



Illinois Department of Transportation

To: Roger Driskell Attn: District Six
From: John D. Baranzelli
Subject: Pavement Design
Date: May 15, 2013

A handwritten signature in black ink, appearing to be 'JDB', enclosed in a hand-drawn oval.

I-55 [Business Loop 55]
Section 23(B-1)
Logan County
Over Salt Creek

We have reviewed the pavement design for the above captioned section, which was submitted to BDE on April 24, 2013. This project does not require alternate bidding. Life Cycle Cost Analysis favored a flexible pavement design.

The approved pavement design is as follows:

I-55 [Business Loop 55]

10.75 inches of Full-Depth HMA Pavement
 1.5 inches Surface Course (64-22, Mix "D", N70, 9.5)
 1 inch Leveling Binder Course (64-22, N70, 9.5)
 8.25 inches Base Course (64-22, N70, 19.0)
8 inches Aggregate Subgrade Improvement

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



Illinois Department of Transportation

To: John Baranzelli Attn: Paul Niedernhofer
From: Roger Driskell By: Laura Mlacnik *LRM*
Subject: Pavement Design *gln*
Date: April 24, 2013

FAU 7706 (Business Loop 55)
Section 23(B-1)
Logan County
D-96-521-03
Contract 72789

Attached for your review is the pavement design for the above-referenced section. The section consists of a new structure over Salt Creek, 900 feet of new full-depth pavement at the structure, and 3500 feet of resurfaced pavement. Several options were considered for the new pavement with the results as follows (based on mechanistic design):

Full-Depth HMA	10.75 inch
JPCP	9 inch

Based on a 45 year Life Cycle Cost Analysis, Full-Depth HMA Pavement is estimated to cost about 14% less per mile than JPCP. Therefore, the district proposes to use 10.75 inch full-depth HMA.

The following HMA mix designs are proposed:

Surface	PG64-22, Mix "D"
Top Binder	PG64-22
Lower Binder	PG64-22

The District requests to use an improved subgrade consisting of 8 inch Subbase Granular Material, Type A. District 6 typically specifies 8 inch of Subbase Granular Material, Type A in improved subgrade applications where the underlying soils show an IBV of 3 or better. Research conducted by District 6 (Physical Research Report #154) and the Illinois Center for Transportation (ICT R27-1 & R27-81), combined with approximately 10 years of field experience, indicates an 8 inch layer of Subbase Granular Material, Type A performs as well as a 12 inch layer when the underlying soil IBV is 3 or better. The physical properties of the aggregates typically used in District 6 allow this reduction in thickness with no loss in performance. When the IBV is less than 3 at the time of construction, the appropriate remedial action is determined

according to the Department's Subgrade Stability Manual. An improved subgrade consisting of Lime Modified Soil was previously proposed as shown on the attached LCCA, but the improved subgrade was changed to Subbase Granular Material, Type A based on comments from the district materials engineer. The LCCA results should not be significantly affected.

This project is scheduled for the August 2013 letting.

If you have any questions or require additional information, please contact Jay Edwards at 785-5321.

Enclosures

**PRE-FINAL PLANS
MARCH 22, 2013**

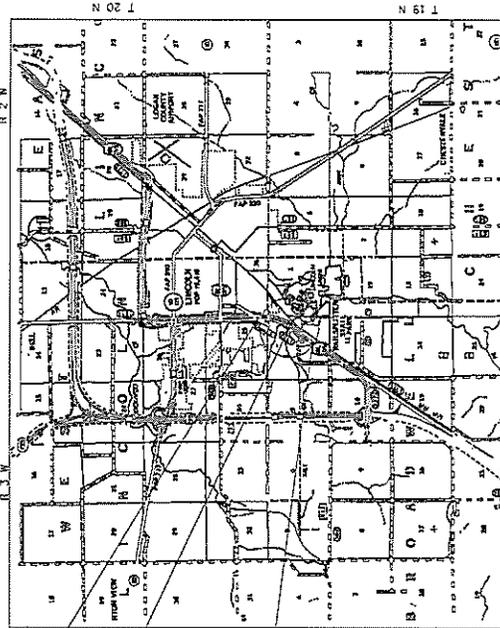
FOR INDEX OF SHEETS, SEE SHEET NO. 2

**STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
PROPOSED
HIGHWAY PLANS
F.A.U. ROUTE 7706 (BUSINESS LOOP 55)
SECTION 23(B-1)
PROJECT
LOGAN COUNTY
C-96-503-10**

STA 73+00.00
BEGIN IMPROVEMENT
BEGIN PROJECT

STA 36+50.01 TO STA 102+55.56 60' SKEW
PROJECT INCLUDES REMOVAL AND REPLACEMENT OF
EXISTING SN 054-0005 OVER SALT CREEK WITH A
PROPOSED FIVE SPAN, 48" WEB PLATE GIRDER BRIDGE.
587'-0" 174" BK-TO-BK ABUTMENTS
89'-2" 0-TO-0 CONCRETE BECK
PROPOSED SN 054-0512

STA 124+50.00
END IMPROVEMENT
END PROJECT



GROSS LENGTH OF PROJECT = 5,150.00 FEET = 0.975 MILES
NET LENGTH OF PROJECT = 5,150.00 FEET = 0.975 MILES

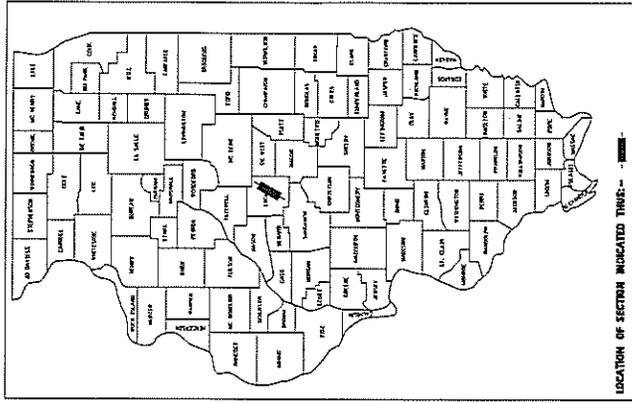
PLANS PREPARED BY
HORNER & SHIRN, INC.
ENGINEERS
www.HornerShirn.com
640 Pierce Boulevard, Suite 200 • O'Fallon, Illinois 62289
Phone: (616) 822-3040
Illinois Professional Design Firm No. 184-000435
License Expires 4/30/2015

PROJECT ENGINEER: JOHN NEGANGARD, P.E. (217) 782-6990
PROJECT MANAGER: VINCE MADONIA, P.E. (217) 785-9046

CONTRACT NO. 72789

SECTION	COUNTY	SHEET
23(B-1)	LOGAN	139
CONTRACT NO.	CONTRACT NO.	72789

D-96-521-03



ADT = 4,914 120005
% SU = 2.0
% BU = 4.0
TOWNSHIPS = BROADWELL (T18N, R3W)
WEST LINCOLN (T20N, R3W)
FUNCTIONAL CLASSIFICATION = MINOR ARTERIAL

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

SUBMITTED _____

DEPUTY DIRECTOR OF HIGHWAYS, REGION ENGINEER _____

ENGINEER OF DESIGN AND ESTIMATION _____

DIRECTOR OF HIGHWAYS, CHIEF ENGINEER _____

**PRINTED BY THE AUTHORITY
OF THE STATE OF ILLINOIS**



PROFESSIONAL ENGINEER
Steven B. Denehan, P.E.
License Expires 11/30/2015

PROJECT AND TRAFFIC INPUTS				(Enter Data in Gray Shaded Cells)			
Route: I-55 Business Loop	Comments: Contract 72789						
Section: 23(B-1)							
County: Logan	Design Date: 04/16/2013	JDE	<-- BY				
Location: Salt Creek 0.3 Mi SW of Lincoln	Modify Date:		<-- BY	ADT	Year		
				Current:	5,250	2011	
				Future:	6,131	2024	
Facility Type: Other Marked State Route	# of Lanes = 4						
Road Class: I				Structural Design Traffic			
Subgrade Support Rating (SSR): Poor				Minimum ADT	Actual ADT	Actual % of Total ADT	% of ADT in Design Lane
Construction Year: 2014				PV = 0	5,518	90.0%	P = 32%
Design Period (DP) = 20 years				SU = 250	497	8.1%	S = 45%
				MU = 750	116	1.9%	M = 45%
				Struct. Design ADT =	6,131	(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) = 1.10	(Actual ADT)			TF rigid (Actual) = 1.38	(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.R)				Edge Support = Tied Shoulder or C.&G.			
HMA Mixture Temp. = 77.5 deg. F (Fig. 54-5.C)				Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)			
Design HMA Mixture Modulus (E _{HMA}) = 620 ksi (Fig. 54-5.D)							
Design HMA Strain (ε _{HMA}) = 84 (Fig. 54-5.E)				CRC Pavement			
Full Depth HMA Design Thickness = 10.75 in. (Fig. 54-5.F)				Use TF rigid = 5.02			
Limiting Strain Criterion Thickness = 15.75 in. (Fig. 54-5.I)				IBR value =			
Use Full-Depth HMA Thickness = 10.75 inches				CRCP Thickness = 999.00 in. (Fig. 54-4.M)			
TF MUST BE > 60 FOR CRCP							

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS							
HMA Overlay of Rubblized PCC				Unbonded Concrete Overlay			
Use TF flexible = 3.56				Review 54-4.03 for limitations and special considerations.			
District =							
HMA Overlay Design Thickness = 999.00 in. (Fig. 54-5.U)				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		2 lanes with ADT > 2000		2 Lanes		2 Lanes	
Part of a future 4 lanes or more		One way Street with ADT <= 3500		(ADT 750 -2000)		(ADT < 750)	
One-way Streets with ADT > 3500							
				Min. Str. Design Traffic (Fig 54-2.C)			
Facility Type		PV	SU	MU		Class Table for One-Way Streets	
Interstate or Supplemental Freeway		0	500	1500			
Other Marked State Route		0	250	750			
Unmarked State Route		No Min	No Min	No Min			
				Traffic Factor ESAL Coefficients			
		Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)		Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
Class		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		
Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)							
		Rural			Urban		
Number of Lanes		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 **I-55 Business Loop**
 SECTION **23(B-1)**
 COUNTY **Logan**
 LOCATION **Salt Creek 0.3 MI SW of Lincoln**

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **911 FT ==>** 0.17 Miles
 # OF CENTERLINES **2 CL**
 # OF LANES **4 LANES**
 # OF EDGES **4 EP**
 LANE WIDTH - AVERAGE **12 FT**
 SHOULDER WIDTH HMA Inside **9 FT**
 HMA Outside **9 FT**

PAVEMENT THICKNESS (FLEXIBLE) **10.75 IN** **15.75 IN MAX**
 SHOULDER THICKNESS **8.00 IN** **HMA, 9 FT Standard Design**
 POLICY OVERLAY THICKNESS **2.25 IN**

FLEX PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		3.56	1.10	3.56

Read Me!

HMA	COST PER TON	UNIT PRICE
HMA SURFACE		\$90.00 / TON
HMA TOP BINDER		\$75.00 / TON
HMA LOWER BINDER		\$75.00 / TON
HMA BINDER (LEVELING)		\$85.00 / TON
HMA SHOULDER		\$80.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(10.75")	4,859	SQ YD	\$48.53 / SQ YD	\$235,776 ~
HMA SURFACE COURSE	(2.00")	4,859	SQ YD	\$10.15 / SQ YD	\$0
HMA TOP BINDER COURSE	(2.25")	4,859	SQ YD	\$9.66 / SQ YD	\$0
HMA LOWER BINDER COURSE	(6.50")	4,859	SQ YD	\$28.72 / SQ YD	\$0
HMA SHOULDER	(8.00")	3,644	SQ YD	\$35.84 / SQ YD	\$130,601 ~
CURB & GUTTER		911	LIN FT	\$40.00 / LIN FT	\$36,440
SUBBASE GRAN MATL TY C (TONS)		224	TONS	\$35.00 / TON	\$7,840
IMPROVED SUBGRADE: Modified Soil		9,068	SQ YD	\$4.00 / SQ YD	\$36,272
LIME		182	TONS	\$75.00 / TONS	\$13,650
		0	TONS	\$0.00	\$0
PAVEMENT REMOVAL		0	SQ YD		\$0
SHOULDER REMOVAL		0	SQ YD		\$0

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST \$460,579
 FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE \$108,873

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			\$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix	\$10.15 / SQ YD
HMA OVERLAY PVMT	(2.25")	Surface Mix	\$11.22 / SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	\$7.60 / SQ YD
HMA BINDER MIX	(0.75")	Leveling Binder Mix	\$3.62 / SQ YD
HMA OVERLAY SHLD (Year 30)	(2.25")	Shoulder Mix	\$10.08 / SQ YD
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	\$8.96 / SQ YD
MILLING (2.00 IN)			\$2.50 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf)		Surface Mix	\$79.58 / SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill Surf)		Shoulder Mix	\$78.46 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill +2.00")		Leveling Binder Mix	\$79.02 / SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill +2.00")		Shoulder Mix	\$78.46 / 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 \$632,908
 FLEXIBLE TOTAL ANNUAL COST PER MILE \$149,609

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%	3,644	LIN FT	\$2.00	\$7,288	
	CNTR LINE JOINT R&S	100.00%	1,822	LIN FT	\$2.00	\$3,644	
	RNDM / THRM CRACK R&S	50.00%	2,004	LIN FT	\$2.00	\$4,008	
	PD PVMT PATCH M&F SURF	0.10%	5	SQ YD	\$79.58	\$398	
	PWFn =	0.8626		PW =	0.8626 X	\$15,338	\$13,231
YEAR 10							
	LONG SHLD JT R&S	100.00%	3,644	LIN FT	\$2.00	\$7,288	
	CNTR LINE JOINT R&S	100.00%	1,822	LIN FT	\$2.00	\$3,644	
	RNDM / THRM CRACK R&S	50.00%	2,004	LIN FT	\$2.00	\$4,008	
	PD PVMT PATCH M&F SURF	0.50%	24	SQ YD	\$79.58	\$1,910	
	PWFn =	0.7441		PW =	0.7441 X	\$16,850	\$12,538
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	8,503	SQ YD	\$2.50	\$21,258	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	49	SQ YD	\$79.02	\$3,872	
	HMA OVERLAY PVMT 2.00"	100.00%	4,859	SQ YD	\$10.15	\$49,315	
	HMA OVERLAY SHLD 2.00 "	100.00%	3,644	SQ YD	\$8.96	\$32,650	
	PWFn =	0.6419		PW =	0.6419 X	\$107,095	\$68,740
YEAR 20							
	LONG SHLD JT R&S	100.00%	3,644	LIN FT	\$2.00	\$7,288	
	CNTR LINE JOINT R&S	100.00%	1,822	LIN FT	\$2.00	\$3,644	
	RNDM / THRM CRACK R&S	50.00%	2,004	LIN FT	\$2.00	\$4,008	
	PD PVMT PATCH M&F SURF	0.10%	5	SQ YD	\$79.58	\$398	
	PWFn =	0.5537		PW =	0.5537 X	\$15,338	\$8,492
YEAR 25							
	LONG SHLD JT R&S	100.00%	3,644	LIN FT	\$2.00	\$7,288	
	CNTR LINE JOINT R&S	100.00%	1,822	LIN FT	\$2.00	\$3,644	
	RNDM / THRM CRACK R&S	50.00%	2,004	LIN FT	\$2.00	\$4,008	
	PD PVMT PATCH M&F SURF	0.50%	24	SQ YD	\$79.58	\$1,910	
	PWFn =	0.4776		PW =	0.4776 X	\$16,850	\$8,048
HMA SD							
YEAR 30 NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	8,503	SQ YD	\$2.50	\$21,258	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	97	SQ YD	\$79.02	\$7,665	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	36	SQ YD	\$78.46	\$2,825	
	HMA OVERLAY PVMT 2.25 "	100.00%	4,859	SQ YD	\$11.22	\$54,494	
	HMA OVERLAY SHLD 2.25 "	100.00%	3,644	SQ YD	\$10.08	\$36,732	
	PWFn =	0.4120		PW =	0.4120 X	\$122,974	\$50,664
YEAR 35							
	LONG SHLD JT R&S	100.00%	3,644	LIN FT	\$2.00	\$7,288	
	CNTR LINE JOINT R&S	100.00%	1,822	LIN FT	\$2.00	\$3,644	
	RNDM / THRM CRACK R&S	50.00%	2,004	LIN FT	\$2.00	\$4,008	
	PD PVMT PATCH M&F SURF	0.10%	5	SQ YD	\$79.58	\$398	
	PWFn =	0.3554		PW =	0.3554 X	\$15,338	\$5,451
YEAR 40							
	LONG SHLD JT R&S	100.00%	3,644	LIN FT	\$2.00	\$7,288	
	CNTR LINE JOINT R&S	100.00%	1,822	LIN FT	\$2.00	\$3,644	
	RNDM / THRM CRACK R&S	50.00%	2,004	LIN FT	\$2.00	\$4,008	
	PD PVMT PATCH M&F SURF	0.50%	24	SQ YD	\$79.58	\$1,910	
	PWFn =	0.3066		PW =	0.3066 X	\$16,850	\$5,165
							\$172,329
ROUTINE MAINTENANCE ACTIVITY				0.69 Lane Miles	0.00	\$0	\$0
							MAINTENANCE LIFE-CYCLE COST \$172,329
45	YEAR LIFE CYCLE	CRFn = 0.0407852					MAINTENANCE ANNUAL COST PER MILE \$40,736

PCC PAVEMENT

JPCP

ROUTE **I-55 Business Loop**
 SECTION **23(B-1)**
 COUNTY **Logan**
 LOCATION **Salt Creek 0.3 Mi SW of Lincoln**

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **911 FT ==> 0.17 Miles**
 # OF CENTERLINES **2 CL**
 # OF LANES **4 LANES**
 # OF EDGES **4 EP**
 LANE WIDTH - AVERAGE **12 FT**
 SHOULDER WIDTH **PCC Inside 9 FT**
 PCC Outside 9 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
		5.02	1.38	5.02
Worksheet Construction Type is New Construction		The Pavement Type is		JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
JPC PAVEMENT	(9.00")	4,859	SQ YD	\$50.00 /SQ YD	\$242,950
PAVEMENT REINFORCEMENT		0	SQ YD	/SQ YD	\$0
STABILIZED SUBBASE	(4.00")	5,466	SQ YD	\$19.00 /SQ YD	\$103,854
PCC SHOULDERS	(9.00" to 9.00")	3,644	SQ YD	\$45.00 /SQ YD	\$163,980
CURB & GUTTER		911	LIN FT	\$40.00 /LIN FT	\$36,440
SUBBASE GRAN MATL TY C	(~ 3.48")	422	TONS	\$35.00 /TON	\$14,770
IMPROVED SUBGRADE:	Modified Soil	8,705	SQ YD	\$4.00 /SQ YD	\$34,820
LIME		182	UNITS	\$75.00 /UNITS	\$13,650
		0			\$0
PAVEMENT REMOVAL		0	SQ YD	/SQ YD	\$0
SHOULDER REMOVAL		0	SQ YD	/SQ YD	\$0

Note: * Denotes User Supplied Quantity
 RIGID CONSTRUCTION INITIAL COST **\$610,464**
 RIGID CONSTRUCTION ANNUAL COST PER MILE **\$144,304**

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY \$0.00 /LANE-MILE / YEAR			
HMA POLICY OVERLAY	(2.50")		\$2.80 /SQ YD
HMA POLICY OVERLAY PVMT	(2.50")	1.5087	\$12.43 /SQ YD
HMA SURFACE MIX	(1.50")	1.5087	\$7.60 /SQ YD
HMA BINDER MIX	(1.00")	1.5087	\$4.83 /SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		\$11.20 /SQ YD
CLASS A PAVEMENT PATCHING			\$220.00 /SQ YD
CLASS B PAVEMENT PATCHING			\$135.00 /SQ YD
CLASS C SHOULDER PATCHING			
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix 1.79	\$77.06 /SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix 2.50	\$82.10 /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 **\$725,826**
 RIGID TOTAL ANNUAL COST PER MILE **\$171,574**

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE

11/05/13

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%	5	SQ YD	\$220.00	\$1,100	
		PWFn = 0.7441			PW = 0.7441 X	\$1,100	\$819
YEAR 15							
	PAVEMENT PATCH CLASS B	0.20%	10	SQ YD	\$220.00	\$2,200	
		PWFn = 0.6419			PW = 0.6419 X	\$2,200	\$1,412
YEAR 20							
	PAVEMENT PATCH CLASS B	2.00%	97	SQ YD	\$220.00	\$21,340	
	SHOULDER PATCH CLASS C	0.50%	18	SQ YD	\$135.00	\$2,430	
	LONGITUDINAL SHLD JT R&S	100.00%	3,644	LIN FT	\$2.00	\$7,288	
	CENTERLINE JT R&S	100.00%	1,822	LIN FT	\$2.00	\$3,644	
		PWFn = 0.5537			PW = 0.5537 X	\$34,702	\$19,214
YEAR 25							
	PAVEMENT PATCH CLASS B	3.00%	146	SQ YD	\$220.00	\$32,120	
	SHOULDER PATCH CLASS C	1.00%	36	SQ YD	\$135.00	\$4,860	
		PWFn = 0.4776			PW = 0.4776 X	\$36,980	\$17,662
YEAR 30 NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	194	SQ YD	\$220.00	\$42,680	
	SHOULDER PATCH CLASS C	1.50%	55	SQ YD	\$135.00	\$7,425	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	4,859	SQ YD	\$12.43	\$60,371	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	3,644	SQ YD	\$11.20	\$40,813	
		PWFn = 0.4120			PW = 0.4120 X	\$151,289	\$62,329
YEAR 35 NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	3,644	LIN FT	\$2.00	\$7,288	
	CENTERLINE JT R&S	100.00%	1,822	LIN FT	\$2.00	\$3,644	
	RANDOM CRACK R&S	50.00%	1,822	LIN FT	\$2.00	\$3,644	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	1,171	LIN FT	\$2.00	\$2,342	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	5	SQ YD	\$82.10	\$411	
		PWFn = 0.3554			PW = 0.3554 X	\$17,329	\$6,158
YEAR 40 NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	24	SQ YD	\$220.00	\$5,280	
	LONGITUDINAL SHLD JT R&S	100.00%	3,644	LIN FT	\$2.00	\$7,288	
	CENTERLINE JT R&S	100.00%	1,822	LIN FT	\$2.00	\$3,644	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	1,757	LIN FT	\$2.00	\$3,514	
	RANDOM CRACK R&S	50.00%	1,822	LIN FT	\$2.00	\$3,644	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	24	SQ YD	\$82.10	\$1,970	
		PWFn = 0.3066			PW = 0.3066 X	\$25,340	\$7,768
							\$115,362
	ROUTINE MAINTENANCE ACTIVITY		0.69 Lane Miles		\$0.00	\$0	\$0
							MAINTENANCE LIFE-CYCLE COST \$115,362
45	YEAR LIFE CYCLE	CRFn = 0.0407852					MAINTENANCE ANNUAL COST PER MILE \$27,270

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 4/24/13 1:42 PM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$610,464	\$460,579
		ANNUAL COST PER MILE	\$144,304	\$108,873
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$115,362	\$172,329
		ANNUAL COST PER MILE	\$27,270	\$40,736
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$725,826	\$632,908
		ANNUAL COST PER MILE	\$171,574	\$149,609

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	=====>	HMA	\$149,609	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	JPCP	\$171,574	14.7%