Illinois Department of Transportation

To:	Roger Driskell	Attn: District Seven
From:	John D. Baranzelli	
Subject:	Pavement Design	
Date:	January 3, 2014	

FAP 91 (IL Route 16)
Section 5N
Coles County
At relocated East Harrison Avenue

We have reviewed the pavement design for the above captioned section, which was originally submitted to BDE on October 15, 2013. The project will construct widen IL 16 to provide turn lanes at relocated East Harrison Avenue. The turn lanes on IL 16 will be built using full-depth HMA to match the existing mainline thickness. East Harrison Avenue will be transferred to local jurisdictions, with one leg going to the City of Charleston, and the second leg going to Coles County. Both local entities have requested an HMA design.

The approved pavement design is as follows:

IL 16 [Widening]

10.75 inches of Full-Depth HMA Pavement with HMA Shoulders
- 2 inches of HMA Surface Course, Mix "D", N90
- 8.75 inches of HMA Base Course

12 inches of Lime Modified Soil

IL 16 will have ½ inch of HMA Surface Removal

East Harrison Avenue [New Construction]

7.75 inches of Full-Depth HMA Pavement with HMA Shoulders
- 2 inches of HMA Surface Course, Mix "C", N70
- 5.75 inches of HMA Binder Course, N70, IL-19.0

12 inches of Lime Modified Soil

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

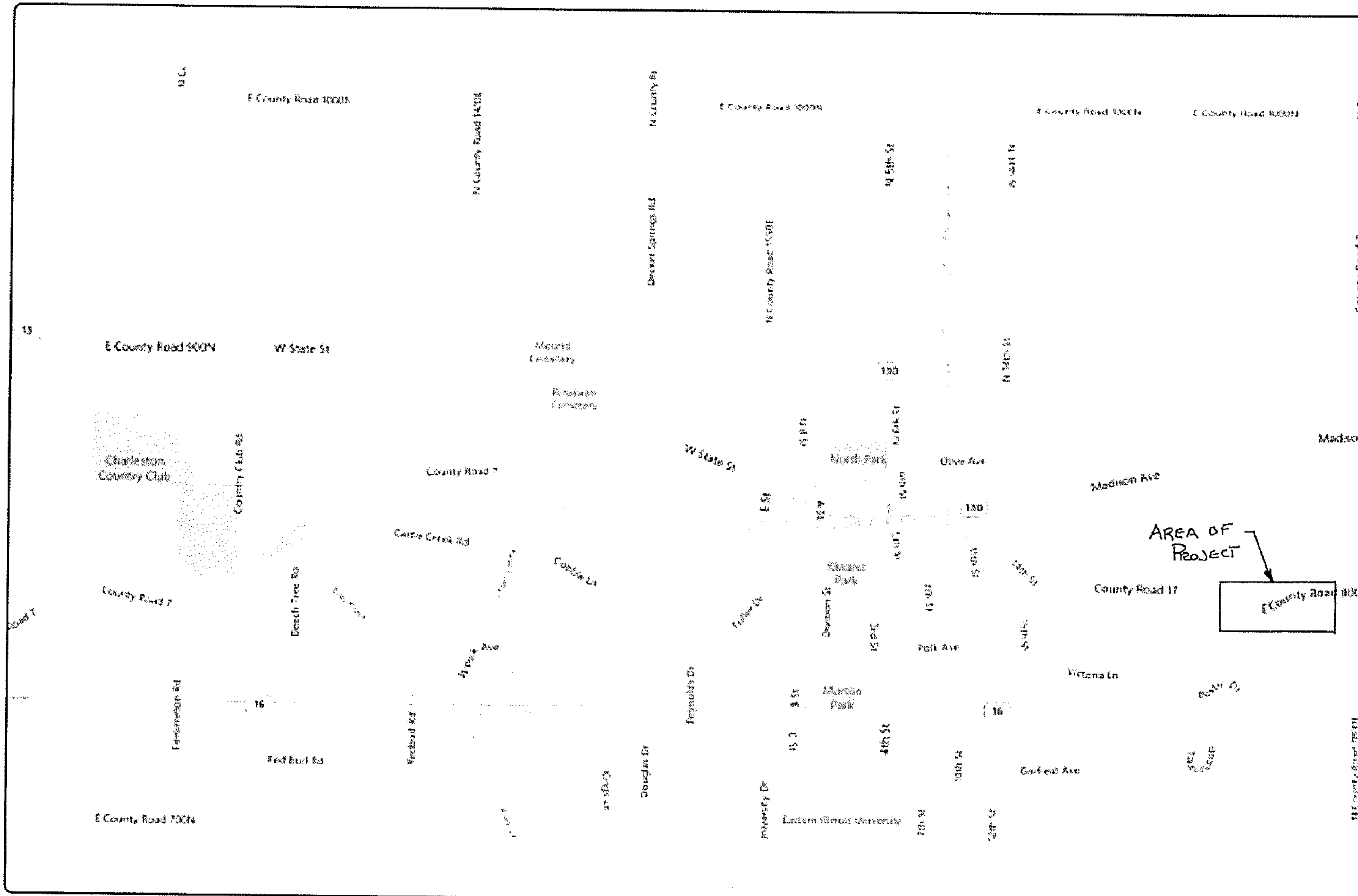
RECOMMENDATION

The proposed improvement includes relocation of the FAP 91(IL 16) /E. Harrison Ave. intersection, construction of a right turn lane on FAP 91 (IL 16) as well as widening to allow a left turn lane in each direction and new alignment of E. Harrison Ave. There is a total of 5,592 square yards of Base Course and 6,059 tons of Hot-Mix Asphalt on this project.

The pavement design spreadsheet (see Exhibit C (Pavement Designs)) provided 2 pavement designs for this project for each leg. FAP 91 (IL 16) was a PCC Pavement 9" (Jointed) and a HMA Pavement 10 ¾" (Full Depth). E. Harrison Ave. (A) was a PCC Pavement 7 ¾" (Jointed) and a HMA Pavement 8" (Full Depth), and E. Harrison Ave. (B) was a PCC Pavement 7 ½" (Jointed) and a HMA Pavement 7 ¾" (Full Depth). Both options on all legs would be constructed on Processed Modified Soil, 12".

The construction cost analysis for FAP 91 (IL 16), (see Exhibit D (Cost Analysis)) shows the initial construction cost for the PCC Pavement 9" (Jointed) as $495,809 and the initial construction cost for HMA Pavement 10 ¾" as $394,633. According to the life-cycle cost analysis, the annual cost per mile for PCC Pavement 9"(Jointed) is $125,966 and the annual cost per mile for HMA Pavement 10 ¾" (Full Depth) is $119, 810. The initial construction cost on E. Harrison Ave. (A) for PCC Pavement 7 ¾" (Jointed) is $495,809 and for HMA Pavement 8" (Full Depth) $$334,437. The annual cost per mile for the PCC Pavement 7 ¾" (Jointed) is $125,966 as compared to the HMA Pavement 8" (Full Depth) annual cost of $106,847. The initial construction cost on E. Harrison Ave. (B) for PCC Pavement 7 ½" (Jointed) is $495,809 and for the HMA Pavement 7 ¾" (Full Depth) $$329,567. The annual cost per mile for the PCC Pavement 7 ½" is $125,966 and for the HMA Pavement 7 ¾" (Full Depth) is $105,798.

It is recommended to use the HMA Pavement option for all legs on this project for two reasons. First, the life-cycle annual cost per mile for the PCC pavement is 12.03% higher (combined of all three legs) than the HMA pavement. Second, E. Harrison Ave. (A) will be a jurisdictional transfer to the City of Charleston and E. Harrison Ave. (B) will be a jurisdictional transfer to Coles County, both entities prefer a HMA pavement design.



Illinois Dept. Transportation - IRoads

10/11/201

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 91 (IL 16) | Comments: IL 16
Section: 5N
County: Coles | Design Date: | JDS | <-- BY
Location: At Harrison Ave. E. of Charleston | Modify Date: | <-- BY

	ADT	Year
Current:	-	-
Future:	-	-

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: 2013
Design Period (DP) = 20 years

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	7,505	92.5%	P = 50%
SU =	250	319	3.9%	S = 50%
MU =	750	287	3.5%	M = 50%
Struct. Design ADT =		8,111	(2023)	

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) =	1.47	(Actual ADT)	TF rigid (Actual) =	2.07	(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 64-22 (Fig. 53-4.R)
Goto Map
HMA Mixture Temp. = 78.1 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 600 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 = 15.75 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 = 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
District = 7,8,9

HMA Overlay Design Thickness = 8.25 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) Printed: 01/31/2014

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE			FAP 91 (IL 16)		
SECTION			5N		
COUNTY			Coles		
LOCATION			At Harrison Ave. E. of Charleston		
FACILITY TYPE			NON-INTERSTATE		
PROJECT LENGTH			1000	FT = = >	0.19 Miles
# OF CENTERLINES			2	CL	
# OF LANES			3	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	15.75 IN MAX
SHOULDER THICKNESS	8.00	IN	Standard Design
POLICY OVERLAY THICKNESS	2.25	IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	3.17	1.47	3.17

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$95.00 / TON
HMA TOP BINDER	$95.00 / TON
HMA LOWER BINDER	$80.00 / TON
HMA BINDER (LEVELING)	$85.00 / TON
HMA SHOULDER	$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE		COST	
HMA PAVEMENT (FULL-DEPTH)	(10.75")	4,000	SQ YD	$54.20	/ SQ YD	$216,788	~
HMA SURFACE COURSE	(2.00")	452	TONS	$95.00	/ TON	$0	
HMA TOP BINDER COURSE	(2.25")	519	TONS	$95.00	/ TON	$0	
HMA LOWER BINDER COURSE	(6.50")	1,557	TONS	$80.00	/ TON	$0	
HMA SHOULDER	(8.00")	1,593	TONS	$72.00	/ TON	$114,688	~
CURB & GUTTER		0	LIN FT	$30.00	/ LIN FT	$0	
SUBBASE GRAN MATL TY C (TONS)		237	TONS	$25.00	/ TON	$5,925	
IMPROVED SUBGRADE:	Modified Soil	8,176	SQ YD	$7.00	/ SQ YD	$57,232	
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0	
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0	
PAVEMENT REMOVAL		4,000	SQ YD	$0.00	/ SQ YD	$0	
SHOULDER REMOVAL		3,556	SQ YD	$0.00	/ SQ YD	$0	

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$394,633
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$84,983

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY				$0.00	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix	$10.74	/ SQ YD
HMA OVERLAY PVMT		(2.25")		$11.67	/ SQ YD
HMA SURFACE MIX		(1.50")	Surface Mix	$8.04	/ SQ YD
HMA BINDER MIX		(0.75")	eling Binder Mix	$3.63	/ SQ YD
HMA OVERLAY SHLD	(Year 30)	(2.25")	Shoulder Mix	$9.07	/ SQ YD
HMA OVERLAY SHLD		(2.00")	Shoulder Mix	$8.06	/ SQ YD
MILLING (2.00 IN)				$3.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)	Surface Mix	$80.64	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill Surf)	Shoulder Mix	$78.06	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill +2.00 ")	Leveling Binder Mix	$79.52	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill +2.00 ")	Shoulder Mix	$78.06	/ 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	$556,359
FLEXIBLE TOTAL ANNUAL COST PER MILE	$119,810

HMA_SD

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 01/31/14

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%	4,000	LIN FT	$2.00		$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00		$3,300	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$80.64		$323	
	PWFn =	0.8626		PW =	0.8626	X	$15,623	$13,477
YEAR 10								
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00		$3,300	
	PD PVMT PATCH M&F SURF	0.50%	20	SQ YD	$80.64		$1,613	
	PWFn =	0.7441		PW =	0.7441	X	$16,913	$12,585
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	7,556	SQ YD	$3.00		$22,668	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	40	SQ YD	$79.52		$3,181	
	HMA OVERLAY PVMT 2.00"	100.00%	4,000	SQ YD	$10.74		$42,954	
	HMA OVERLAY SHLD 2.00 "	100.00%	3,556	SQ YD	$8.06		$28,672	
	PWFn =	0.6419		PW =	0.6419	X	$97,475	$62,565
YEAR 20								
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00		$3,300	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$80.64		$323	
	PWFn =	0.5537		PW =	0.5537	X	$15,623	$8,650
YEAR 25								
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00		$3,300	
	PD PVMT PATCH M&F SURF	0.50%	20	SQ YD	$80.64		$1,613	
	PWFn =	0.4776		PW =	0.4776	X	$16,913	$8,078
HMA_SD								
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	7,556	SQ YD	$3.00		$22,668	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	80	SQ YD	$79.52		$6,362	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	36	SQ YD	$78.06		$2,810	
	HMA OVERLAY PVMT 2.25 "	100.00%	4,000	SQ YD	$11.67		$46,670	
	HMA OVERLAY SHLD 2.25 "	100.00%	3,556	SQ YD	$9.07		$32,256	
	PWFn =	0.4120		PW =	0.4120	X	$110,766	$45,634
YEAR 35								
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00		$3,300	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$80.64		$323	
	PWFn =	0.3554		PW =	0.3554	X	$15,623	$5,552
YEAR 40								
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00		$3,300	
	PD PVMT PATCH M&F SURF	0.50%	20	SQ YD	$80.64		$1,613	
	PWFn =	0.3066		PW =	0.3066	X	$16,913	$5,185
								$161,726
	ROUTINE MAINTENANCE ACTIVITY		0.57	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$161,726
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$34,827

PCC PAVEMENT — JPCP

ROUTE			FAP 91 (IL 16)		
SECTION			5N		
COUNTY			Coles		
LOCATION			At Harrison Ave. E. of Charleston		
FACILITY TYPE			NON-INTERSTATE		
PROJECT LENGTH			1000 FT	= = >	0.19 Miles
# OF CENTERLINES			2 CL		
# OF LANES			3 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			9.00 IN		
POLICY OVERLAY THICKNESS			2.50 IN		

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	4.59	2.07	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")	4,000	SQ YD	$50.00	/ SQ YD	$200,000
PAVEMENT REINFORCEMENT		0	SQ YD	$22.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	4,667	SQ YD	$19.00	/ SQ YD	$88,673
PCC SHOULDERS	(9.00" to 9.00")	3,556	SQ YD	$40.00	/ SQ YD	$142,240
CURB & GUTTER		0	LIN FT	$30.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(~ 3.46")	418	TONS	$25.00	/ TON	$10,450
IMPROVED SUBGRADE:	Modified Soil	7,778	SQ YD	$7.00	/ SQ YD	$54,446
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
PAVEMENT REMOVAL		4,000	SQ YD	$0.00	/ SQ YD	$0
SHOULDER REMOVAL		3,556	SQ YD	$0.00	/ SQ YD	$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$495,809
RIGID CONSTRUCTION ANNUAL COST PER MILE	$106,770

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY			$0.00	/ LANE-MILE / YEAR
HMA POLICY OVERLAY	(2.50")			
HMA POLICY OVERLAY PVMT	(2.50")		$12.88	/ SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	$8.04	/ SQ YD
HMA BINDER MIX	(1.00")	eling Binder Mix	$4.85	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")	Shoulder Mix	$10.08	/ SQ YD
CLASS A PAVEMENT PATCHING			$195.00	/ SQ YD
CLASS B PAVEMENT PATCHING			$150.00	/ SQ YD
CLASS C SHOULDER PATCHING			$145.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	$77.98	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	$83.30	/ 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	$584,950
RIGID TOTAL ANNUAL COST PER MILE	$125,966

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%	4	SQ YD	$150.00		$600	
	PWFn =	0.7441		PW =	0.7441	X	$600	$446
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	8	SQ YD	$150.00		$1,200	
	PWFn =	0.6419		PW =	0.6419	X	$1,200	$770
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	80	SQ YD	$150.00		$12,000	
	SHOULDER PATCH CLASS C	0.50%	18	SQ YD	$145.00		$2,610	
	LONGITUDINAL SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CENTERLINE JT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	PWFn =	0.5537		PW =	0.5537	X	$26,610	$14,733
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	120	SQ YD	$150.00		$18,000	
	SHOULDER PATCH CLASS C	1.00%	36	SQ YD	$145.00		$5,220	
	PWFn =	0.4776		PW =	0.4776	X	$23,220	$11,090
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	160	SQ YD	$150.00		$24,000	
	SHOULDER PATCH CLASS C	1.50%	53	SQ YD	$145.00		$7,685	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	4,000	SQ YD	$12.88		$51,534	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	3,556	SQ YD	$10.08		$35,840	
	PWFn =	0.4120		PW =	0.4120	X	$119,059	$49,051
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CENTERLINE JT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	RANDOM CRACK R&S	50.00%	1,500	LIN FT	$2.00		$3,000	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	965	LIN FT	$2.00		$1,930	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	4	SQ YD	$83.30		$333	
	PWFn =	0.3554		PW =	0.3554	X	$17,263	$6,135
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	20	SQ YD	$150.00		$3,000	
	LONGITUDINAL SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CENTERLINE JT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	1,447	LIN FT	$2.00		$2,894	
	RANDOM CRACK R&S	50.00%	1,500	LIN FT	$2.00		$3,000	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	20	SQ YD	$83.30		$1,666	
	PWFn =	0.3066		PW =	0.3066	X	$22,560	$6,916
								$89,141
	ROUTINE MAINTENANCE ACTIVITY		0.57	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$89,141
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$19,196

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : **10/11/13 1:43 PM**

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$495,809	$394,633
		ANNUAL COST PER MILE	$106,770	$84,983
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$89,141	$161,726
		ANNUAL COST PER MILE	$19,196	$34,827
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$584,950	$556,359
		ANNUAL COST PER MILE	$125,966	$119,810

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**HMA**	**$119,810**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**JPCP**	**$125,966**	5.1%

P:\Pavement Design Stuff\D-7\IL 16 at East Harrison Avenue 10-15-13\[New IL 16-IDOT Mechanistic Pavement Design with LCCA.xlsm]LifeCycleCost

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 91 (IL 16)
Section: 5N
County: Coles
Location: At Harrison Ave. E. of Charleston
Facility Type: Unmarked State Route

Comments: E. Harrison Ave. (A)
Design Date: JDS <-- BY
Modify Date: <-- BY

	ADT	Year
Current:	-	-
Future:	-	-

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: 2013
Design Period (DP) = 20 years

Structural Design Traffic	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	No Min	5,428	93.8%	P = 50%
SU =	No Min	295	5.1%	S = 50%
MU =	No Min	61	1.1%	M = 50%
Struct. Design ADT =		5,784	(2023)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = 0.15
Csu = 112.06
Cmu = 385.44
TF flexible (Actual) = 0.57 (Actual ADT)
TF flexible (Min) = No Min (Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv = 0.15
Csu = 135.78
Cmu = 567.21
TF rigid (Actual) = 0.75 (Actual ADT)
TF rigid (Min) = No Min (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 0.57
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)
Goto Map
HMA Mixture Temp. = 78.1 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 600 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 141 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 8.00 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 15.75 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 8.00 inches

JPC Pavement

Use TF rigid = 0.75
Edge Support = Tied Shoulder or C.&G.

Rigid Pavt Thick. = 7.75 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 0.75
IBR value = 3

CRCP Thickness = 5.75 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 = 0.57
District = 7,8,9

HMA Overlay Design Thickness = 5.50 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	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. 10/05/2012) Printed: 01/31/2014

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE			FAP 91 (IL 16)
SECTION			5N
COUNTY			Coles
LOCATION			At Harrison Ave. E. of Charleston
FACILITY TYPE			NON-INTERSTATE
PROJECT LENGTH			1000 FT = = > 0.19 Miles
# OF CENTERLINES			2 CL
# OF LANES			3 LANES
# OF EDGES			4 EP
LANE WIDTH - AVERAGE			12 FT
SHOULDER WIDTH	HMA	Inside	6 FT
	HMA	Outside	10 FT

PAVEMENT THICKNESS (FLEXIBLE)	8.00 IN	15.75 IN MAX
SHOULDER THICKNESS	8.00 IN	Standard Design
POLICY OVERLAY THICKNESS	2.25 IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	No Min	0.57	No Min

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$95.00 / TON
HMA TOP BINDER	$95.00 / TON
HMA LOWER BINDER	$80.00 / TON
HMA BINDER (LEVELING)	$85.00 / TON
HMA SHOULDER	$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(8.00")	4,000	SQ YD	$40.81 / SQ YD	$163,231 ~
HMA SURFACE COURSE	(2.00")	452	TONS	$95.00 / TON	$0
HMA TOP BINDER COURSE	(2.25")	519	TONS	$95.00 / TON	$0
HMA LOWER BINDER COURSE	(3.75")	888	TONS	$80.00 / TON	$0
HMA SHOULDER	(8.00")	1,593	TONS	$72.00 / TON	$114,688 ~
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	8,074	SQ YD	$7.00 / SQ YD	$56,518
Reserved For User Supplied Item		0	UNITS	$0.00 / UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00 / UNITS	$0
PAVEMENT REMOVAL		4,000	SQ YD	$0.00 / SQ YD	$0
SHOULDER REMOVAL		3,556	SQ YD	$0.00 / SQ YD	$0

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$334,437
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$72,020

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix	$10.74 / SQ YD
HMA OVERLAY PVMT	(2.25")		$11.67 / SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	$8.04 / SQ YD
HMA BINDER MIX	(0.75")	eling Binder Mix	$3.63 / SQ YD
HMA OVERLAY SHLD (Year 30)	(2.25")	Shoulder Mix	$9.07 / SQ YD
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	$8.06 / SQ YD
MILLING (2.00 IN)			$3.00 / SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill Surf)	Surface Mix	$80.64 / SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder Mix	$78.06 / SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00 ")	Leveling Binder Mix	$79.52 / SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")	Shoulder Mix	$78.06 / 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	$496,163
FLEXIBLE TOTAL ANNUAL COST PER MILE	$106,847

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 01/31/14

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%	4,000	LIN FT	$2.00		$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00		$3,300	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$80.64		$323	
	PWFn =	0.8626		PW =	0.8626	X	$15,623	$13,477
YEAR 10								
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00		$3,300	
	PD PVMT PATCH M&F SURF	0.50%	20	SQ YD	$80.64		$1,613	
	PWFn =	0.7441		PW =	0.7441	X	$16,913	$12,585
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	7,556	SQ YD	$3.00		$22,668	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	40	SQ YD	$79.52		$3,181	
	HMA OVERLAY PVMT 2.00"	100.00%	4,000	SQ YD	$10.74		$42,954	
	HMA OVERLAY SHLD 2.00 "	100.00%	3,556	SQ YD	$8.06		$28,672	
	PWFn =	0.6419		PW =	0.6419	X	$97,475	$62,565
YEAR 20								
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00		$3,300	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$80.64		$323	
	PWFn =	0.5537		PW =	0.5537	X	$15,623	$8,650
YEAR 25								
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00		$3,300	
	PD PVMT PATCH M&F SURF	0.50%	20	SQ YD	$80.64		$1,613	
	PWFn =	0.4776		PW =	0.4776	X	$16,913	$8,078
HMA_SD								
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	7,556	SQ YD	$3.00		$22,668	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	80	SQ YD	$79.52		$6,362	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	36	SQ YD	$78.06		$2,810	
	HMA OVERLAY PVMT 2.25 "	100.00%	4,000	SQ YD	$11.67		$46,670	
	HMA OVERLAY SHLD 2.25 "	100.00%	3,556	SQ YD	$9.07		$32,256	
	PWFn =	0.4120		PW =	0.4120	X	$110,766	$45,634
YEAR 35								
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00		$3,300	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$80.64		$323	
	PWFn =	0.3554		PW =	0.3554	X	$15,623	$5,552
YEAR 40								
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00		$3,300	
	PD PVMT PATCH M&F SURF	0.50%	20	SQ YD	$80.64		$1,613	
	PWFn =	0.3066		PW =	0.3066	X	$16,913	$5,185
								$161,726
	ROUTINE MAINTENANCE ACTIVITY		0.57	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$161,726
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$34,827

PCC PAVEMENT

JPCP

ROUTE			FAP 91 (IL 16)
SECTION			5N
COUNTY			Coles
LOCATION			At Harrison Ave. E. of Charleston
FACILITY TYPE			NON-INTERSTATE
PROJECT LENGTH			1000 FT = = > 0.19 Miles
# OF CENTERLINES			2 CL
# OF LANES			3 LANES
# OF EDGES			4 EP
LANE WIDTH - AVERAGE			12 FT
SHOULDER WIDTH	PCC	Inside	6 FT
	PCC	Outside	10 FT

PAVEMENT THICKNESS (RIGID)	JPCP	7.75 IN	TIED SHLD
SHOULDER THICKNESS		7.75 IN	
POLICY OVERLAY THICKNESS		2.50 IN	

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	No Min	0.75	No Min
Worksheet Construction Type is New Construction		The Pavement Type is	JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE		COST
JPC PAVEMENT	(7.75")	4,000	SQ YD	$50.00	/ SQ YD	$200,000
PAVEMENT REINFORCEMENT		0	SQ YD	$22.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	4,667	SQ YD	$19.00	/ SQ YD	$88,673
PCC SHOULDERS	(7.75" to 7.75")	3,556	SQ YD	$40.00	/ SQ YD	$142,240
CURB & GUTTER		0	LIN FT	$30.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(~ 3.46")	418	TONS	$25.00	/ TON	$10,450
IMPROVED SUBGRADE:	Modified Soil	7,778	SQ YD	$7.00	/ SQ YD	$54,446
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
PAVEMENT REMOVAL		4,000	SQ YD	$0.00	/ SQ YD	$0
SHOULDER REMOVAL		3,556	SQ YD	$0.00	/ SQ YD	$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$495,809
RIGID CONSTRUCTION ANNUAL COST PER MILE	$106,770

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL		UNIT COST	
ROUTINE MAINTENANCE ACTIVITY				$0.00	/ LANE-MILE / YEAR
HMA POLICY OVERLAY	(2.50")				
HMA POLICY OVERLAY PVMT	(2.50")			$12.88	/ SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix		$8.04	/ SQ YD
HMA BINDER MIX	(1.00")	eling Binder Mix		$4.85	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")	Shoulder Mix		$10.08	/ SQ YD
CLASS A PAVEMENT PATCHING				$195.00	/ SQ YD
CLASS B PAVEMENT PATCHING				$150.00	/ SQ YD
CLASS C SHOULDER PATCHING				$145.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix		$77.98	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix		$83.30	/ 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	$584,950
RIGID TOTAL ANNUAL COST PER MILE	$125,966

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%	4	SQ YD	$150.00	$600	
	PWFn =	0.7441		PW =	0.7441 X	$600	$446
YEAR 15							
	PAVEMENT PATCH CLASS B	0.20%	8	SQ YD	$150.00	$1,200	
	PWFn =	0.6419		PW =	0.6419 X	$1,200	$770
YEAR 20							
	PAVEMENT PATCH CLASS B	2.00%	80	SQ YD	$150.00	$12,000	
	SHOULDER PATCH CLASS C	0.50%	18	SQ YD	$145.00	$2,610	
	LONGITUDINAL SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CENTERLINE JT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	PWFn =	0.5537		PW =	0.5537 X	$26,610	$14,733
YEAR 25							
	PAVEMENT PATCH CLASS B	3.00%	120	SQ YD	$150.00	$18,000	
	SHOULDER PATCH CLASS C	1.00%	36	SQ YD	$145.00	$5,220	
	PWFn =	0.4776		PW =	0.4776 X	$23,220	$11,090
YEAR 30	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	4.00%	160	SQ YD	$150.00	$24,000	
	SHOULDER PATCH CLASS C	1.50%	53	SQ YD	$145.00	$7,685	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	4,000	SQ YD	$12.88	$51,534	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	3,556	SQ YD	$10.08	$35,840	
	PWFn =	0.4120		PW =	0.4120 X	$119,059	$49,051
YEAR 35	NON-INTERSTATE						
	LONGITUDINAL SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CENTERLINE JT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	RANDOM CRACK R&S	50.00%	1,500	LIN FT	$2.00	$3,000	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	965	LIN FT	$2.00	$1,930	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	4	SQ YD	$83.30	$333	
	PWFn =	0.3554		PW =	0.3554 X	$17,263	$6,135
YEAR 40	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	0.50%	20	SQ YD	$150.00	$3,000	
	LONGITUDINAL SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CENTERLINE JT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	1,447	LIN FT	$2.00	$2,894	
	RANDOM CRACK R&S	50.00%	1,500	LIN FT	$2.00	$3,000	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	20	SQ YD	$83.30	$1,666	
	PWFn =	0.3066		PW =	0.3066 X	$22,560	$6,916
							$89,141
	ROUTINE MAINTENANCE ACTIVITY		0.57	Lane Miles	$0.00	$0	$0
					MAINTENANCE LIFE-CYCLE COST		$89,141
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE		$19,196

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 5/6/13 1:04 PM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$495,809	$334,437
		ANNUAL COST PER MILE	$106,770	$72,020
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$89,141	$161,726
		ANNUAL COST PER MILE	$19,196	$34,827
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$584,950	$496,163
		ANNUAL COST PER MILE	$125,966	$106,847

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**HMA**	**$106,847**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**JPCP**	**$125,966**	**17.9%**

P:\Pavement Design Stuff\D-7\IL 16 at East Harrison Avenue 10-15-13\[New Harrison Ave (A) - IDOT Mech Pvt Design Spreadsheet - Copy.xlsm]LifeCycleCost

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 91 (IL 16)
Section: 5N
County: Coles
Location: At Harrison Ave. E. of Charleston
Comments: E. Harrison Ave. (B)
Design Date: JDS
Modify Date:

	ADT	Year
<-- BY		
<-- BY		
Current:	-	-
Future:	-	-

Facility Type: Unmarked 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: 2013
Design Period (DP) = 20 years

Structural Design Traffic	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	No Min	1,450	94.7%	P = 50%
SU =	No Min	68	4.4%	S = 50%
MU =	No Min	13	0.8%	M = 50%
Struct. Design ADT =		1,531	(2023)	

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) =	0.13	(Actual ADT)	TF rigid (Actual) =	0.17	(Actual ADT)
TF flexible (Min) =	No Min	(Min ADT Fig. 54-2.C)	TF rigid (Min) =	No Min	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 0.50 Per BDE 54-5.01(i)-1g
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)
Goto Map
HMA Mixture Temp. = 78.1 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 600 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 147 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 7.75 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 15.75 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 7.75 inches

JPC Pavement

Use TF rigid = 0.17
Edge Support = Tied Shoulder or C.&G.

Rigid Pavt Thick. = 7.50 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 0.17
IBR value = 3

CRCP Thickness = 4.50 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 = 0.50
District = 7,8,9

HMA Overlay Design Thickness = 5.50 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	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. 10/05/2012) Printed: 01/31/2014

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE			FAP 91 (IL 16)
SECTION			5N
COUNTY			Coles
LOCATION			At Harrison Ave. E. of Charleston
FACILITY TYPE			NON-INTERSTATE
PROJECT LENGTH			1000 FT ==> 0.19 Miles
# OF CENTERLINES			2 CL
# OF LANES			3 LANES
# OF EDGES			4 EP
LANE WIDTH - AVERAGE			12 FT
SHOULDER WIDTH	HMA	Inside	6 FT
	HMA	Outside	10 FT

PAVEMENT THICKNESS (FLEXIBLE)	7.75 IN	15.75 IN MAX	
SHOULDER THICKNESS	8.00 IN	HMA_SD	Standard Design
POLICY OVERLAY THICKNESS	2.25 IN		

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	No Min	0.13	No Min

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$95.00 / TON
HMA TOP BINDER	$95.00 / TON
HMA LOWER BINDER	$80.00 / TON
HMA BINDER (LEVELING)	$85.00 / TON
HMA SHOULDER	$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(7.75")	4,000	SQ YD	$39.61 / SQ YD	$158,424 ~
HMA SURFACE COURSE	(2.00")	452	TONS	$95.00 / TON	$0
HMA TOP BINDER COURSE	(2.25")	519	TONS	$95.00 / TON	$0
HMA LOWER BINDER COURSE	(3.50")	828	TONS	$80.00 / TON	$0
HMA SHOULDER	(8.00")	1,593	TONS	$72.00 / TON	$114,688 ~
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	8,065	SQ YD	$7.00 / SQ YD	$56,455
Reserved For User Supplied Item		0	UNITS	$0.00 / UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00 / UNITS	$0
PAVEMENT REMOVAL		4,000	SQ YD	$0.00 / SQ YD	$0
SHOULDER REMOVAL		3,556	SQ YD	$0.00 / SQ YD	$0

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$329,567
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$70,971

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix	$10.74 / SQ YD
HMA OVERLAY PVMT	(2.25")		$11.67 / SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	$8.04 / SQ YD
HMA BINDER MIX	(0.75")	eling Binder Mix	$3.63 / SQ YD
HMA OVERLAY SHLD (Year 30)	(2.25")	Shoulder Mix	$9.07 / SQ YD
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	$8.06 / SQ YD
MILLING (2.00 IN)			$3.00 / SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill Surf)	Surface Mix	$80.64 / SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder Mix	$78.06 / SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00 ")	Leveling Binder Mix	$79.52 / SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")	Shoulder Mix	$78.06 / 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	$491,293
FLEXIBLE TOTAL ANNUAL COST PER MILE	$105,798

HMA_SD

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE

01/31/14

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%	4,000	LIN FT	$2.00	$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00	$3,300	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$80.64	$323	
	PWFn =	0.8626		PW =	0.8626 X	$15,623	$13,477
YEAR 10							
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00	$3,300	
	PD PVMT PATCH M&F SURF	0.50%	20	SQ YD	$80.64	$1,613	
	PWFn =	0.7441		PW =	0.7441 X	$16,913	$12,585
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	7,556	SQ YD	$3.00	$22,668	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	40	SQ YD	$79.52	$3,181	
	HMA OVERLAY PVMT 2.00"	100.00%	4,000	SQ YD	$10.74	$42,954	
	HMA OVERLAY SHLD 2.00 "	100.00%	3,556	SQ YD	$8.06	$28,672	
	PWFn =	0.6419		PW =	0.6419 X	$97,475	$62,565
YEAR 20							
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00	$3,300	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$80.64	$323	
	PWFn =	0.5537		PW =	0.5537 X	$15,623	$8,650
YEAR 25							
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00	$3,300	
	PD PVMT PATCH M&F SURF	0.50%	20	SQ YD	$80.64	$1,613	
	PWFn =	0.4776		PW =	0.4776 X	$16,913	$8,078
	HMA_SD						
YEAR 30	NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	7,556	SQ YD	$3.00	$22,668	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	80	SQ YD	$79.52	$6,362	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	36	SQ YD	$78.06	$2,810	
	HMA OVERLAY PVMT 2.25 "	100.00%	4,000	SQ YD	$11.67	$46,670	
	HMA OVERLAY SHLD 2.25 "	100.00%	3,556	SQ YD	$9.07	$32,256	
	PWFn =	0.4120		PW =	0.4120 X	$110,766	$45,634
YEAR 35							
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00	$3,300	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$80.64	$323	
	PWFn =	0.3554		PW =	0.3554 X	$15,623	$5,552
YEAR 40							
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	RNDM / THRM CRACK R&S	50.00%	1,650	LIN FT	$2.00	$3,300	
	PD PVMT PATCH M&F SURF	0.50%	20	SQ YD	$80.64	$1,613	
	PWFn =	0.3066		PW =	0.3066 X	$16,913	$5,185
							$161,726
	ROUTINE MAINTENANCE ACTIVITY		0.57	Lane Miles	0.00	$0	$0
					MAINTENANCE LIFE-CYCLE COST		$161,726
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE		$34,827

PCC PAVEMENT

JPCP

ROUTE			FAP 91 (IL 16)	
SECTION			5N	
COUNTY			Coles	
LOCATION			At Harrison Ave. E. of Charleston	
FACILITY TYPE			NON-INTERSTATE	
PROJECT LENGTH			1000 FT = = >	0.19 Miles
# OF CENTERLINES			2 CL	
# OF LANES			3 LANES	
# OF EDGES			4 EP	
LANE WIDTH - AVERAGE			12 FT	
SHOULDER WIDTH	PCC	Inside	6 FT	
	PCC	Outside	10 FT	

PAVEMENT THICKNESS (RIGID)	JPCP	7.50 IN	TIED SHLD
SHOULDER THICKNESS		7.50 IN	
POLICY OVERLAY THICKNESS		2.50 IN	

RIGID PAVEMENT TRAFFIC FACTORS		MINIMUM	ACTUAL	USE
		No Min	0.17	No Min
Worksheet Construction Type is	New Construction		The Pavement Type is	JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE		COST
JPC PAVEMENT	(7.50")	4,000	SQ YD	$50.00	/ SQ YD	$200,000
PAVEMENT REINFORCEMENT		0	SQ YD	$22.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	4,667	SQ YD	$19.00	/ SQ YD	$88,673
PCC SHOULDERS	(7.50" to 7.50")	3,556	SQ YD	$40.00	/ SQ YD	$142,240
CURB & GUTTER		0	LIN FT	$30.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(~ 3.46")	418	TONS	$25.00	/ TON	$10,450
IMPROVED SUBGRADE:	Modified Soil	7,778	SQ YD	$7.00	/ SQ YD	$54,446
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
PAVEMENT REMOVAL		4,000	SQ YD	$0.00	/ SQ YD	$0
SHOULDER REMOVAL		3,556	SQ YD	$0.00	/ SQ YD	$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$495,809
RIGID CONSTRUCTION ANNUAL COST PER MILE	$106,770

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")	1.0116	2.50	$12.88	/ SQ YD
HMA SURFACE MIX	(1.50")	1.0065	Surface Mix 1.50	$8.04	/ SQ YD
HMA BINDER MIX	(1.00")	1.0185	eling Binder Mix 1.00	$4.85	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		Shoulder Mix 2.50	$10.08	/ SQ YD
CLASS A PAVEMENT PATCHING				$195.00	/ SQ YD
CLASS B PAVEMENT PATCHING				$150.00	/ SQ YD
CLASS C SHOULDER PATCHING				$145.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	1.50	$77.98	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	2.50	$83.30	/ 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	$584,950
RIGID TOTAL ANNUAL COST PER MILE	$125,966

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%	4	SQ YD	$150.00	$600	
	PWFn =	0.7441		PW =	0.7441 X	$600	$446
YEAR 15							
	PAVEMENT PATCH CLASS B	0.20%	8	SQ YD	$150.00	$1,200	
	PWFn =	0.6419		PW =	0.6419 X	$1,200	$770
YEAR 20							
	PAVEMENT PATCH CLASS B	2.00%	80	SQ YD	$150.00	$12,000	
	SHOULDER PATCH CLASS C	0.50%	18	SQ YD	$145.00	$2,610	
	LONGITUDINAL SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CENTERLINE JT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	PWFn =	0.5537		PW =	0.5537 X	$26,610	$14,733
YEAR 25							
	PAVEMENT PATCH CLASS B	3.00%	120	SQ YD	$150.00	$18,000	
	SHOULDER PATCH CLASS C	1.00%	36	SQ YD	$145.00	$5,220	
	PWFn =	0.4776		PW =	0.4776 X	$23,220	$11,090
YEAR 30	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	4.00%	160	SQ YD	$150.00	$24,000	
	SHOULDER PATCH CLASS C	1.50%	53	SQ YD	$145.00	$7,685	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	4,000	SQ YD	$12.88	$51,534	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	3,556	SQ YD	$10.08	$35,840	
	PWFn =	0.4120		PW =	0.4120 X	$119,059	$49,051
YEAR 35	NON-INTERSTATE						
	LONGITUDINAL SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CENTERLINE JT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	RANDOM CRACK R&S	50.00%	1,500	LIN FT	$2.00	$3,000	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	965	LIN FT	$2.00	$1,930	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	4	SQ YD	$83.30	$333	
	PWFn =	0.3554		PW =	0.3554 X	$17,263	$6,135
YEAR 40	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	0.50%	20	SQ YD	$150.00	$3,000	
	LONGITUDINAL SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CENTERLINE JT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	1,447	LIN FT	$2.00	$2,894	
	RANDOM CRACK R&S	50.00%	1,500	LIN FT	$2.00	$3,000	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	20	SQ YD	$83.30	$1,666	
	PWFn =	0.3066		PW =	0.3066 X	$22,560	$6,916
							$89,141
	ROUTINE MAINTENANCE ACTIVITY		0.57	Lane Miles	$0.00	$0	$0
					MAINTENANCE LIFE-CYCLE COST		$89,141
	45 YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE		$19,196

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : **10/11/13 1:42 PM**

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$495,809	$329,567
		ANNUAL COST PER MILE	$106,770	$70,971
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$89,141	$161,726
		ANNUAL COST PER MILE	$19,196	$34,827
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$584,950	$491,293
		ANNUAL COST PER MILE	$125,966	$105,798

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**HMA**	**$105,798**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**JPCP**	**$125,966**	**19.1%**

P:\Pavement Design Stuff\D-7\IL 16 at East Harrison Avenue 10-15-13\[New Harrison Ave (B) - IDOT Mech Pvt Design Spreadsheet - Copy.xlsm]LifeCycleCost