M&F SURF		0.50%	1,267 SQ YD	$78.30		$99,201	
		PWFn =	0.3066	PW =	0.3066	X	$878,529	$269,319
								$8,065,460
	ROUTINE MAINTENANCE ACTIVITY			36.00 Lane Miles	0.00		$0	$0
							MAINTENANCE LIFE-CYCLE COST	$8,065,460
45	YEAR LIFE CYCLE	CRFn = 0.0407852					MAINTENANCE ANNUAL COST PER MILE	$36,550

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 01/31/14

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%	253	SQ YD	$150.00		$37,950	
	PWFn =	0.7441		PW =	0.7441	X	$37,950	$28,238
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	507	SQ YD	$150.00		$76,050	
	PWFn =	0.6419		PW =	0.6419	X	$76,050	$48,814
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	5,069	SQ YD	$150.00		$760,350	
	SHOULDER PATCH CLASS C	0.50%	845	SQ YD	$145.00		$122,525	
	LONGITUDINAL SHLD JT R&S	100.00%	190,080	LIN FT	$2.00		$380,160	
	CENTERLINE JT R&S	100.00%	95,040	LIN FT	$2.00		$190,080	
	PWFn =	0.5537		PW =	0.5537	X	$1,453,115	$804,555
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	7,603	SQ YD	$150.00		$1,140,450	
	SHOULDER PATCH CLASS C	1.00%	1,690	SQ YD	$145.00		$245,050	
	PWFn =	0.4776		PW =	0.4776	X	$1,385,500	$661,723
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	10,138	SQ YD	$150.00		$1,520,700	
	SHOULDER PATCH CLASS C	1.50%	2,534	SQ YD	$145.00		$367,430	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	253,440	SQ YD	$11.17		$2,830,925	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	168,960	SQ YD	$10.08		$1,703,117	
	PWFn =	0.4120		PW =	0.4120	X	$6,422,172	$2,645,850
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	190,080	LIN FT	$2.00		$380,160	
	CENTERLINE JT R&S	100.00%	95,040	LIN FT	$2.00		$190,080	
	RANDOM CRACK R&S	50.00%	95,040	LIN FT	$2.00		$190,080	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	60,826	LIN FT	$2.00		$121,652	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	253	SQ YD	$80.62		$20,397	
	PWFn =	0.3554		PW =	0.3554	X	$902,369	$320,687
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	1,267	SQ YD	$150.00		$190,050	
	LONGITUDINAL SHLD JT R&S	100.00%	190,080	LIN FT	$2.00		$380,160	
	CENTERLINE JT R&S	100.00%	95,040	LIN FT	$2.00		$190,080	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	91,238	LIN FT	$2.00		$182,476	
	RANDOM CRACK R&S	50.00%	95,040	LIN FT	$2.00		$190,080	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	1,267	SQ YD	$80.62		$102,146	
	PWFn =	0.3066		PW =	0.3066	X	$1,234,992	$378,595
								$4,888,462
	ROUTINE MAINTENANCE ACTIVITY		36.00	Lane Miles	$0.00		$0	$0
							MAINTENANCE LIFE-CYCLE COST	$4,888,462
45	YEAR LIFE CYCLE	CRFn = 0.0407852					MAINTENANCE ANNUAL COST PER MILE	$22,153