

Niedernhofer, Paul R

From: Marruffo, Rebecca A
Sent: Wednesday, June 01, 2016 3:28 PM
To: Niedernhofer, Paul R
Subject: Pavement Design - IL 40 at Ideal Road
Attachments: Mechanistic Design - IL 40 at Ideal Rd.xlsm; Mechanistic Design - IL 40 at Ideal Rd.PDF; Pages from PDR-PRELIMINARY-08282015.pdf

Paul –

Attached is a pavement design and supporting details for the proposed realignment of IL 40 at Ideal Road for your review. The design is for approximately 14,000 square yards of pavement. The recommended pavement structure based on life-cycle cost analysis is a Full-Depth HMA pavement with a thickness of 9.75 inches. This alternate is estimated to have a 15.9% cost savings versus a rigid pavement design.

If you should need any additional information, please let me know.

Thank you,
Becky

Becky Marruffo, P.E.

Project Engineer, Studies and Plans

IDOT, District 2

Phone 815-284-5902

Fax 815-284-5486

Rebecca.Marruffo@illinois.gov



SITE

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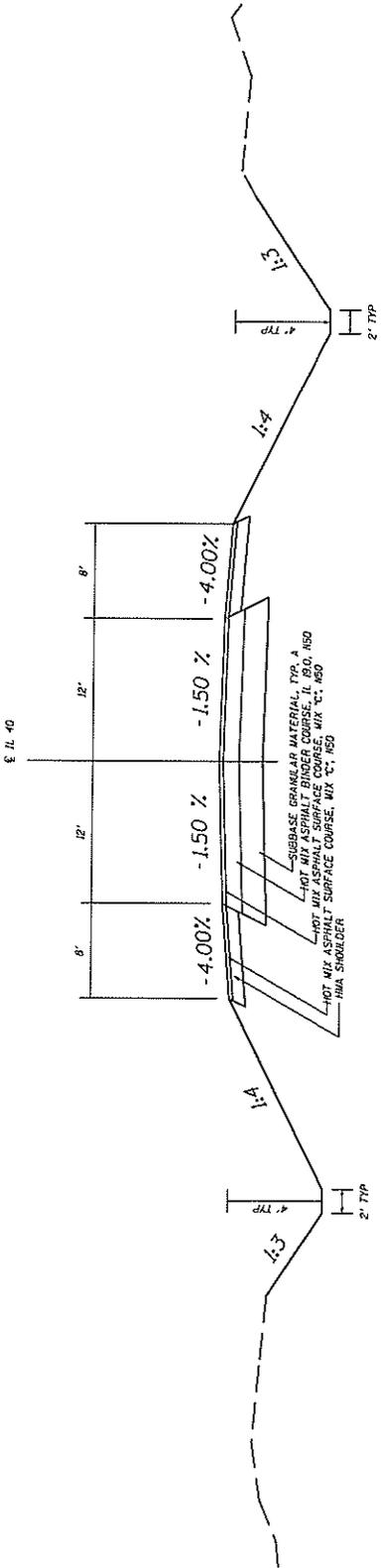


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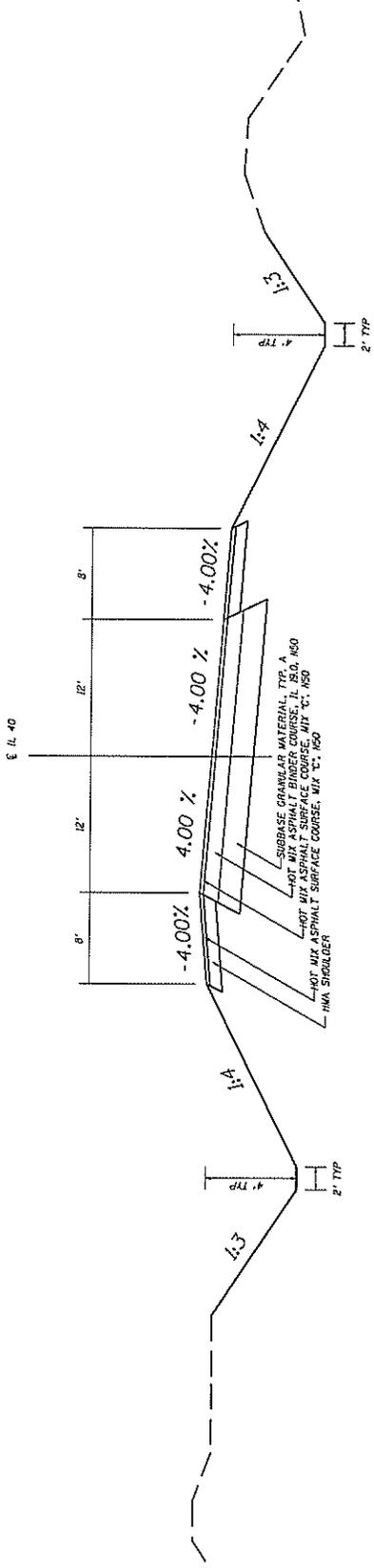


N.T.S.

ATTACHMENT #1c
AERIAL MAP
IDEAL ROAD
BRIDGE REPLACEMENT
CARROLL COUNTY
SEC# 03-00083-00-BR
JOB NO. C-92-067-06



PROPOSED TYPICAL SECTION
NORMAL CROWN



PROPOSED TYPICAL SECTION
SUPERELEVATION

ATTACHMENT #2C
SHEET #1 OF 1

	DESIGNED -	REVISION -	SHEET NO. 1077 COUNTY SEALS CONTRACT NO.
	DRAWN -	REVISION -	
LIST NAME / PROJECT NUMBER EAST SCALE - INCHES / FEET PLOT DATE 3/20/2020	ILL. ROUTE 40 PROPOSED TYPICAL SECTIONS SCALE: SHEET OF SHEETS STA. TO STA.	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	ILLINOIS CONTRACT NO.

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: IL 40	Comments:		
Section: 03-00083-00-BR	Design Date: 10/22/2015	<-- BY	
County: Carroll	Modify Date:	<-- BY	ADT Year
Location: Ideal Road & IL 40		Current:	- -
Facility Type: Other Marked State Route		Future:	- -
# of Lanes = 2 or 3		Structural Design Traffic	
Part of future 4 lanes or more? No		Minimum ADT	Actual ADT Actual % of Total ADT % of ADT in Design Lane
One Way Street? No		PV = 0	1,785 87.1% P = 50%
Road Class: II		SU = 250	165 8.0% S = 50%
Subgrade Support Rating (SSR): Poor		MU = 750	100 4.9% M = 50%
Construction Year: 2015		Struct. Design ADT =	2,050 (2025)
Design Period (DP) = 20 years			

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = 0.15
 Csu = **112.06**
 Cmu = **385.44**
 TF flexible (Actual) = 0.57 (Actual ADT)
 TF flexible (Min) = 3.17 (Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv = 0.15
 Csu = **135.78**
 Cmu = **567.21**
 TF rigid (Actual) = 0.79 (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 = 3.17	PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)	Use TF rigid = 4.59	Edge Support = Tied Shoulder or C.&G.
Goto Map	HMA Mixture Temp. = 74.0 deg. F (Fig. 54-5.C)	Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)	
Design HMA Mixture Modulus (E _{HMA}) = 720 ksi (Fig. 54-5.D)	Design HMA Strain (ε _{HMA}) = 86 (Fig. 54-5.E)	CRC Pavement	
Full Depth HMA Design Thickness = 9.75 in. (Fig. 54-5.F)	Limiting Strain Criterion Thickness = 14.50 in. (Fig. 54-5.I)	Use TF rigid = 4.59	IBR value = 3
Goto Map	Use Full-Depth HMA Thickness = 9.75 inches	CRCP Thickness = 7.75 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 = 3.17	HMA Overlay Design Thickness = 7.25 in. (Fig. 54-5.U)	Review 54-4.03 for limitations and special considerations.	
Goto Map	Limiting Strain Criterion Thickness = in. (Fig. 54-5.V)	JPCP Thickness = NA inches	
Use HMA Overlay Thickness = 999.00 inches			

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

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

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			Urban		
	P	S	M	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%

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE IL 40
 SECTION 03-00083-00-BR
 COUNTY Carroll
 LOCATION Ideal Road & IL 40

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 5280 FT ==> 1.00 Miles
 # OF CENTERLINES 1 CL
 # OF LANES 2 LANES
 # OF EDGES 2 EP
 LANE WIDTH - AVERAGE 12 FT
 SHOULDER WIDTH HMA Left 8 FT
 HMA Right 8 FT
 Total Width of Paved Shoulders 16 FT

PAVEMENT THICKNESS (FLEXIBLE) 9.75 IN 14.50 IN MAX
 SHOULDER THICKNESS 8.00 IN HMA_SD Standard Design
 POLICY OVERLAY THICKNESS 2.25 IN

FLEX PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		3.17	0.57	3.17

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	\$88.06 / TON
HMA TOP BINDER	\$86.53 / TON
HMA LOWER BINDER	\$69.46 / TON
HMA BINDER (LEVELING)	\$82.02 / TON
HMA SHOULDER	\$75.97 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(9.75")	14,080	SQ YD	\$44.98 / SQ YD	\$633,318 ~
HMA SURFACE COURSE	(2.00")	1,588	TONS	\$88.06 / TON	\$0
HMA TOP BINDER COURSE	(2.25")	3,036	TONS	\$86.53 / TON	\$0
HMA LOWER BINDER COURSE	(5.50")	3,324	TONS	\$69.46 / TON	\$0
HMA SHOULDER	(8.00")	9,387	SQ YD	\$34.03 / SQ YD	\$319,471 ~
CURB & GUTTER		0	LIN FT	\$0.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C (TONS)		113	TONS	\$45.00 / TON	\$5,085
IMPROVED SUBGRADE: Aggregate	Width = 42.8'	25,007	SQ YD	\$18.80 / SQ YD	\$470,132
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL		16,039	SQ YD	\$10.00 / SQ YD	\$160,390
SHOULDER REMOVAL		687	SQ YD	\$12.00 / SQ YD	\$8,244

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST \$1,596,640
 FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE \$65,119

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			\$0.00 / LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix	\$10.18 / SQ YD
HMA OVERLAY PVMT	(2.25")	Surface Mix	\$10.80 / SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	\$7.31 / SQ YD
HMA BINDER MIX	(0.75")	Leveling Binder Mix	\$3.49 / SQ YD
HMA OVERLAY SHLD (Year 30)	(2.25")	Shoulder Mix	\$9.48 / SQ YD
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	\$8.85 / SQ YD
MILLING (2.00 IN)			\$3.34 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf)		Surface Mix	\$85.00 / SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill Surf)		Shoulder Mix	\$0.00 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill +2.00")		Leveling Binder Mix	\$69.35 / SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill +2.00")		Shoulder Mix	\$82.00 / SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL			\$0.75 / LIN FT
CENTERLINE JOINT ROUT & SEAL			\$0.75 / LIN FT
RANDOM / THERMAL CRACK ROUT & SEAL (100% Rehab = 110.00' / Station / Lane)			\$0.75 / LIN FT

FLEXIBLE TOTAL LIFE-CYCLE COST \$2,004,092
 FLEXIBLE TOTAL ANNUAL COST PER MILE \$81,737

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%	10,560	LIN FT	\$0.75	\$7,920	
	CNTR LINE JOINT R&S	100.00%	5,280	LIN FT	\$0.75	\$3,960	
	RNDM / THRM CRACK R&S	50.00%	5,808	LIN FT	\$0.75	\$4,356	
	PD PVMT PATCH M&F SURF	0.10%	14	SQ YD	\$85.00	\$1,190	
		PWF _n = 0.8626		PW =	0.8626 X	\$17,426	\$15,032
YEAR 10							
	LONG SHLD JT R&S	100.00%	10,560	LIN FT	\$0.75	\$7,920	
	CNTR LINE JOINT R&S	100.00%	5,280	LIN FT	\$0.75	\$3,960	
	RNDM / THRM CRACK R&S	50.00%	5,808	LIN FT	\$0.75	\$4,356	
	PD PVMT PATCH M&F SURF	0.50%	70	SQ YD	\$85.00	\$5,950	
		PWF _n = 0.7441		PW =	0.7441 X	\$22,186	\$16,508
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	23,467	SQ YD	\$3.34	\$78,380	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	141	SQ YD	\$59.35	\$8,368	
	HMA OVERLAY PVMT 2.00"	100.00%	14,080	SQ YD	\$10.18	\$143,334	
	HMA OVERLAY SHLD 2.00 "	100.00%	9,387	SQ YD	\$8.85	\$83,072	
		PWF _n = 0.6419		PW =	0.6419 X	\$313,154	\$201,002
YEAR 20							
	LONG SHLD JT R&S	100.00%	10,560	LIN FT	\$0.75	\$7,920	
	CNTR LINE JOINT R&S	100.00%	5,280	LIN FT	\$0.75	\$3,960	
	RNDM / THRM CRACK R&S	50.00%	5,808	LIN FT	\$0.75	\$4,356	
	PD PVMT PATCH M&F SURF	0.10%	14	SQ YD	\$85.00	\$1,190	
		PWF _n = 0.5537		PW =	0.5537 X	\$17,426	\$9,648
YEAR 25							
	LONG SHLD JT R&S	100.00%	10,560	LIN FT	\$0.75	\$7,920	
	CNTR LINE JOINT R&S	100.00%	5,280	LIN FT	\$0.75	\$3,960	
	RNDM / THRM CRACK R&S	50.00%	5,808	LIN FT	\$0.75	\$4,356	
	PD PVMT PATCH M&F SURF	0.50%	70	SQ YD	\$85.00	\$5,950	
		PWF _n = 0.4776		PW =	0.4776 X	\$22,186	\$10,596
YEAR 30							
	HMA SD NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	23,467	SQ YD	\$3.34	\$78,380	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	282	SQ YD	\$59.35	\$16,737	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	94	SQ YD	\$82.00	\$7,708	
	HMA OVERLAY PVMT 2.25 "	100.00%	14,080	SQ YD	\$10.80	\$152,064	
	HMA OVERLAY SHLD 2.25 "	100.00%	9,387	SQ YD	\$9.48	\$88,986	
		PWF _n = 0.4120		PW =	0.4120 X	\$343,875	\$141,672
YEAR 35							
	LONG SHLD JT R&S	100.00%	10,560	LIN FT	\$0.75	\$7,920	
	CNTR LINE JOINT R&S	100.00%	5,280	LIN FT	\$0.75	\$3,960	
	RNDM / THRM CRACK R&S	50.00%	5,808	LIN FT	\$0.75	\$4,356	
	PD PVMT PATCH M&F SURF	0.10%	14	SQ YD	\$85.00	\$1,190	
		PWF _n = 0.3554		PW =	0.3554 X	\$17,426	\$6,193
YEAR 40							
	LONG SHLD JT R&S	100.00%	10,560	LIN FT	\$0.75	\$7,920	
	CNTR LINE JOINT R&S	100.00%	5,280	LIN FT	\$0.75	\$3,960	
	RNDM / THRM CRACK R&S	50.00%	5,808	LIN FT	\$0.75	\$4,356	
	PD PVMT PATCH M&F SURF	0.50%	70	SQ YD	\$85.00	\$5,950	
		PWF _n = 0.3066		PW =	0.3066 X	\$22,186	\$6,801
							\$407,452
ROUTINE MAINTENANCE ACTIVITY					2.00 Lane Miles	0.00	\$0
					MAINTENANCE LIFE-CYCLE COST		\$407,452
45	YEAR LIFE CYCLE	CRF _n = 0.0407852	MAINTENANCE ANNUAL COST PER MILE				\$16,618

PCC PAVEMENT

JPCP

ROUTE IL 40
 SECTION 03-00083-00-BR
 COUNTY Carroll
 LOCATION Ideal Road & IL 40

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 5280 FT ==> 1.00 Miles
 # OF CENTERLINES 1 CL
 # OF LANES 2 LANES
 # OF EDGES 2 EP
 LANE WIDTH - AVERAGE 12 FT
 SHOULDER WIDTH PCC Left 8 FT
 PCC Right 8 FT
 Total Width of Paved Shoulders 16 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	New Construction	4.59	0.79	4.59
The Pavement Type is				JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
JPC PAVEMENT	(9.00")	14,080	SQ YD	\$53.18 /SQ YD	\$748,774
PAVEMENT REINFORCEMENT		0	SQ YD	\$0.00 /SQ YD	\$0
STABILIZED SUBBASE	(4.00")	15,840	SQ YD	\$14.44 /SQ YD	\$228,730
PCC SHOULDERS	(9.00" to 9.00")	9,387	SQ YD	\$43.31 /SQ YD	\$406,551
CURB & GUTTER		0	LIN FT	\$0.00 /LIN FT	\$0
SUBBASE GRAN MATL TY C	(~ 1.50")	1,145	TONS	\$26.00 /TON	\$29,770
IMPROVED SUBGRADE:	Aggregate Width = 41.0'	24,053	SQ YD	\$18.80 /SQ YD	\$452,196
Reserved For User Supplied Item		0	UNITS	\$0.00 /UNITS	\$0
Reserved For User Supplied Item		0	UNITS	\$0.00 /UNITS	\$0
PAVEMENT REMOVAL		16,039	SQ YD	\$10.00 /SQ YD	\$160,390
SHOULDER REMOVAL		687	SQ YD	\$12.00 /SQ YD	\$8,244

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST \$2,034,655
 RIGID CONSTRUCTION ANNUAL COST PER MILE \$82,984

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	T	UNIT COST
ROUTINE MAINTENANCE ACTIVITY				\$0.00 /LANE-MILE / YEAR
HMA POLICY OVERLAY	(2.50")		2.50	
HMA POLICY OVERLAY PVMT	(2.50")	1.0087	2.50	\$10.62 /SQ YD
HMA SURFACE MIX	(1.50")	1.0062	1.50	\$6.41 /SQ YD
HMA BINDER MIX	(1.00")	1.0139	1.00	\$4.21 /SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		2.50	\$10.79 /SQ YD
CLASS A PAVEMENT PATCHING				\$0.00 /SQ YD
CLASS B PAVEMENT PATCHING				\$218.00 /SQ YD
CLASS C SHOULDER PATCHING				\$182.00 /SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	1.50	\$0.00 /SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	2.50	\$94.75 /SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				\$0.75 /LIN FT
CENTERLINE JOINT ROUT & SEAL				\$0.75 /LIN FT
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL				\$0.75 /LIN FT
RANDOM CRACK ROUT & SEAL (100% Rehab = 100.00' / Station / Lane)				\$0.75 /LIN FT

RIGID TOTAL LIFE-CYCLE COST \$2,322,507
 RIGID TOTAL ANNUAL COST PER MILE \$94,724

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%	14	SQ YD	\$218.00	\$3,052	
		PWF _n = 0.7441			PW = 0.7441 X	\$3,052	\$2,271
YEAR 15							
	PAVEMENT PATCH CLASS B	0.20%	28	SQ YD	\$218.00	\$6,104	
		PWF _n = 0.6419			PW = 0.6419 X	\$6,104	\$3,918
YEAR 20							
	PAVEMENT PATCH CLASS B	2.00%	282	SQ YD	\$218.00	\$61,476	
	SHOULDER PATCH CLASS C	0.50%	47	SQ YD	\$182.00	\$8,554	
	LONGITUDINAL SHLD JT R&S	100.00%	10,560	LIN FT	\$0.75	\$7,920	
	CENTERLINE JT R&S	100.00%	5,280	LIN FT	\$0.75	\$3,960	
		PWF _n = 0.5537			PW = 0.5537 X	\$81,910	\$45,352
YEAR 25							
	PAVEMENT PATCH CLASS B	3.00%	422	SQ YD	\$218.00	\$91,996	
	SHOULDER PATCH CLASS C	1.00%	94	SQ YD	\$182.00	\$17,108	
		PWF _n = 0.4776			PW = 0.4776 X	\$109,104	\$52,109
YEAR 30 NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	563	SQ YD	\$218.00	\$122,734	
	SHOULDER PATCH CLASS C	1.50%	141	SQ YD	\$182.00	\$25,662	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	14,080	SQ YD	\$10.62	\$149,530	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	9,387	SQ YD	\$10.79	\$101,282	
		PWF _n = 0.4120			PW = 0.4120 X	\$399,208	\$164,468
YEAR 35 NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	10,560	LIN FT	\$0.75	\$7,920	
	CENTERLINE JT R&S	100.00%	5,280	LIN FT	\$0.75	\$3,960	
	RANDOM CRACK R&S	50.00%	5,280	LIN FT	\$0.75	\$3,960	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	3,379	LIN FT	\$0.75	\$2,534	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	14	SQ YD	\$94.75	\$1,327	
		PWF _n = 0.3554			PW = 0.3554 X	\$19,701	\$7,001
YEAR 40 NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	70	SQ YD	\$218.00	\$15,260	
	LONGITUDINAL SHLD JT R&S	100.00%	10,560	LIN FT	\$0.75	\$7,920	
	CENTERLINE JT R&S	100.00%	5,280	LIN FT	\$0.75	\$3,960	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	5,069	LIN FT	\$0.75	\$3,802	
	RANDOM CRACK R&S	50.00%	5,280	LIN FT	\$0.75	\$3,960	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	70	SQ YD	\$94.75	\$6,633	
		PWF _n = 0.3066			PW = 0.3066 X	\$41,535	\$12,733
							\$287,852
	ROUTINE MAINTENANCE ACTIVITY		2.00	Lane Miles	\$0.00	\$0	\$0
							MAINTENANCE LIFE-CYCLE COST \$287,852
45	YEAR LIFE CYCLE	CRF _n = 0.0407852					MAINTENANCE ANNUAL COST PER MILE \$11,740

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 10/28/15 8:04 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$2,034,655	\$1,596,640
		ANNUAL COST PER MILE	\$82,984	\$65,119
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$287,852	\$407,452
		ANNUAL COST PER MILE	\$11,740	\$16,618
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$2,322,507	\$2,004,092
		ANNUAL COST PER MILE	\$94,724	\$81,737

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	=====>	HMA	\$81,737	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	JPCP	\$94,724	15.9%