Illinois Department of Transportation

To:	Roger Driskell	Attn: District Six
From:	John D. Baranzelli	
Subject:	Pavement Design	
Date:	December 12, 2013	

FAP 67 (IL Route 97)
Section S(X) & W(X,TS)
Sangamon County
From Covered Bridge Road to IL 4

We have reviewed the pavement design for the above captioned section, which was originally submitted to BDE on November 25, 2013. The project will construct new 4-lane expressway and a short piece of 2-lane roadway. The pavement design favored the rigid pavement by 11%.

The approved pavement design for both the 4-lane and 2-lane sections is as follows:

IL 97 [New Construction]

9 inches of PCC Jointed Pavement with tied PCC Shoulders
4 inches of Stabilized Subbase
12 inches of Lime Modified Soil

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:	Roger Driskell	By: Laura Mlacnik LRM
Subject:	Pavement Design	
Date:	November 25, 2013	

FAP 67 (IL 97)
Contract 92621
D-96-501-95
Section S(X) & W(X,TS)
Sangamon County
New Construction from Covered Bridge Road to 0.1 Mi W of IL 4 in Springfield

Attached for your review is the pavement design for the above-referenced section. This section consists of approximately 5.5 miles of new 4-lane expressway construction, as well as just over one-half mile of new 2-lane construction. The 2-lane pavement is split between several locations.

The results of the pavement design calculations are as follows:

4-lane Section (183,400 square yards)

Full-Depth HMA,	10.75 inches (Mechanistic)
	2.00 inches of Surface Course—SBS PG 70-28
	2.25 inches of Top Lift Binder—SBS PG 64-28
	6.50 inches of Bottom Lift Binder—PG 64-22
JPCP	9 inches (Mechanistic)

2-lane Section (12,800 square yards)

Full-Depth HMA,	10.75 inches (Mechanistic)
	2.00 inches of Surface Course—SBS PG 70-28
	2.25 inches of Top Lift Binder—SBS PG 64-28
	6.50 inches of Bottom Lift Binder—PG 64-22
JPCP	9 inches (Mechanistic)

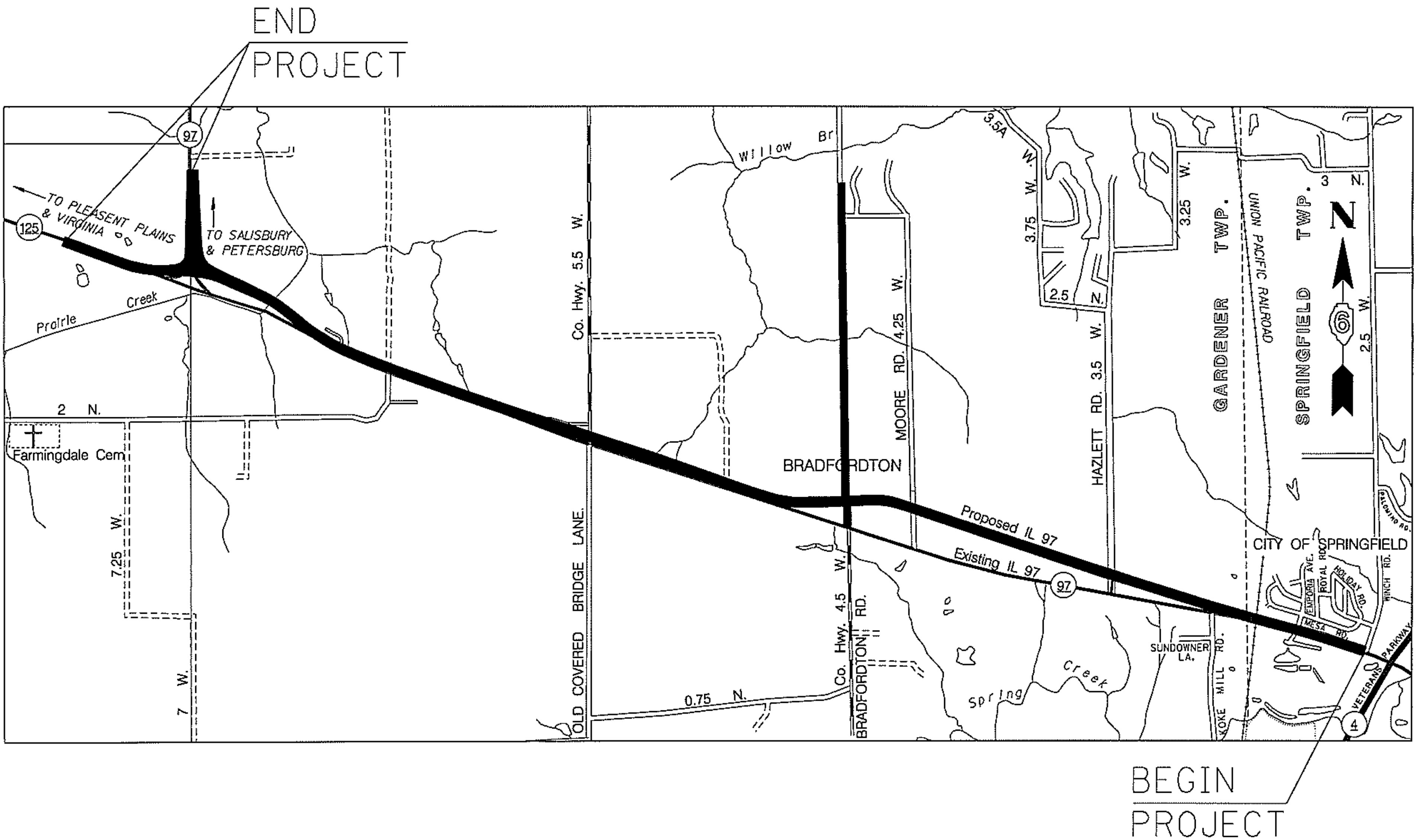
A Life Cycle Cost Analysis was completed on the 4-lane section using a 45 year life cycle which showed Jointed Plain Concrete Pavement as approximately 11% less expensive than HMA. Based on these results, the district recommends that JPCP be utilized throughout this section.

Recommended Pavement Structure

9 inches of PCC Jointed Pavement with Tied PCC Shoulder
4 inches of Stabilized Subbase
12 inches of Lime Modified Soil
9 inch PCC Shoulders tapering to 6 inches at edge of shoulder

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

Enclosures


END PROJECT
BEGIN PROJECT
TO PLEASENT PLAINS & VIRGINIA
TO SAUSBURY & PETERSBURG
125
97
4
Prairie Creek
Farmingdale Cem
2 N.
7.25 W.
7 W.
Co. Hwy. 5.5 W.
OLD COVERED BRIDGE LANE.
0.75 N.
Willow Br
BRADFORDTON
Co. Hwy. 4.5 W.
BRADFORDTON RD.
MOORE RD. 4.25 W.
Proposed IL 97
Existing IL 97
Spring Creek
3.5A
3.75 W.
2.5 N.
HAZLETT RD. 3.5 W.
3.25 W.
GARDENER TWP.
UNION PACIFIC RAILROAD
SPRINGFIELD TWP.
3 N.
2.5 W.
N
6
CITY OF SPRINGFIELD
SUNDOWNER LA.
KOKE MILL RD.
EMPORIA AVE.
ROYAL RD.
HOLIDAY RD.
MESA RD.
WINCH RD.
PALOMINO RD.
VETERANS PARKWAY

BDE 5401 Template (Rev. 10/05/2012)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 01/31/2014

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: FAP 67 (IL 97) (2-lane NS section)
Section: S(X) & W(X,TS)
County: Sangamon
Location: 0.1 Mi E of Smith Rd to 0.1 Mi W of IL 4 i

Comments: Contract 92621
Design Date: 03/22/2013 JDE <-- BY
Modify Date: 08/14/2013 JDE <-- BY

	ADT	Year
Current:	4,850	2011
Future:	5,545	2020

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: 2020
Design Period (DP) = 20 years

Structural Design Traffic	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	5,874	93.0%	P = 50%
SU =	250	325	5.2%	S = 50%
MU =	750	118	1.9%	M = 50%
Struct. Design ADT =		6,317	(2030)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = 0.15
Csu = 112.06
Cmu = 385.44
TF flexible (Actual) = 0.83 (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) = 1.12 (Actual ADT)
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 64-22 (Fig. 53-4.R)
Goto Map
HMA Mixture Temp. = 78.0 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 610 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 86 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 10.75 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 16.00 in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness = 10.75 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 =
CRCP Thickness = 999.00 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
District =
HMA Overlay Design Thickness = 999.00 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)

	Min. Str. Design Traffic (Fig 54-2.C)		
Facility Type	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

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

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

	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%

BDE 5401 Template (Rev. 10/05/2012)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 01/31/2014

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: FAP 67 (IL 97) (4-lane EW section)
Section: S(X) & W(X,TS)
County: Sangamon
Location: 0.1 Mi E of Smith Rd to 0.1 Mi W of IL 4 i

Comments: Contract 92621
Design Date: 03/22/2013 JDE <-- BY
Modify Date: 08/14/2013 JDE <-- BY

	ADT	Year
Current:	10,600	2011
Future:	12,120	2020

Facility Type: Other Marked State Route
# of Lanes = 4
Road Class: I
Subgrade Support Rating (SSR): Poor
Construction Year: 2020
Design Period (DP) = 20 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	12,994	94.1%	P = 32%
SU =	250	587	4.3%	S = 45%
MU =	750	228	1.7%	M = 45%
Struct. Design ADT =		13,809	(2030)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv =	0.15	
Csu =	132.5	
Cmu =	482.53	
TF flexible (Actual) =	1.70	(Actual ADT)
TF flexible (Min) =	3.56	(Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv =	0.15	
Csu =	143.81	
Cmu =	696.42	
TF rigid (Actual) =	2.20	(Actual ADT)
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. = 78.0 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 610 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 84 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 10.75 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 16.00 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 10.75 inches

JPC Pavement

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

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

CRC Pavement

Use TF rigid = 5.02
IBR value =

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

Use TF flexible = 3.56
District =

HMA Overlay Design Thickness = 999.00 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	Rigid Cmu	Flexible (Fig. 54-5.B) Csu	Flexible 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	Rural S	Rural M	Urban P	Urban S	Urban 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		FAP 67 (IL 97) (4-lane EW section)	
SECTION		S(X) & W(X,TS)	
COUNTY		Sangamon	
LOCATION		Mi E of Smith Rd to 0.1 Mi W of IL 4 in Springfield	
FACILITY TYPE		INTERSTATE	
PROJECT LENGTH		29000 FT = = >	5.49 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	

PAVEMENT THICKNESS (FLEXIBLE)	10.75 IN	16.00 IN MAX	
SHOULDER THICKNESS	8.00 IN		Standard Design
POLICY OVERLAY THICKNESS	3.75 IN		

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	3.56	1.70	3.56

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$105.00 / TON
HMA TOP BINDER	$90.00 / TON
HMA LOWER BINDER	$68.00 / TON
HMA BINDER (LEVELING)	N/A / TON
HMA SHOULDER	$78.50 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST	
HMA PAVEMENT (FULL-DEPTH)	(10.75")	183,400	SQ YD	*	$49.47	/ SQ YD	$9,072,601	~
HMA SURFACE COURSE	(2.00")	183,400	SQ YD	*	$11.84	/ SQ YD	$0	
HMA TOP BINDER COURSE	(2.25")	183,400	SQ YD	*	$11.59	/ SQ YD	$0	
HMA LOWER BINDER COURSE	(6.50")	183,400	SQ YD	*	$26.04	/ SQ YD	$0	
HMA SHOULDER	(8.00")	103,111	SQ YD		$35.17	/ SQ YD	$3,626,212	~
CURB & GUTTER		0	LIN FT		$0.00	/ LIN FT	$0	
SUBBASE GRAN MATL TY C (TONS)		6,869	TONS		$26.75	/ TON	$183,746	
IMPROVED SUBGRADE:	Modified Soil	306,113	SQ YD	*	$2.75	/ SQ YD	$841,811	
LIME		6,122	TONS	*	$70.00	/ TONS	$428,558	
		0					$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 $14,152,928

FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE $105,096

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY			$0.00	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix	$105.00	/ TON
HMA OVERLAY PVMT	(3.75")		$95.95	/ TON
HMA SURFACE MIX	(1.50")	Surface Mix	$105.00	/ TON
HMA BINDER MIX	(2.25")	Top Binder Mix	$90.00	/ TON
HMA OVERLAY SHLD (Year 30)	(1.75")	Shoulder Mix	$84.00	/ TON
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	$84.00	/ TON
MILLING (2.00 IN)			$2.10	/ SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill Surf)	Surface Mix	$58.00	/ SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder Mix	$58.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00 ")	Leveling Binder Mix	$58.00	/ SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")	Shoulder Mix	$58.00	/ SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL			$1.10	/ LIN FT
CENTERLINE JOINT ROUT & SEAL			$1.10	/ LIN FT
RANDOM / THERMAL CRACK ROUT & SEAL	(100% Rehab = 110.00' / Station / Lane)		$1.25	/ LIN FT

FLEXIBLE TOTAL LIFE-CYCLE COST $19,781,879

FLEXIBLE TOTAL ANNUAL COST PER MILE $146,895

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%	116,000	LIN FT	$1.10		$127,600	
	CNTR LINE JOINT R&S	100.00%	58,000	LIN FT	$1.10		$63,800	
	RNDM / THRM CRACK R&S	50.00%	63,800	LIN FT	$1.25		$79,750	
	PD PVMT PATCH M&F SURF	0.10%	183	SQ YD	$58.00		$10,614	
	PWFn =	0.8626		PW =	0.8626	X	$281,764	$243,052
YEAR 10								
	LONG SHLD JT R&S	100.00%	116,000	LIN FT	$1.10		$127,600	
	CNTR LINE JOINT R&S	100.00%	58,000	LIN FT	$1.10		$63,800	
	RNDM / THRM CRACK R&S	50.00%	63,800	LIN FT	$1.25		$79,750	
	PD PVMT PATCH M&F SURF	0.50%	917	SQ YD	$58.00		$53,186	
	PWFn =	0.7441		PW =	0.7441	X	$324,336	$241,336
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	286,511	SQ YD	$2.10		$601,673	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	1,834	SQ YD	$58.00		$106,372	
	HMA OVERLAY PVMT 2.00"	100.00%	20,683	TON	$105.00		$2,171,762	
	HMA OVERLAY SHLD 2.00 "	100.00%	11,548	TON	$84.00		$970,069	
	PWFn =	0.6419		PW =	0.6419	X	$3,849,876	$2,471,089
YEAR 20								
	LONG SHLD JT R&S	100.00%	116,000	LIN FT	$1.10		$127,600	
	CNTR LINE JOINT R&S	100.00%	58,000	LIN FT	$1.10		$63,800	
	RNDM / THRM CRACK R&S	50.00%	63,800	LIN FT	$1.25		$79,750	
	PD PVMT PATCH M&F SURF	0.10%	183	SQ YD	$58.00		$10,614	
	PWFn =	0.5537		PW =	0.5537	X	$281,764	$156,006
YEAR 25								
	LONG SHLD JT R&S	100.00%	116,000	LIN FT	$1.10		$127,600	
	CNTR LINE JOINT R&S	100.00%	58,000	LIN FT	$1.10		$63,800	
	RNDM / THRM CRACK R&S	50.00%	63,800	LIN FT	$1.25		$79,750	
	PD PVMT PATCH M&F SURF	0.50%	917	SQ YD	$58.00		$53,186	
	PWFn =	0.4776		PW =	0.4776	X	$324,336	$154,905
	HMA_SD							
YEAR 30	INTERSTATE							
	MILL PVMT ONLY 2.00"	100.00%	183,400	SQ YD	$2.10		$385,140	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	3,668	SQ YD	$58.00		$212,744	
	PD SHLD PATCH M&F SURF 2.00"	1.00%	1,031	SQ YD	$58.00		$59,798	
	HMA OVERLAY PVMT 3.75 "	100.00%	39,015	TON	$95.95		$3,743,681	
	HMA OVERLAY SHLD 1.75 "	100.00%	10,105	TON	$84.00		$848,811	
	PWFn =	0.4120		PW =	0.4120	X	$5,250,174	$2,163,002
YEAR 35								
	LONG SHLD JT R&S	100.00%	116,000	LIN FT	$1.10		$127,600	
	CNTR LINE JOINT R&S	100.00%	58,000	LIN FT	$1.10		$63,800	
	RNDM / THRM CRACK R&S	50.00%	63,800	LIN FT	$1.25		$79,750	
	PD PVMT PATCH M&F SURF	0.10%	183	SQ YD	$58.00		$10,614	
	PWFn =	0.3554		PW =	0.3554	X	$281,764	$100,134
YEAR 40								
	LONG SHLD JT R&S	100.00%	116,000	LIN FT	$1.10		$127,600	
	CNTR LINE JOINT R&S	100.00%	58,000	LIN FT	$1.10		$63,800	
	RNDM / THRM CRACK R&S	50.00%	63,800	LIN FT	$1.25		$79,750	
	PD PVMT PATCH M&F SURF	0.50%	917	SQ YD	$58.00		$53,186	
	PWFn =	0.3066		PW =	0.3066	X	$324,336	$99,427
								$5,628,951
	ROUTINE MAINTENANCE ACTIVITY		21.97	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$5,628,951
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$41,799

PCC PAVEMENT

JPCP

ROUTE			FAP 67 (IL 97) (4-lane EW section)
SECTION			S(X) & W(X,TS)
COUNTY			Sangamon
LOCATION			Mi E of Smith Rd to 0.1 Mi W of IL 4 in Springfield
FACILITY TYPE			INTERSTATE
PROJECT LENGTH			29000 FT = = > 5.49 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

PAVEMENT THICKNESS (RIGID)	JPCP	9.00 IN	TIED SHLD
SHOULDER THICKNESS		7.50 IN	
POLICY OVERLAY THICKNESS		3.75 IN	

RIGID PAVEMENT TRAFFIC FACTORS		MINIMUM	ACTUAL	USE
		5.02	2.20	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")	183,400	SQ YD	*	$37.15	/ SQ YD	$6,813,310
PAVEMENT REINFORCEMENT		0	SQ YD		$0.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	202,733	SQ YD	*	$12.10	/ SQ YD	$2,453,069
PCC SHOULDERS	(7.50" to 7.50")	103,111	SQ YD		$24.50	/ SQ YD	$2,526,220
CURB & GUTTER		0	LIN FT		$0.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(~ 6.22")	21,685	TONS		$26.75	/ TON	$580,074
IMPROVED SUBGRADE:	Modified Soil (Width = 66.3'	290,955	SQ YD	*	$2.75	/ SQ YD	$800,126
LIME		5,819	TONS	*	$70.00	/ TONS	$407,337
		0					$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

RIGID CONSTRUCTION INITIAL COST	$13,580,136
RIGID CONSTRUCTION ANNUAL COST PER MILE	$100,842

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL		UNIT COST	
ROUTINE MAINTENANCE ACTIVITY				$0.00	/ LANE-MILE / YEAR
HMA POLICY OVERLAY	(3.75")		3.75		
HMA POLICY OVERLAY PVMT	(3.75")	1.9125	2.25	$95.95	/ TON
HMA SURFACE MIX	(1.50")	1.0222	Surface Mix 1.50	$105.00	/ TON
HMA BINDER MIX	(2.25")	1.5192	Top Binder Mix 2.25	$90.00	/ TON
HMA POLICY OVERLAY SHLD	(3.75")		Shoulder Mix 3.75	$83.00	/ TON
CLASS A PAVEMENT PATCHING				$0.00	/ SQ YD
CLASS B PAVEMENT PATCHING				$170.00	/ SQ YD
CLASS C SHOULDER PATCHING				$120.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)			Surface Mix 1.50	$51.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 1.50")			Surface Mix 1.50	$51.00	/ SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				$1.10	/ LIN FT
CENTERLINE JOINT ROUT & SEAL				$1.10	/ LIN FT
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL				$1.25	/ LIN FT
RANDOM CRACK ROUT & SEAL	(100% Rehab = 100.00' / Station / Lane)			$1.25	/ LIN FT

RIGID TOTAL LIFE-CYCLE COST	$17,785,658
RIGID TOTAL ANNUAL COST PER MILE	$132,071

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%	183	SQ YD	$170.00		$31,110	
	PWFn =	0.7441		PW =	0.7441	X	$31,110	$23,149
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	367	SQ YD	$170.00		$62,390	
	PWFn =	0.6419		PW =	0.6419	X	$62,390	$40,046
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	3,668	SQ YD	$170.00		$623,560	
	SHOULDER PATCH CLASS C	0.50%	516	SQ YD	$120.00		$61,920	
	LONGITUDINAL SHLD JT R&S	100.00%	116,000	LIN FT	$1.10		$127,600	
	CENTERLINE JT R&S	100.00%	58,000	LIN FT	$1.10		$63,800	
	PWFn =	0.5537		PW =	0.5537	X	$876,880	$485,507
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	5,502	SQ YD	$170.00		$935,340	
	SHOULDER PATCH CLASS C	1.00%	1,031	SQ YD	$120.00		$123,720	
	PWFn =	0.4776		PW =	0.4776	X	$1,059,060	$505,813
YEAR 30	INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	7,336	SQ YD	$170.00		$1,247,120	
	SHOULDER PATCH CLASS C	1.50%	1,547	SQ YD	$120.00		$185,640	
	HMA POLICY OVERLAY 3.75" (PVMT)	100.00%	39,015	TON	$95.95		$3,743,681	
	HMA POLICY OVERLAY 3.75" (SHLD)	100.00%	21,653	TON	$83.00		$1,797,226	
	PWFn =	0.4120		PW =	0.4120	X	$6,973,667	$2,873,058
YEAR 35	INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	116,000	LIN FT	$1.10		$127,600	
	CENTERLINE JT R&S	100.00%	58,000	LIN FT	$1.10		$63,800	
	RANDOM CRACK R&S	50.00%	58,000	LIN FT	$1.25		$72,500	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	37,114	LIN FT	$1.25		$46,393	
	PD PVMT PATCH M&F HMA SURF 1.50"	0.10%	183	SQ YD	$51.00		$9,333	
	PWFn =	0.3554		PW =	0.3554	X	$319,626	$113,590
YEAR 40	INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	917	SQ YD	$170.00		$155,890	
	LONGITUDINAL SHLD JT R&S	100.00%	116,000	LIN FT	$1.10		$127,600	
	CENTERLINE JT R&S	100.00%	58,000	LIN FT	$1.10		$63,800	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	55,670	LIN FT	$1.25		$69,588	
	RANDOM CRACK R&S	50.00%	58,000	LIN FT	$1.25		$72,500	
	PD PVMT PATCH M&F HMA SURF 1.50"	0.50%	917	SQ YD	$51.00		$46,767	
	PWFn =	0.3066		PW =	0.3066	X	$536,145	$164,359
								$4,205,522
	ROUTINE MAINTENANCE ACTIVITY		21.97	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$4,205,522
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$31,229

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : **11/20/13 8:15 AM**

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$13,580,136	$14,152,928
		ANNUAL COST PER MILE	$100,842	$105,096
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$4,205,522	$5,628,951
		ANNUAL COST PER MILE	$31,229	$41,799
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$17,785,658	$19,781,879
		ANNUAL COST PER MILE	$132,071	$146,895

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**JPCP**	**$132,071**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**HMA**	**$146,895**	**11.2%**

P:\Pavement Design Stuff\D-6\IL 97 from Covered Bridge Road to IL 4\[IL 97 4-lane--IDOT Mechanistic Pavement Design with LCCA (112013).xlsm]LifeCycleCost