



# Illinois Department of Transportation

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To: Paul Loete, P.E. Attn: District Two  
From: John Baranzelli  
Subject: Pavement Design   
Date: December 5, 2013

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FAU Route 5789 (US 6)  
Henry County  
At IL Route 84

The project, submitted to BDE by memo dated October 17, 2013, will reconstruct the intersection of US 6 and IL 84. Life cycle costs are less than 10% and were reviewed by the pavement selection committee. The MU ADT exceeds 200 vehicles and the approach gradient exceeds 3.5%. The district requested to use a rigid design, due to the high stress factors. The pavement selection committee discussed the district's request and concurred.

The approved pavement design is as follows:

US 6 at IL 84 (Pavement Reconstruction)

9 inches of PCC Jointed Pavement with PCC Shoulders  
4 inches of Stabilized Sub-Base  
12 inches of Aggregate Subgrade Improvement

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



# Illinois Department of Transportation

## Memorandum

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To:	John Baranzelli	Attn: Paul Niedernhofer
From:	Paul Loete, P.E.	By: Masood Ahmad
Subject:	Pavement Design	
Date:	October 17, 2013	

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FAU 5789 (US 6) & FAU 5861 (IL 84)  
Section 2R-1  
Henry County  
Job No. P-92-017-09  
Contract No. 64J43

Attached is the pavement selection analysis for the reconstruction of the intersection at US 6 & IL 84 south of Colona. This section consists of approximately 17,072 square yards of new pavement for approximately 0.75 miles.

Mechanistic Pavement Design indicates that HMA pavement presents the lowest annual life cycle costs, providing a 3.8% annual cost savings versus a rigid pavement design. The flexible pavement design consists of a 10" Full-Depth HMA Pavement.

Although there is a slight cost advantage projected through this analysis for a flexible design, the District wishes to request use of a rigid pavement design consisting of a 9" Jointed PCC Pavement. Our recommendation is based on the presence of a high stress intersection at this location. This intersection is under signalized stop control with an approach grade on US 6 Westbound of 6.61% and IL 84 Southbound of 5.41%.

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

## Pavement Selection Committee Summary

December 9, 1913

D-2

US 6 at IL 84

Life Cycle Costs for this project were within 10% of each other and this project was discussed by the Pavement Section Committee. Attending were:

D-2 - Brad Cushman

D-2 - Masood Ahmad

BMPR - LaDonna Rowden

CON - Jeff Harpring

BDE - Paul Niedernhofer

The district indicated that they would like to use a rigid design, even though the flexible design was slightly less expensive. The intersection meets the requirements of a high stress intersection, due to the amount of Multi-Unit vehicles and the approach gradients exceeding 3.5%. The BDE Manual allows the use of either a rigid pavement or a stiffer mix HMA. After discussion, the Pavement Selection Committee concurred with the use of a rigid design for this project.

## Location Map



FAU 5789 (US 6) & FAU 5861 (IL84)

Section 2R-1

Henry County

P-92-017-09

Contract No.64J43

Colona/T-17-N R-1-E/14, 15, 22, 23

Green Rock NW

US 6 2174.54 FT; IL 84/400<sup>th</sup> Street 2085.57 FT

January 2015 Letting

Reconstruction of the Intersection at US 6 and IL 84 West of Colona

HSIP 90/10

**PROJECT AND TRAFFIC INPUTS**

(Enter Data in Gray Shaded Cells)

Route: <b>FAU 5789 (US 6) &amp; FAU 5861 (IL 84)</b>	Comments:																										
Section: <b>2R-1</b>	Design Date: <b>06/10/2013</b>	<table border="1"> <tr> <td>&lt;-- BY</td> <td>ADT</td> <td>Year</td> </tr> <tr> <td>Current:</td> <td><b>5,900</b></td> <td><b>2013</b></td> </tr> <tr> <td>Future:</td> <td><b>8,550</b></td> <td><b>2020</b></td> </tr> </table>		<-- BY	ADT	Year	Current:	<b>5,900</b>	<b>2013</b>	Future:	<b>8,550</b>	<b>2020</b>															
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Current:	<b>5,900</b>	<b>2013</b>																									
Future:	<b>8,550</b>	<b>2020</b>																									
County: <b>Henry</b>	Modify Date:																										
Location:																											
Facility Type: <b>Other Marked State Route</b>	# of Lanes = <b>2 or 3</b>	<table border="1"> <tr> <th colspan="4">Structural Design Traffic</th> </tr> <tr> <th>Minimum ADT</th> <th>Actual ADT</th> <th>Actual % of Total ADT</th> <th>% of ADT in Design Lane</th> </tr> <tr> <td>PV = <b>0</b></td> <td>8,665</td> <td>86.1%</td> <td>P = <b>50%</b></td> </tr> <tr> <td>SU = <b>250</b></td> <td>725</td> <td><b>7.2%</b></td> <td>S = <b>50%</b></td> </tr> <tr> <td>MU = <b>750</b></td> <td>674</td> <td><b>6.7%</b></td> <td>M = <b>50%</b></td> </tr> <tr> <td colspan="3">Struct. Design ADT = <b>10,064</b></td> <td>(2024)</td> </tr> </table>		Structural Design Traffic				Minimum ADT	Actual ADT	Actual % of Total ADT	% of ADT in Design Lane	PV = <b>0</b>	8,665	86.1%	P = <b>50%</b>	SU = <b>250</b>	725	<b>7.2%</b>	S = <b>50%</b>	MU = <b>750</b>	674	<b>6.7%</b>	M = <b>50%</b>	Struct. Design ADT = <b>10,064</b>			(2024)
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Struct. Design ADT = <b>10,064</b>			(2024)																								
Part of future 4 lanes or more ? <b>No</b>	One Way Street ? <b>No</b>																										
Road Class: <b>II</b>	Subgrade Support Rating (SSR): <b>Poor</b>																										
Construction Year: <b>2014</b>	Design Period (DP) = <b>20</b> years																										

**TRAFFIC FACTOR CALCULATION**

**FLEXIBLE PAVEMENT**

C<sub>pv</sub> = 0.15  
 C<sub>su</sub> = **112.06**  
 C<sub>mu</sub> = **385.44**  
 TF flexible (Actual) = 3.42 (Actual ADT)  
 TF flexible (Min) = 3.17 (Min ADT Fig. 54-2.C)

**RIGID PAVEMENT**

C<sub>pv</sub> = 0.15  
 C<sub>su</sub> = **135.78**  
 C<sub>mu</sub> = **567.21**  
 TF rigid (Actual) = 4.82 (Actual ADT)  
 TF rigid (Min) = 4.59 (Min ADT Fig. 54-2.C)

**NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS**

Full-Depth HMA Pavement		JPC Pavement	
Use TF flexible = 3.42	PG Grade Lower Binder Lifts = <b>PG 64-22</b> (Fig. 53-4.R)	Use TF rigid = 4.82	Edge Support = <b>Tied</b> Shoulder or C.&G.
<a href="#">Goto Map</a>	HMA Mixture Temp. = <b>75.5</b> deg. F (Fig. 54-5.C)	<b>Rigid Pavt Thick. = 9.00</b> in. (Fig. 54-4.E)	
Design HMA Mixture Modulus (E <sub>HMA</sub> ) = 680 ksi (Fig. 54-5.D)	Design HMA Strain (ε <sub>HMA</sub> ) = 85 (Fig. 54-5.E)	<b>CRCP Pavement</b>	
Full Depth HMA Design Thickness = 10.25 in. (Fig. 54-5.F)	Limiting Strain Criterion Thickness = <b>15.00</b> in. (Fig. 54-5.I)	Use TF rigid = 4.82	IBR value = <b>3</b>
<a href="#">Goto Map</a>	<b>Use Full-Depth HMA Thickness = 10.25</b> inches	<b>CRCP Thickness = 7.75</b> in. (Fig. 54-4.N)	

**TF MUST BE > 60 FOR CRCP**

**RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS**

HMA Overlay of Rubblized PCC	Unbonded Concrete Overlay
Use TF flexible = 3.42	Review 54-4.03 for limitations and special considerations.
District = <b>1,2</b>	
<b>HMA Overlay Design Thickness = 7.75</b> in. (Fig. 54-5.U)	<b>JPCP Thickness = NA</b> 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
<b>Other Marked State Route</b>	<b>0</b>	<b>250</b>	<b>750</b>
Unmarked State Route	No Min	No Min	No Min

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

Class	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
	C <sub>su</sub>	C <sub>mu</sub>	C <sub>su</sub>	C <sub>mu</sub>
<b>I</b>	<b>143.81</b>	<b>696.42</b>	<b>132.50</b>	<b>482.53</b>
<b>II</b>	<b>135.78</b>	<b>567.21</b>	<b>112.06</b>	<b>385.44</b>
<b>III</b>	<b>129.58</b>	<b>562.47</b>	<b>109.14</b>	<b>384.35</b>
<b>IV</b>	<b>129.58</b>	<b>562.47</b>	<b>109.14</b>	<b>384.35</b>

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

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

# LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

## FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE **FAU 5789 (US 6) & FAU 5861 (IL 84)**  
 SECTION  
 COUNTY **2R-1**  
 LOCATION **Henry**

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **4014 FT ==> 0.76 Miles**  
 # OF CENTERLINES **1 CL**  
 # OF LANES **2 LANES**  
 # OF EDGES **2 EP**  
 LANE WIDTH - AVERAGE **12 FT**  
 SHOULDER WIDTH HMA Inside **8 FT**  
 HMA Outside **8 FT**

PAVEMENT THICKNESS (FLEXIBLE) **10.00 IN** **15.00 IN MAX**  
 SHOULDER THICKNESS **8.00 IN** **HMA\_SC Standard Design**  
 POLICY OVERLAY THICKNESS **2.25 IN**

FLEX PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		3.17	1.05	3.17

Read Me!

HMA	COST PER TON	UNIT PRICE
HMA SURFACE		\$81.15 / TON
HMA TOP BINDER		\$76.50 / TON
HMA LOWER BINDER		\$71.05 / TON
HMA BINDER (LEVELING)		\$0.00 / TON
HMA SHOULDER		\$73.50 / TON

### INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT ( FULL-DEPTH )	( 10.00" )	17,072	SQ YD	\$43.25 / SQ YD	\$0
HMA SURFACE COURSE	( 2.00" )	1,925	TONS	\$81.15 / TON	\$156,214 ~
HMA TOP BINDER COURSE	( 2.25" )	2,938	TONS	\$76.50 / TON	\$224,757 ~
HMA LOWER BINDER COURSE	( 5.75" )	5,029	TONS	\$71.05 / TON	\$357,310 ~
HMA SHOULDER	( 8.00" )	7,369	SQ YD	\$32.93 / SQ YD	\$242,646 ~
CURB & GUTTER		776	LIN FT	\$35.00 / LIN FT	\$27,160
SUBBASE GRAN MATL TY C (TONS)		0	TONS	\$0.00 / TON	\$0
IMPROVED SUBGRADE: Aggregate	Width = 0.0'	0	SQ YD	\$0.00 / SQ YD	\$0
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL		0	SQ YD	\$0.00 / SQ YD	\$0
SHOULDER REMOVAL		0	SQ YD	\$0.00 / SQ YD	\$0

Note: \* Denotes User Supplied Quantity  
 FLEXIBLE CONSTRUCTION INITIAL COST \$1,008,087  
 FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE \$54,083

### MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	T	UNIT COST
ROUTINE MAINTENANCE ACTIVITY				\$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	( 2.00" )	Surface Mix	2.00	\$9.50 / SQ YD
HMA OVERLAY PVMT	( 2.25" )	Leveling Binder Mix	2.25	\$10.45 / SQ YD
HMA SURFACE MIX	( 1.50" )	Surface Mix	1.50	\$0.00 / SQ YD
HMA BINDER MIX	( 0.75" )	Leveling Binder Mix	0.75	\$0.00 / SQ YD
HMA OVERLAY SHLD (Year 30)	( 2.25" )	Shoulder Mix	2.25	\$9.75 / SQ YD
HMA OVERLAY SHLD	( 2.00" )	Shoulder Mix	2.00	\$8.70 / SQ YD
MILLING (2.00 IN)			2.00	\$2.55 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf)		Surface Mix	2.00	\$62.45 / SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill Surf)		Shoulder Mix	2.00	\$0.00 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill +2.00")		Leveling Binder Mix	2.00	\$46.00 / SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill +2.00")		Shoulder Mix	2.00	\$46.50 / 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 \$1,453,654  
 FLEXIBLE TOTAL ANNUAL COST PER MILE \$77,987

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
<b>YEAR 5</b>							
	LONG SHLD JT R&S	100.00%	8,028	LIN FT	\$2.00	\$16,056	
	CNTR LINE JOINT R&S	100.00%	4,014	LIN FT	\$2.00	\$8,028	
	RNDM / THRM CRACK R&S	50.00%	4,415	LIN FT	\$2.00	\$8,830	
	PD PVMT PATCH M&F SURF	0.10%	17	SQ YD	\$62.45	\$1,062	
	PWF <sub>n</sub> =	0.8626		PW =	0.8626 X	\$33,976	\$29,308
<b>YEAR 10</b>							
	LONG SHLD JT R&S	100.00%	8,028	LIN FT	\$2.00	\$16,056	
	CNTR LINE JOINT R&S	100.00%	4,014	LIN FT	\$2.00	\$8,028	
	RNDM / THRM CRACK R&S	50.00%	4,415	LIN FT	\$2.00	\$8,830	
	PD PVMT PATCH M&F SURF	0.50%	85	SQ YD	\$62.45	\$5,308	
	PWF <sub>n</sub> =	0.7441		PW =	0.7441 X	\$38,222	\$28,441
<b>YEAR 15</b>							
	MILL PVMT & SHLD 2.00"	100.00%	24,441	SQ YD	\$2.55	\$62,325	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	171	SQ YD	\$46.00	\$7,866	
	HMA OVERLAY PVMT 2.00"	100.00%	17,072	SQ YD	\$9.50	\$162,184	
	HMA OVERLAY SHLD 2.00 "	100.00%	7,369	SQ YD	\$8.70	\$64,110	
	PWF <sub>n</sub> =	0.6419		PW =	0.6419 X	\$296,485	\$190,302
<b>YEAR 20</b>							
	LONG SHLD JT R&S	100.00%	8,028	LIN FT	\$2.00	\$16,056	
	CNTR LINE JOINT R&S	100.00%	4,014	LIN FT	\$2.00	\$8,028	
	RNDM / THRM CRACK R&S	50.00%	4,415	LIN FT	\$2.00	\$8,830	
	PD PVMT PATCH M&F SURF	0.10%	17	SQ YD	\$62.45	\$1,062	
	PWF <sub>n</sub> =	0.5537		PW =	0.5537 X	\$33,976	\$18,812
<b>YEAR 25</b>							
	LONG SHLD JT R&S	100.00%	8,028	LIN FT	\$2.00	\$16,056	
	CNTR LINE JOINT R&S	100.00%	4,014	LIN FT	\$2.00	\$8,028	
	RNDM / THRM CRACK R&S	50.00%	4,415	LIN FT	\$2.00	\$8,830	
	PD PVMT PATCH M&F SURF	0.50%	85	SQ YD	\$62.45	\$5,308	
	PWF <sub>n</sub> =	0.4776		PW =	0.4776 X	\$38,222	\$18,255
<b>HMA_SD</b>							
<b>YEAR 30</b>							
	NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	24,441	SQ YD	\$2.55	\$62,325	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	341	SQ YD	\$46.00	\$15,686	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	74	SQ YD	\$46.50	\$3,441	
	HMA OVERLAY PVMT 2.25 "	100.00%	17,072	SQ YD	\$10.45	\$178,402	
	HMA OVERLAY SHLD 2.25 "	100.00%	7,369	SQ YD	\$9.75	\$71,848	
	PWF <sub>n</sub> =	0.4120		PW =	0.4120 X	\$331,702	\$136,657
<b>YEAR 35</b>							
	LONG SHLD JT R&S	100.00%	8,028	LIN FT	\$2.00	\$16,056	
	CNTR LINE JOINT R&S	100.00%	4,014	LIN FT	\$2.00	\$8,028	
	RNDM / THRM CRACK R&S	50.00%	4,415	LIN FT	\$2.00	\$8,830	
	PD PVMT PATCH M&F SURF	0.10%	17	SQ YD	\$62.45	\$1,062	
	PWF <sub>n</sub> =	0.3554		PW =	0.3554 X	\$33,976	\$12,075
<b>YEAR 40</b>							
	LONG SHLD JT R&S	100.00%	8,028	LIN FT	\$2.00	\$16,056	
	CNTR LINE JOINT R&S	100.00%	4,014	LIN FT	\$2.00	\$8,028	
	RNDM / THRM CRACK R&S	50.00%	4,415	LIN FT	\$2.00	\$8,830	
	PD PVMT PATCH M&F SURF	0.50%	85	SQ YD	\$62.45	\$5,308	
	PWF <sub>n</sub> =	0.3066		PW =	0.3066 X	\$38,222	\$11,717
							\$445,567
ROUTINE MAINTENANCE ACTIVITY			1.52 Lane Miles	0.00	\$0	\$0	
							MAINTENANCE LIFE-CYCLE COST \$445,567
45	YEAR LIFE CYCLE	CRF <sub>n</sub> = 0.0407852				MAINTENANCE ANNUAL COST PER MILE	\$23,904

**PCC PAVEMENT**

**JPCP**

ROUTE **FAU 5789 (US 6) & FAU 5861 (IL 84)**  
 SECTION **2R-1**  
 COUNTY **Henry**  
 LOCATION **0**

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **4014 FT ==> 0.76 Miles**  
 # OF CENTERLINES **1 CL**  
 # OF LANES **2 LANES**  
 # OF EDGES **2 EP**  
 LANE WIDTH - AVERAGE **12 FT**  
 SHOULDER WIDTH **PCC Inside 8 FT**  
                           **PCC Outside 8 FT**

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

POLICY OVERLAY THICKNESS **2.50 IN**

RIGID PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
Worksheet Construction Type is	Reconstruction	<b>4.59</b>	<b>1.48</b>	<b>JPCP</b>
			The Pavement Type is	

**INITIAL COSTS**

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
JPC PAVEMENT	( 9.00" )	17,072	SQ YD	* <b>\$41.30</b> / SQ YD	\$705,074
PAVEMENT REINFORCEMENT		0	SQ YD	* <b>\$0.00</b> / SQ YD	\$0
STABILIZED SUBBASE	( 4.00" )	18,561	SQ YD	* <b>\$15.45</b> / SQ YD	\$286,767
PCC SHOULDERS	( 9.00" to 9.00" )	7,369	SQ YD	* <b>\$30.60</b> / SQ YD	\$225,491
CURB & GUTTER		776	LIN FT	* <b>\$35.00</b> / LIN FT	\$27,160
SUBBASE GRAN MATL TY C	( ~ 1.80" )	0	TONS	* <b>\$0.00</b> / TON	\$0
IMPROVED SUBGRADE:	Aggregate Width = 5.0'	0	SQ YD	* <b>\$0.00</b> / SQ YD	\$0
Reserved For User Supplied Item		0	UNITS	* <b>\$0.00</b> / UNITS	\$0
Reserved For User Supplied Item		0	UNITS	* <b>\$0.00</b> / UNITS	\$0
PAVEMENT REMOVAL		0	SQ YD	* <b>\$0.00</b> / SQ YD	\$0
SHOULDER REMOVAL		0	SQ YD	* <b>\$0.00</b> / SQ YD	\$0

Note: \* Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	\$1,244,492
RIGID CONSTRUCTION ANNUAL COST PER MILE	\$66,765

**MAINTENANCE COSTS:**

ITEM	THICKNESS	MATERIAL	UNIT	UNIT COST
ROUTINE MAINTENANCE ACTIVITY				<b>\$0.00</b> / LANE-MILE / YEAR
HMA POLICY OVERLAY	( 2.50" )		2.50	
HMA POLICY OVERLAY PVMT	( 2.50" )	1.0000	2.50	<b>\$11.60</b> / SQ YD
HMA SURFACE MIX	( 1.50" )	1.0000	1.50	<b>\$0.00</b> / SQ YD
HMA BINDER MIX	( 1.00" )	1.0000	1.00	<b>\$0.00</b> / SQ YD
HMA POLICY OVERLAY SHLD	( 2.50" )		2.50	<b>\$10.55</b> / SQ YD
CLASS A PAVEMENT PATCHING				<b>\$0.00</b> / SQ YD
CLASS B PAVEMENT PATCHING				<b>\$123.00</b> / SQ YD
CLASS C SHOULDER PATCHING				<b>\$142.00</b> / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	1.50	<b>\$0.00</b> / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	2.50	<b>\$62.45</b> / SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				<b>\$2.00</b> / LIN FT
CENTERLINE JOINT ROUT & SEAL				<b>\$2.00</b> / LIN FT
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL				<b>\$2.00</b> / LIN FT
RANDOM CRACK ROUT & SEAL	(100% Rehab = 100.00' / Station / Lane)			<b>\$2.00</b> / LIN FT

RIGID TOTAL LIFE-CYCLE COST	\$1,508,676
RIGID TOTAL ANNUAL COST PER MILE	\$80,938

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%	17	SQ YD	\$123.00	\$2,091		
		PWF <sub>n</sub> = 0.7441			PW = 0.7441 X	\$2,091	\$1,556	
YEAR 15	PAVEMENT PATCH CLASS B							
		0.20%	34	SQ YD	\$123.00	\$4,182		
		PWF <sub>n</sub> = 0.6419			PW = 0.6419 X	\$4,182	\$2,684	
YEAR 20	PAVEMENT PATCH CLASS B							
		2.00%	341	SQ YD	\$123.00	\$41,943		
	SHOULDER PATCH CLASS C							
		0.50%	37	SQ YD	\$142.00	\$5,254		
	LONGITUDINAL SHLD JT R&S							
		100.00%	8,028	LIN FT	\$2.00	\$16,056		
	CENTERLINE JT R&S							
		100.00%	4,014	LIN FT	\$2.00	\$8,028		
		PWF <sub>n</sub> = 0.5537			PW = 0.5537 X	\$71,281	\$39,467	
YEAR 25	PAVEMENT PATCH CLASS B							
		3.00%	512	SQ YD	\$123.00	\$62,976		
	SHOULDER PATCH CLASS C							
		1.00%	74	SQ YD	\$142.00	\$10,508		
		PWF <sub>n</sub> = 0.4776			PW = 0.4776 X	\$73,484	\$35,096	
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B							
		4.00%	683	SQ YD	\$123.00	\$84,009		
	SHOULDER PATCH CLASS C							
		1.50%	111	SQ YD	\$142.00	\$15,762		
	HMA POLICY OVERLAY 2.5" (PVMT)							
		100.00%	17,072	SQ YD	\$11.60	\$198,035		
	HMA POLICY OVERLAY 2.5" (SHLD)							
		100.00%	7,369	SQ YD	\$10.55	\$77,743		
		PWF <sub>n</sub> = 0.4120			PW = 0.4120 X	\$375,549	\$154,721	
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S							
		100.00%	8,028	LIN FT	\$2.00	\$16,056		
	CENTERLINE JT R&S							
		100.00%	4,014	LIN FT	\$2.00	\$8,028		
	RANDOM CRACK R&S							
		50.00%	4,014	LIN FT	\$2.00	\$8,028		
	REFLECTIVE TRANSVERSE CRACK R&S							
		40.00%	2,573	LIN FT	\$2.00	\$5,146		
	PD PVMT PATCH M&F HMA 2.50"							
		0.10%	17	SQ YD	\$62.45	\$1,062		
		PWF <sub>n</sub> = 0.3554			PW = 0.3554 X	\$38,320	\$13,618	
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B							
		0.50%	85	SQ YD	\$123.00	\$10,455		
	LONGITUDINAL SHLD JT R&S							
		100.00%	8,028	LIN FT	\$2.00	\$16,056		
	CENTERLINE JT R&S							
		100.00%	4,014	LIN FT	\$2.00	\$8,028		
	REFLECTIVE TRANSVERSE CRACK R&S							
		60.00%	3,859	LIN FT	\$2.00	\$7,718		
	RANDOM CRACK R&S							
		50.00%	4,014	LIN FT	\$2.00	\$8,028		
	PD PVMT PATCH M&F HMA 2.50"							
		0.50%	85	SQ YD	\$62.45	\$5,308		
		PWF <sub>n</sub> = 0.3066			PW = 0.3066 X	\$55,593	\$17,042	
							\$264,184	
	ROUTINE MAINTENANCE ACTIVITY				1.52 Lane Miles	\$0.00	\$0	\$0
						MAINTENANCE LIFE-CYCLE COST		\$264,184
45	YEAR LIFE CYCLE		CRF <sub>n</sub> = 0.0407852		MAINTENANCE ANNUAL COST PER MILE		\$14,173	

**LIFE-CYCLE COST ANALYSIS: NEW DESIGN**

Calculated / Revised : 9/30/13 1:59 PM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$1,244,492	\$1,008,087
		ANNUAL COST PER MILE	\$66,765	\$54,083
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$264,184	\$445,567
		ANNUAL COST PER MILE	\$14,173	\$23,904
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$1,508,676	\$1,453,654
		ANNUAL COST PER MILE	\$80,938	\$77,987

**LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY**

LOWEST COST OPTION	=====>	HMA	\$77,987	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	JPCP	\$80,938	3.8%