Illinois Department of Transportation

To:	Paul Loete	Attn: District Three
From:	John D. Baranzelli	
Subject:	Pavement Design	
Date:	April 17, 2014	

FAP Route 608 (IL 89)
Section (1) BR
Bureau & Putnam Counties
Over the Illinois River at Spring Valley

We have reviewed the pavement design for the above captioned section submitted to BDE on April 4, 2014.The project will reconstruct a portion of IL 89 in conjunction with Spring Valley Bridge over the Illinois River. The project will omit the stabilized sub-base due to a storm sewer system and cub & gutter. The life cycle cost analysis favored the rigid design by more than 10%. The approved pavement design is as follows:

IL 89 over the Illinois River at Spring Valley[new pavement]]

9 inches of Jointed PCC Pavement with Tied PCC Curb & Gutter
12 inches of Aggregate Subgrade Improvement

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

Illinois Department of Transportation

Memorandum

To: John Baranzelli Attn: Paul Niedernhofer

From: Paul Loete By: Dave Broviak

Subject: Pavement Design *

Date: April 4, 2014

* FAP 698 (IL 89)
Section (1) BR
Bureau & Putnam Counties
PTB 159/021
Contract No. 66A69
File No. 2100
D3 No. 1366

The attached pavement design is provided for your approval. The project consists of reconstructing 0.93 mile of IL 89. The new bridge is approximately 0.34 mile so the actual new pavement is 0.59 mile. On the north end of the project, the proposed typical section consists of 700' of 26' wide pavement plus B6.24 curb and gutter. The remaining portion of the reconstructed pavement consists of two 12' lanes plus 8' shoulders. The estimated quantity of new pavement is 8,600 square yards plus an additional 4,400 square yards for the shoulders.

The district proposes to use 9" concrete JPC pavement. The 4" stabilized sub-base was not included in the JPC design due to a portion of this roadway having curb and gutter, the proposed use of a 12" Aggregate Subgrade Improvement (ASI) throughout, and the difficulty of constructing a stabilized sub-base throughout multiple stages and entrances.

The following facts and assumptions were used in the design:

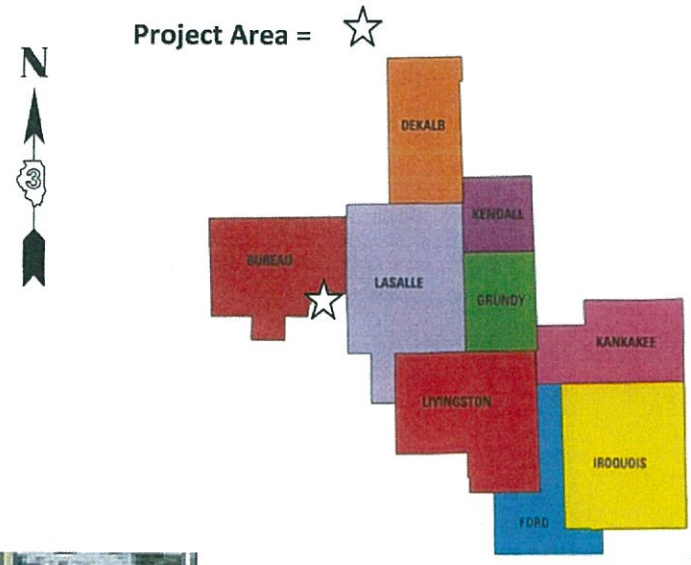
- It was assumed "New Construction/Reconstruction" when entering the life cycle cost spreadsheet.
- Design Traffic was based on 2026 projections.
- Design Period of 20 years.
- Poor Sub-grade.
- PG grade 70-22 for top lifts of binder and the surface course.
- The JPC design would not use the optional 4" stabilized sub-base.

Attachments

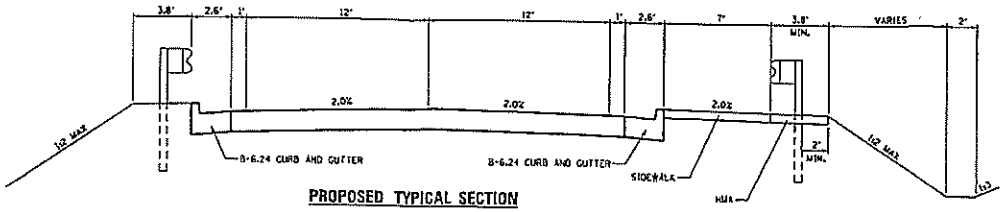
DL:lw/dl 4-4-14 Pavement Design 66A69

Project Location Map

FAP 698 (IL 89)
Section (1) BR
Bureau & Putnam Counties
P-93-013-11 File #2100
D3# 1366 Contract 66A69
SN 078-0006

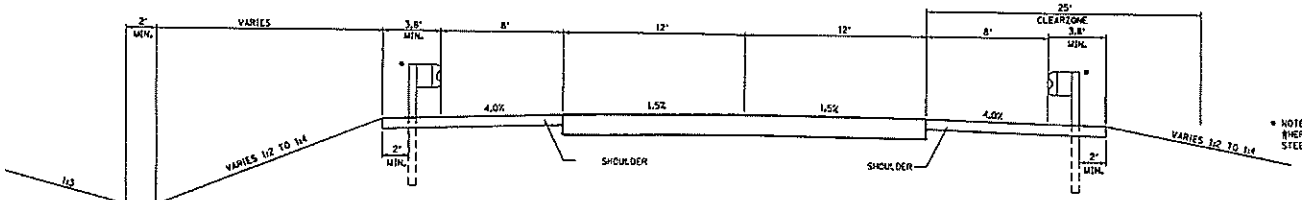


ILLINOIS ROUTE 89 – PROPOSED TYPICAL SECTIONS



PROPOSED TYPICAL SECTION

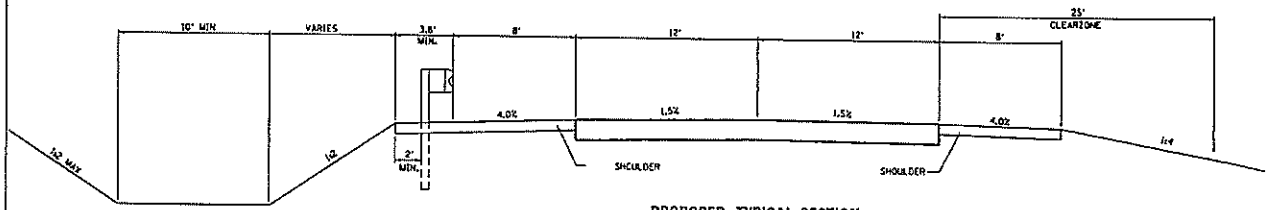
(SOUTH OF EXISTING RAILROAD BRIDGE TO BARTO BOAT LANDING ENTRANCE, LOOKING SOUTH)



* NOTE: GUARDRAIL IS PROPOSED AT LOCATIONS WHERE THE PROPOSED FRONT SLOPE IS 1:3 OR STEEPER.

PROPOSED TYPICAL SECTION

(NORTH OF PROPOSED RIVER BRIDGE, LOOKING SOUTH)



PROPOSED TYPICAL SECTION

(SOUTH OF PROPOSED RIVER BRIDGE, LOOKING SOUTH)

IL 89 (Spalding Street)
Illinois River Bridge
Replacement

Illinois Department of Transportation

benesch
engineers · scientists · planners

BDE 5401 Template (Rev. 09/05/2013)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 08/12/2014

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: FAP 689 (IL89)
Section: (1) BR
County: Bureau & Putnam
Location: Spring Valley
Comments:
Design Date: 10/8/2013 DPL <-- BY
Modify Date: <-- BY

	ADT	Year
Current:	5,650	2011
Future:	6,600	2025

Facility Type: Other Marked State Route
# of Lanes = 2 or 3
Part of future 4 lanes or more ? No
One Way Street ? No
Road Class: II

Subgrade Support Rating (SSR): Poor
Construction Year: 2016
Design Period (DP) = 20 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	6,001	90.0%	P = 50%
SU =	250	333	5.0%	S = 50%
MU =	750	333	5.0%	M = 50%
		Struct. Design ADT =	6,668	(2026)

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT			RIGID PAVEMENT		
Cpv =	0.15		Cpv =	0.15	
Csu =	112.06		Csu =	135.78	
Cmu =	385.44		Cmu =	567.21	
TF flexible (Actual) =	1.67	(Actual ADT)	TF rigid (Actual) =	2.35	(Actual ADT)
TF flexible (Min) =	3.17	(Min ADT Fig. 54-2.C)	TF rigid (Min) =	4.59	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 3.17
PG Grade Lower Binder Lifts = PG 70-22 (Fig. 53-4.R)
Goto Map
HMA Mixture Temp. = 75.5 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 680 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 86 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 10.00 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 15.00 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 10.00 inches

JPC Pavement

Use TF rigid = 4.59
Edge Support = Tied Shoulder or C.&G.

Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 4.59
IBR value = 3

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

Use TF flexible = 3.17
HMA Overlay Design Thickness = 7.50 in. (Fig. 54-5.U)
Goto Map
Limiting Strain Criterion Thickness = in. (Fig. 54-5.V)

Use HMA Overlay Thickness = 999.00 inches

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 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. 09/05/2013) Printed: 08/12/2014

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE		FAP 689 (IL89)	
SECTION		(1) BR	
COUNTY		Bureau & Putnam	
LOCATION		Spring Valley	
FACILITY TYPE		NON-INTERSTATE	
PROJECT LENGTH		3150 FT	= = > 0.60 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)		10.00 IN	15.00 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	1.67	3.17

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$80.15 / TON
HMA TOP BINDER	$79.21 / TON
HMA LOWER BINDER	$79.21 / TON
HMA BINDER (LEVELING)	$83.00 / TON
HMA SHOULDER	$80.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(10.00")	8,400	SQ YD	$46.00 / SQ YD	$386,432 ~
HMA SURFACE COURSE	(2.00")	947	TONS	$80.15 / TON	$0
HMA TOP BINDER COURSE	(2.25")	1,081	TONS	$79.21 / TON	$0
HMA LOWER BINDER COURSE	(5.75")	2,839	TONS	$79.21 / TON	$0
HMA SHOULDER	(8.00")	2,509	TONS	$80.00 / TON	$200,704 ~
CURB & GUTTER		0	LIN FT	$30.00 / LIN FT	$0
SUBBASE GRAN MATL TY C (TONS)		0	TONS *	$25.00 / TON	$0
IMPROVED SUBGRADE:	Modified Soil	0	SQ YD *	$7.00 / 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		8,400	SQ YD	$0.00 / SQ YD	$0
SHOULDER REMOVAL		5,600	SQ YD	$0.00 / SQ YD	$0

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$587,136
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$40,139

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	$9.04 / SQ YD
HMA OVERLAY PVMT	(2.25")		2.25	$10.30 / SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	1.50	$6.77 / SQ YD
HMA BINDER MIX	(0.75")	eling Binder Mix	0.75	$3.53 / SQ YD
HMA OVERLAY SHLD (Year 30)	(2.25")	Shoulder Mix	2.25	$10.08 / SQ YD
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	2.00	$8.96 / SQ YD
MILLING (2.00 IN)			2.00	$3.00 / SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill Surf)	Surface Mix	2.00	$78.98 / SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder Mix	2.00	$78.96 / SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00 ")	Leveling Binder Mix	2.00	$79.30 / SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")	Shoulder Mix	2.00	$78.96 / SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				$1.60 / LIN FT
CENTERLINE JOINT ROUT & SEAL				$1.85 / LIN FT
RANDOM / THERMAL CRACK ROUT & SEAL	(100% Rehab = 110.00' / Station / Lane)			$2.00 / LIN FT

FLEXIBLE TOTAL LIFE-CYCLE COST	$864,376
FLEXIBLE TOTAL ANNUAL COST PER MILE	$59,092

HMA_SD

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE

08/12/14

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%	6,300	LIN FT	$1.60	$10,080	
	CNTR LINE JOINT R&S	100.00%	3,150	LIN FT	$1.85	$5,828	
	RNDM / THRM CRACK R&S	50.00%	3,465	LIN FT	$2.00	$6,930	
	PD PVMT PATCH M&F SURF	0.10%	8	SQ YD	$78.98	$632	
	PWFn =	0.8626		PW =	0.8626 X	$23,470	$20,245
YEAR 10							
	LONG SHLD JT R&S	100.00%	6,300	LIN FT	$1.60	$10,080	
	CNTR LINE JOINT R&S	100.00%	3,150	LIN FT	$1.85	$5,828	
	RNDM / THRM CRACK R&S	50.00%	3,465	LIN FT	$2.00	$6,930	
	PD PVMT PATCH M&F SURF	0.50%	42	SQ YD	$78.98	$3,317	
	PWFn =	0.7441		PW =	0.7441 X	$26,155	$19,462
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	14,000	SQ YD	$3.00	$42,000	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	84	SQ YD	$79.30	$6,661	
	HMA OVERLAY PVMT 2.00"	100.00%	8,400	SQ YD	$9.04	$75,929	
	HMA OVERLAY SHLD 2.00 "	100.00%	5,600	SQ YD	$8.96	$50,176	
	PWFn =	0.6419		PW =	0.6419 X	$174,766	$112,176
YEAR 20							
	LONG SHLD JT R&S	100.00%	6,300	LIN FT	$1.60	$10,080	
	CNTR LINE JOINT R&S	100.00%	3,150	LIN FT	$1.85	$5,828	
	RNDM / THRM CRACK R&S	50.00%	3,465	LIN FT	$2.00	$6,930	
	PD PVMT PATCH M&F SURF	0.10%	8	SQ YD	$78.98	$632	
	PWFn =	0.5537		PW =	0.5537 X	$23,470	$12,995
YEAR 25							
	LONG SHLD JT R&S	100.00%	6,300	LIN FT	$1.60	$10,080	
	CNTR LINE JOINT R&S	100.00%	3,150	LIN FT	$1.85	$5,828	
	RNDM / THRM CRACK R&S	50.00%	3,465	LIN FT	$2.00	$6,930	
	PD PVMT PATCH M&F SURF	0.50%	42	SQ YD	$78.98	$3,317	
	PWFn =	0.4776		PW =	0.4776 X	$26,155	$12,492
	HMA_SD						
YEAR 30	NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	14,000	SQ YD	$3.00	$42,000	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	168	SQ YD	$79.30	$13,322	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	56	SQ YD	$78.96	$4,422	
	HMA OVERLAY PVMT 2.25 "	100.00%	8,400	SQ YD	$10.30	$86,512	
	HMA OVERLAY SHLD 2.25 "	100.00%	5,600	SQ YD	$10.08	$56,448	
	PWFn =	0.4120		PW =	0.4120 X	$202,704	$83,511
YEAR 35							
	LONG SHLD JT R&S	100.00%	6,300	LIN FT	$1.60	$10,080	
	CNTR LINE JOINT R&S	100.00%	3,150	LIN FT	$1.85	$5,828	
	RNDM / THRM CRACK R&S	50.00%	3,465	LIN FT	$2.00	$6,930	
	PD PVMT PATCH M&F SURF	0.10%	8	SQ YD	$78.98	$632	
	PWFn =	0.3554		PW =	0.3554 X	$23,470	$8,341
YEAR 40							
	LONG SHLD JT R&S	100.00%	6,300	LIN FT	$1.60	$10,080	
	CNTR LINE JOINT R&S	100.00%	3,150	LIN FT	$1.85	$5,828	
	RNDM / THRM CRACK R&S	50.00%	3,465	LIN FT	$2.00	$6,930	
	PD PVMT PATCH M&F SURF	0.50%	42	SQ YD	$78.98	$3,317	
	PWFn =	0.3066		PW =	0.3066 X	$26,155	$8,018
							$277,240
	ROUTINE MAINTENANCE ACTIVITY		1.19	Lane Miles	0.00	$0	$0
					MAINTENANCE LIFE-CYCLE COST		$277,240
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE		$18,953

PCC PAVEMENT

JPCP

ROUTE			FAP 689 (IL89)	
SECTION			(1) BR	
COUNTY			Bureau & Putnam	
LOCATION			Spring Valley	
FACILITY TYPE			NON-INTERSTATE	
PROJECT LENGTH			3150 FT = = >	0.60 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		7.50 IN	
POLICY OVERLAY THICKNESS		2.50 IN	

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	4.59	2.35	4.59
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")	8,400	SQ YD		$39.41	/ SQ YD	$331,044
PAVEMENT REINFORCEMENT		0	SQ YD		$22.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	9,450	SQ YD		$0.00	/ SQ YD	$0
PCC SHOULDERS	(7.50" to 7.50")	5,600	SQ YD		$45.00	/ SQ YD	$252,000
CURB & GUTTER		0	LIN FT		$30.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(3.47")	0	TONS	*	$25.00	/ TON	$0
IMPROVED SUBGRADE:	Modified Soil Width = 0.0'	0	SQ YD	*	$7.00	/ 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		8,400	SQ YD		$0.00	/ SQ YD	$0
SHOULDER REMOVAL		5,600	SQ YD		$0.00	/ SQ YD	$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$583,044
RIGID CONSTRUCTION ANNUAL COST PER MILE	$39,859

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL		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	$11.48	/ SQ YD
HMA SURFACE MIX	(1.50")	1.0062	1.50	$6.77	/ SQ YD
HMA BINDER MIX	(1.00")	1.0139	aling Binder Mix 1.00	$4.71	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		Shoulder Mix 2.50	$11.20	/ SQ YD
CLASS A PAVEMENT PATCHING				$180.00	/ SQ YD
CLASS B PAVEMENT PATCHING				$125.00	/ SQ YD
CLASS C SHOULDER PATCHING				$130.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)			Surface Mix 1.50	$76.73	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")			Surface Mix 2.50	$81.22	/ SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				$1.60	/ LIN FT
CENTERLINE JOINT ROUT & SEAL				$1.85	/ 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	$734,369
RIGID TOTAL ANNUAL COST PER MILE	$50,204

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 08/12/14

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%	8	SQ YD	$125.00		$1,000	
	PWFn =	0.7441		PW =	0.7441	X	$1,000	$744
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	17	SQ YD	$125.00		$2,125	
	PWFn =	0.6419		PW =	0.6419	X	$2,125	$1,364
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	168	SQ YD	$125.00		$21,000	
	SHOULDER PATCH CLASS C	0.50%	28	SQ YD	$130.00		$3,640	
	LONGITUDINAL SHLD JT R&S	100.00%	6,300	LIN FT	$1.60		$10,080	
	CENTERLINE JT R&S	100.00%	3,150	LIN FT	$1.85		$5,828	
	PWFn =	0.5537		PW =	0.5537	X	$40,548	$22,450
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	252	SQ YD	$125.00		$31,500	
	SHOULDER PATCH CLASS C	1.00%	56	SQ YD	$130.00		$7,280	
	PWFn =	0.4776		PW =	0.4776	X	$38,780	$18,522
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	336	SQ YD	$125.00		$42,000	
	SHOULDER PATCH CLASS C	1.50%	84	SQ YD	$130.00		$10,920	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	8,400	SQ YD	$11.48		$96,434	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	5,600	SQ YD	$11.20		$62,720	
	PWFn =	0.4120		PW =	0.4120	X	$212,074	$87,372
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	6,300	LIN FT	$1.60		$10,080	
	CENTERLINE JT R&S	100.00%	3,150	LIN FT	$1.85		$5,828	
	RANDOM CRACK R&S	50.00%	3,150	LIN FT	$2.00		$6,300	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	2,016	LIN FT	$2.00		$4,032	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	8	SQ YD	$81.22		$650	
	PWFn =	0.3554		PW =	0.3554	X	$26,890	$9,556
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	42	SQ YD	$125.00		$5,250	
	LONGITUDINAL SHLD JT R&S	100.00%	6,300	LIN FT	$1.60		$10,080	
	CENTERLINE JT R&S	100.00%	3,150	LIN FT	$1.85		$5,828	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	3,024	LIN FT	$2.00		$6,048	
	RANDOM CRACK R&S	50.00%	3,150	LIN FT	$2.00		$6,300	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	42	SQ YD	$81.22		$3,411	
	PWFn =	0.3066		PW =	0.3066	X	$36,917	$11,317
								$151,325
	ROUTINE MAINTENANCE ACTIVITY		1.19	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$151,325
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$10,345

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

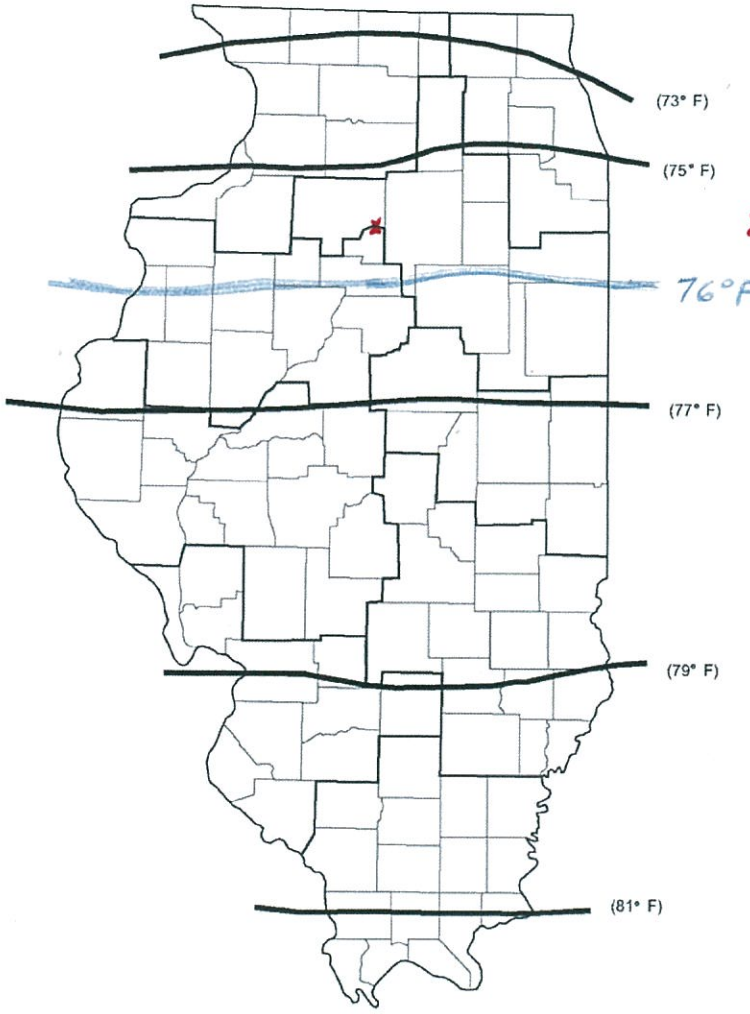
Calculated / Revised : 2/28/14 9:57 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$583,044	$587,136
		ANNUAL COST PER MILE	$39,859	$40,139
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$151,325	$277,240
		ANNUAL COST PER MILE	$10,345	$18,953
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$734,369	$864,376
		ANNUAL COST PER MILE	$50,204	$59,092

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**JPCP**	**$50,204**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**HMA**	**$59,092**	**17.7%**

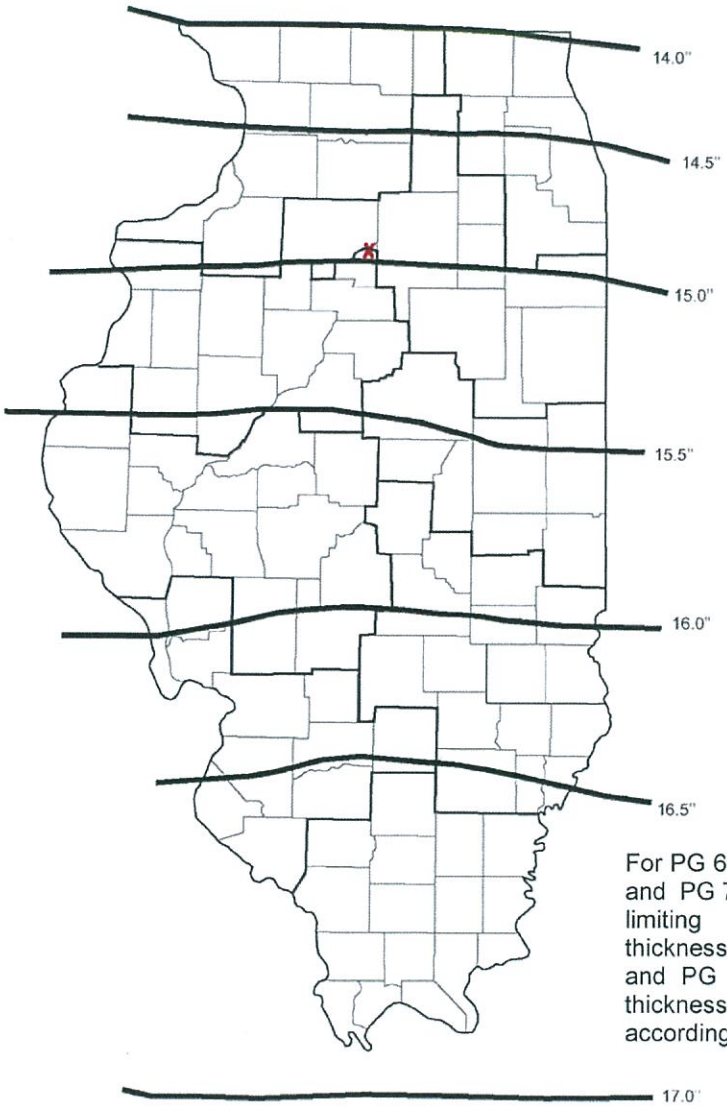
P:\Pavement Design Stuff\D-3\IL 89 over the Illinois River in Spring Valley 04-04-14\[1 Latest IDOT Mechanistic Pavement Design with LCCA 090513.xlsm]LifeCycle



Note: The minimum design HMA mixture temperature will be 73°F.

HMA MIXTURE TEMPERATURE
(Mechanistic Design: Flexible Pavement)

Figure 54-5.C



=15"

Lower lift = PG70-22
(Do not add 1")

Select lower value from Fig's. 54-5.F and this one (10¼" 15"

For PG 64-22, PG 70-22, PG 76-22, and PG 76-28 binder grades, read limiting strain criterion design thickness off of map. For PG 64-28 and PG 70-28 binder grades, the thickness should be corrected according to Section 54-5.01(i)8a.

Note. Thickness values based upon Mean Monthly Pavement Temperature at 4 in. depth correlated to July Mean Monthly Air Temperature, axle load of 20,000 lb, strain of 70 με, and E_{Ri} of 2 ksi.

MAXIMUM PAVEMENT THICKNESS
(Limiting Strain Criterion Design: Flexible Pavement)

Figure 54-5.I