Illinois Department of Transportation

To:	Jeffrey Keirn	Attn: District Nine
From:	John Baranzelli	
Subject:	Pavement Design	
Date:	July 28, 2014	

FAP Route 42 (IL 13/127)
Section 13B-1
Jackson County
Over Beaucoup Creek 4.6 miles north of Murphysboro

We have reviewed the pavement selection for the above captioned section, which was submitted with your memorandum dated July 28, 2014. The Life Cycle Cost Analysis was within 10% for both a rigid and flexible design. The new bridge will be constructed adjacent to the existing structure. The district requested that flexible design be used to facilitate construction and traffic staging. The Pavement Selection Committee reviewed this request and concurred with the request to use HMA Pavement for this project.

In pavement areas where the proposed run-around coincides with the existing roadway, the existing pavement will be overlaid with a 2 inch HMA Surface Course.

The approved pavement design is as follows:

<u>IL 13/127 [Pavement Construction]</u>

11.75 inches Full Depth HMA with HMA Shoulders
- 2 inches of HMA Surface Course, Mix "D", N90
- 9.75 inches of HMA Binder Course, N90, IL-19.0

8 inches HMA Shoulders
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:	Paul R Niedernhofer		
From:	Charles Stein	By:	Darryl Leftwich
Subject:	Pavement Design Approval		
Date:	July 28, 2014		

Route: FAP 42 IL13/127
Section: 13B-1
County: Jackson County
Contract #: 78215

Project Location: Beaucoup Creek Bridge SN 039-0009
~4.6 Miles North of Murphysboro

This project includes run-around lanes (to be used indefinitely) to a new bridge (to be used by a future four-lane facility) across Beaucoup Creek on Rte 13/127 north of Murphysboro and south of Vergennes in Jackson County. The new bridge will be built adjacent to the existing bridge (SN 039-0009) and the existing bridge will be removed. It will begin ~2220 ft south of the existing structure and continue northerly to ~2160 ft north of the existing structure. The run around is to west of the existing structure.

The run around will be new full depth pavement ~ 11 ¾" (9 ¾" Binder & 2" Surface). In pavement areas where the proposed run-around overlaps with the existing roadway, the existing pavement will be overlayed with 2" HMA Surface Course. 8" HMA Bituminous Shoulders are proposed.

District 9 prefers the bituminous pavement because it would provide a consistent pavement surface without a piecemeal appearance and has a more simplified construction.

Mix Designs and Traffic Data are provided on subsequent sheets.

A life-cycle cost analysis comparing concrete and bituminous pavements was performed on the new lanes. The estimated Total Life Cycle Cost of the concrete pavement option is $1.347 million and the estimated Total Life Cycle Cost of the bituminous pavement option is $1.349 million.

Location Map, Typical, Pavement Design and LCCA Sheets are attached.

DLL

78215PavementDesignApproval.docx

Locations	Hot-Mix Asphalt Surface Course and Full Depth Pavement (Top Lift)
Mixture Use(s):	Hot-Mix Asphalt Surface Course, Mix D, N90
AC/PG:	PG64-22
ABR % (Max):	See Special Provision
Design Air Voids:	4.0 %, 90 Gyration Design
Mixture Composition: (Gradation Mixture)	IL-9.5 mm
Friction Aggregate:	D Surface
Quality Management Program:	QCP

Locations	Hot-Mix Asphalt Binder Course, Full Depth Pavement (Lower Lifts), and Hot-Mix Asphalt Shoulders (Lower Lifts)
Mixture Use(s):	Hot-Mix Asphalt Binder Course, N90, IL-19.0mm Fine Grade
AC/PG:	PG64-22
ABR % (Max):	See Special Provision
Design Air Voids:	4.0 %, 90 Gyration Design
Mixture Composition: (Gradation Mixture)	IL-19.0mm Fine Grade
Friction Aggregate:	None
Quality Management Program:	QC/QA

Locations	Hot-Mix Asphalt Shoulders (Top Lift)
Mixture Use(s):	Hot-Mix Asphalt Surface Course, Mix C, N90
AC/PG:	PG64-22
ABR % (Max):	See Special Provision
Design Air Voids:	4.0 %, 90 Gyration Design
Mixture Composition: (Gradation Mixture)	IL-9.5mm
Friction Aggregate:	C Surface
Quality Management Program:	QCP

Mix Requirements Contract: 78215

The following information is provided for your use:

2011 Traffic Data		2013 Traffic Data		2013 Traffic Data		2033 Traffic Data	
DT:	5250	ADT:	5360	ADT:	5920	ADT:	6530
PV:	4875	PV:	4975	PV:	5500	PV:	6060
SU:	160	SU:	165	SU:	180	SU:	200
MU:	215	MU:	220	MU:	240	MU:	270

LOCATION MAP

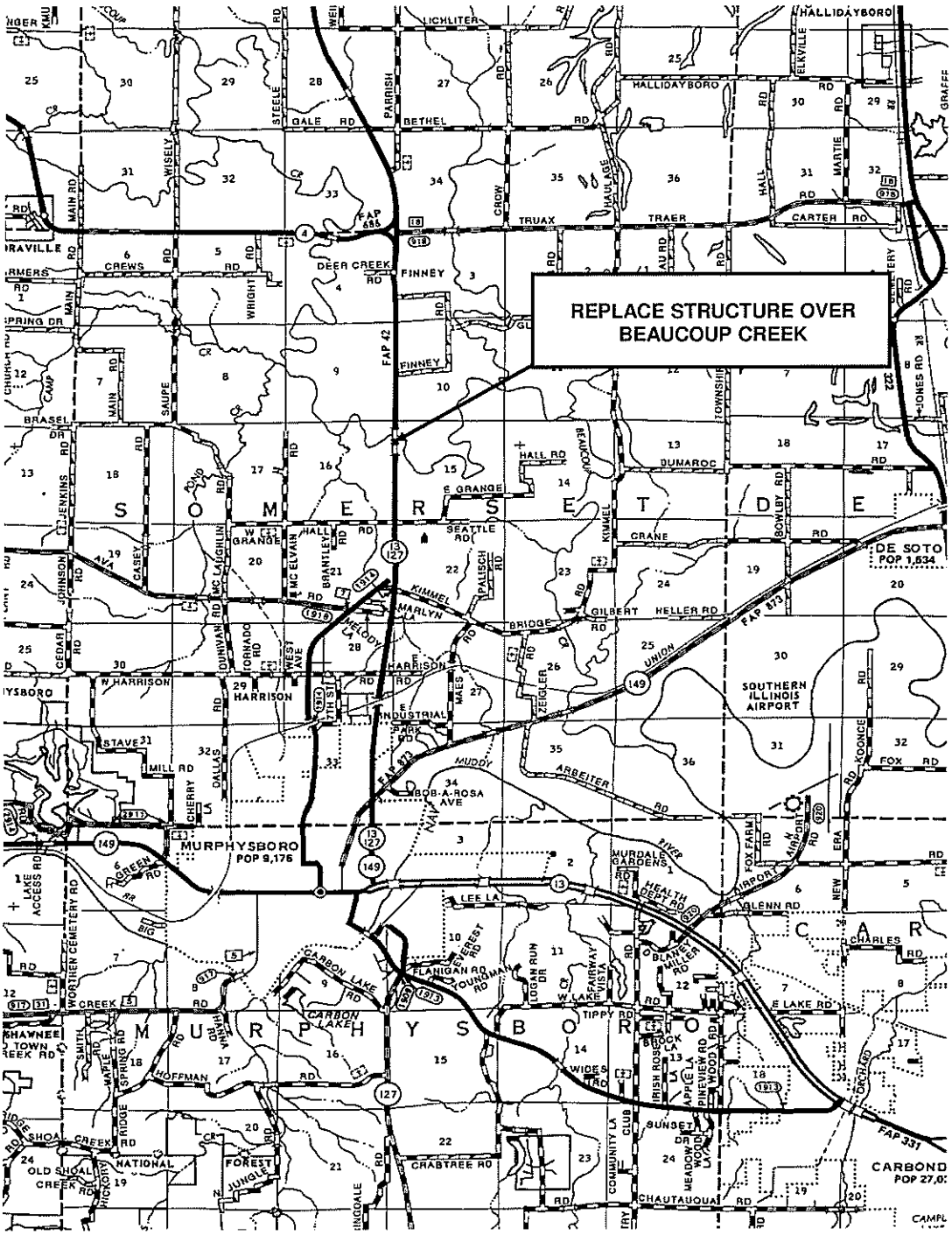
Beaucoup Creek Bridge

SN 039-0009

FAP 42 (IL 13/127)

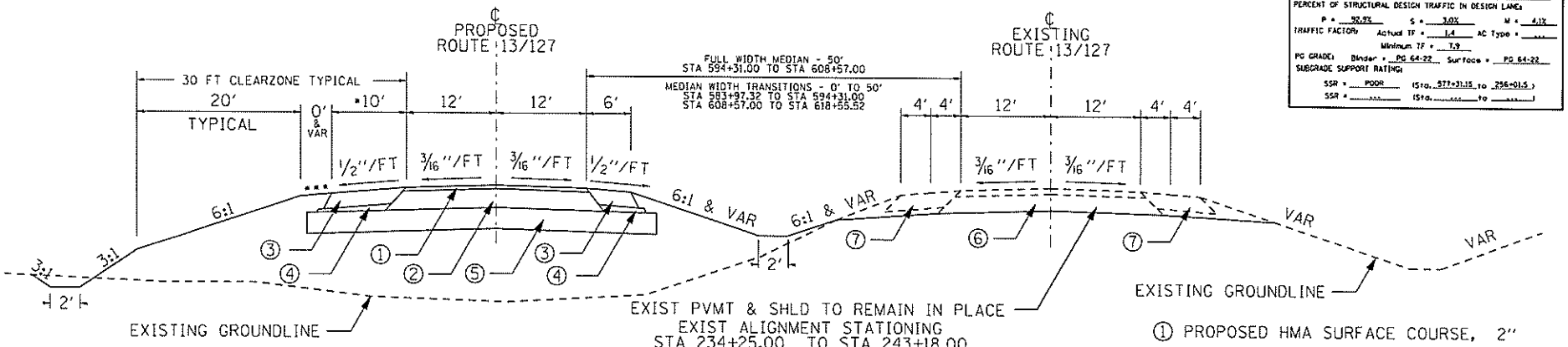
SECTION 13B-1

JACKSON COUNTY



TYPICAL SECTIONS

STRUCTURAL DESIGN TRAFFIC: Year 2023
PV = 5500 SU = 180 MU = 240
ROAD/STREET CLASSIFICATION: Class 1
PERCENT OF STRUCTURAL DESIGN TRAFFIC IN DESIGN LANE:
P = 92.9% S = 3.0% M = 4.1%
TRAFFIC FACTOR: Actual TF = 1.4 AC Type = ...
Minimum TF = 7.9
PG GRADE: Binder = PG 64-22 Surface = PG 64-22
SUBGRADE SUPPORT RATING:
SSR = POOR (Sta. 577+31.15 to 256+01.5)
SSR = ... (Sta. ... to ...)



* NOTE: 10' TYPICAL BUT VARIES DOWN TO 6' NEAR THE START AND END OF THE BRIDGE TANGENT SECTION. WIDTH ALSO CHANGES THROUGH GUARDRAIL AREAS. SEE PLAN VIEW FOR DETAILS.

** IN LIFTS OF 4", 3", AND 2¾"

*** NOTE: ADDITIONAL EARTH SHOULDER
PC STA 608+57.00 TO STA 612+00.00
STA 591+00.00 TO PT STA 594+31.00

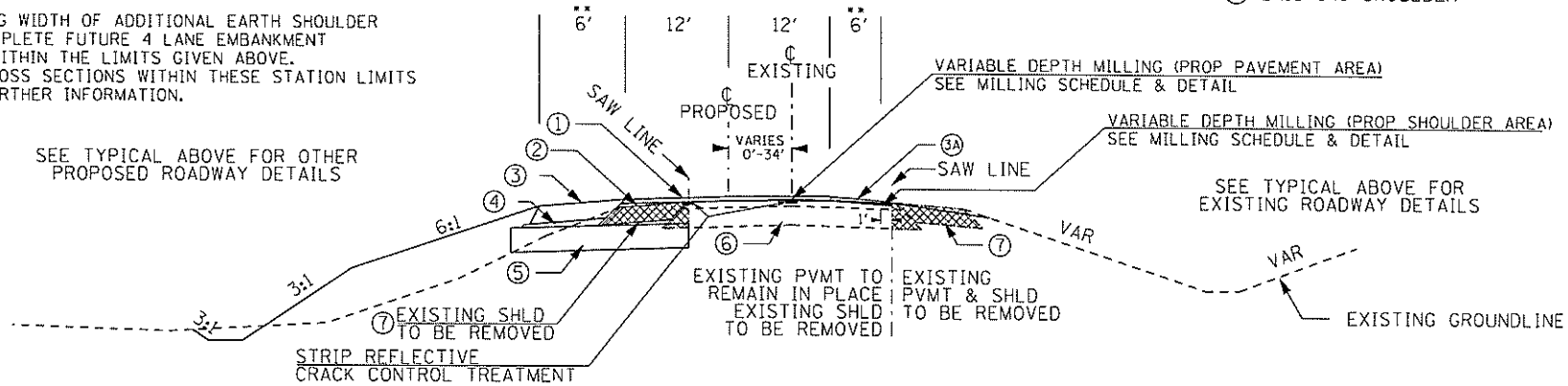
VARYING WIDTH OF ADDITIONAL EARTH SHOULDER TO COMPLETE FUTURE 4 LANE EMBANKMENT ONLY WITHIN THE LIMITS GIVEN ABOVE. SEE CROSS SECTIONS WITHIN THESE STATION LIMITS FOR FURTHER INFORMATION.

FD HMA PVMT & SHLD

STA 603+85.00 TO STA 618+55.52
STA 583+97.32 TO STA 599+03.00

① PROPOSED HMA SURFACE COURSE, 2"
② PROPOSED HMA BINDER COURSE, 9¾"
③ PROPOSED HMA SHOULDER, 8"
③A PROPOSED HMA SHOULDER
④ SUBBASE GRANULAR MATERIAL, TYPE C
⑤ PROPOSED LIME MODIFIED SOILS, 12"
⑥ EXISTING PAVEMENT
⑦ EXISTING SHOULDER

SEE TYPICAL ABOVE FOR OTHER PROPOSED ROADWAY DETAILS



SEE TYPICAL ABOVE FOR EXISTING ROADWAY DETAILS

** NOTE: 6' TYPICAL BUT VARIES DOWN TO 4' TO MATCH EXISTING CONDITIONS AT THE START AND END OF THE JOB. SEE PLAN VIEW FOR DETAILS.

STA 618+55.52 TO STA 625+22.29
STA 577+31.15 TO STA 583+97.32

FILE NAME = d:\pw_work\pwidot\left-school\d0196163\78215-sht-cover-rev.dgn	USER NAME = $USER$	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	TYPICAL SECTIONS	F.A.P. RTE. 42	SECTION 13B-1	COUNTY JACKSON	TOTAL SHEETS 112 / SHEET NO. 13
	PLOT SCALE = 100.0000 ' / in.	DRAWN -	REVISED -					CONTRACT NO. 78215	
$MODELNAME$	PLOT DATE = 6/4/2014	CHECKED -	REVISED -		SCALE: SHEET OF SHEETS STA. TO STA.			ILLINOIS FED. AID PROJECT	
		DATE -	REVISED -						

TYPICAL SECTIONS

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

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 07/25/2014

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: IL 13 / 127
Section: 13B-1
County: Jackson
Location: Beaucoup Creek Bridge

Comments:

Design Date: 10/22/2012 DLL <-- BY
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 ? Yes

Road Class: I

Subgrade Support Rating (SSR): Poor
Construction Year: 2013
Design Period (DP) = 20 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane	
PV =	0	5,500	92.9%	P =	50%
SU =	250	180	3.0%	S =	50%
MU =	750	240	4.1%	M =	50%
Struct. Design ADT =		5,920	(2023)		

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv =	0.15	
Csu =	132.5	
Cmu =	482.53	
TF flexible (Actual) =	1.40	(Actual ADT)
TF flexible (Min) =	3.95	(Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv =	0.15	
Csu =	143.81	
Cmu =	696.42	
TF rigid (Actual) =	1.94	(Actual ADT)
TF rigid (Min) =	5.58	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Goto Map

Use TF flexible =	3.95	
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)
HMA Mixture Temp. =	80.5	deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) =	540	ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) =	81	(Fig. 54-5.E)
Full Depth HMA Design Thickness =	11.75	in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness =	16.75	in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness =	**11.75**	**inches**

JPC Pavement

Use TF rigid =	5.58	
Edge Support =	Tied	Shoulder or C.&G.
Rigid Pavt Thick. =	**9.00**	**in. (Fig. 54-4.E)**

CRC Pavement

Use TF rigid =	5.58	
IBR value =	3	
CRCP Thickness =	**8.25**	**in. (Fig. 54-4.M)**

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Goto Map

Use TF flexible =	3.95	
HMA Overlay Design Thickness =	8.50	in. (Fig. 54-5.U)
Limiting Strain Criterion Thickness =	11.75	in. (Fig. 54-5.V)
Use HMA Overlay Thickness =	**8.50**	**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	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. 09/05/2013) Printed: 07/25/2014

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE	IL 13 / 127
SECTION	13B-1
COUNTY	Jackson
LOCATION	Beaucoup Creek Bridge
FACILITY TYPE	NON-INTERSTATE

PROJECT LENGTH		4309.14	FT	= = > 0.82 Miles
# OF CENTERLINES		1	CL	
# OF LANES		2	LANES	
# OF EDGES		2	EP	
LANE WIDTH - AVERAGE		12	FT	
SHOULDER WIDTH	HMA Left	6	FT	
	HMA Right	10	FT	
	Total Width of Paved Shoulders	16	FT	

PAVEMENT THICKNESS (FLEXIBLE)	11.75	IN	16.75	IN MAX
SHOULDER THICKNESS	8.00	IN		Standard Design
POLICY OVERLAY THICKNESS	2.25	IN		

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	7.90	1.40	7.90

Read Me!

HMA COST PER TON	UNIT PRICE	
HMA SURFACE	$75.00	/ TON
HMA TOP BINDER	$70.00	/ TON
HMA LOWER BINDER	$70.00	/ TON
HMA BINDER (LEVELING)	$70.00	/ TON
HMA SHOULDER	$65.00	/ TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE		COST	
HMA PAVEMENT (FULL-DEPTH)	(11.75")	11,491	SQ YD	$48.50	/ SQ YD	$557,351	~
HMA SURFACE COURSE	(2.00")	1,296	TONS	$75.00	/ TON	$0	
HMA TOP BINDER COURSE	(2.25")	1,479	TONS	$70.00	/ TON	$0	
HMA LOWER BINDER COURSE	(7.50")	5,094	TONS	$70.00	/ TON	$0	
HMA SHOULDER	(8.00")	3,432	TONS	$65.00	/ TON	$223,079	~
CURB & GUTTER		0	LIN FT	$0.00	/ LIN FT	$0	
SUBBASE GRAN MATL TY C (TONS)		962	TONS	$24.00	/ TON	$23,088	
IMPROVED SUBGRADE:	Modified Soil	20,568	SQ YD	$4.50	/ SQ YD	$92,556	
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0	
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0	
PAVEMENT REMOVAL		11,510	SQ YD *	$7.00	/ SQ YD	$80,569	
SHOULDER REMOVAL		3,908	SQ YD *	$6.00	/ SQ YD	$23,446	

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$1,000,089
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$49,979

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	$8.46	/ SQ YD
HMA OVERLAY PVMT		(2.25")		2.25	$9.31	/ SQ YD
HMA SURFACE MIX		(1.50")	Surface Mix	1.50	$6.33	/ SQ YD
HMA BINDER MIX		(0.75")	eling Binder Mix	0.75	$2.98	/ SQ YD
HMA OVERLAY SHLD	(Year 30)	(2.25")	Shoulder Mix	2.25	$8.19	/ SQ YD
HMA OVERLAY SHLD		(2.00")	Shoulder Mix	2.00	$7.28	/ SQ YD
MILLING (2.00 IN)				2.00	$2.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)	Surface Mix	2.00	$77.40	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill Surf)	Shoulder Mix	2.00	$76.28	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill +2.00 ")	Leveling Binder Mix	2.00	$76.84	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill +2.00 ")	Shoulder Mix	2.00	$76.28	/ 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	$1,348,789
FLEXIBLE TOTAL ANNUAL COST PER MILE	$67,405

HMA_SD

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE

07/25/14

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%	8,618	LIN FT	$2.00		$17,236	
	CNTR LINE JOINT R&S	100.00%	4,309	LIN FT	$2.00		$8,618	
	RNDM / THRM CRACK R&S	50.00%	4,740	LIN FT	$2.00		$9,480	
	PD PVMT PATCH M&F SURF	0.10%	11	SQ YD	$77.40		$851	
	PWFn =	0.8626		PW =	0.8626	X	$36,185	$31,213
YEAR 10								
	LONG SHLD JT R&S	100.00%	8,618	LIN FT	$2.00		$17,236	
	CNTR LINE JOINT R&S	100.00%	4,309	LIN FT	$2.00		$8,618	
	RNDM / THRM CRACK R&S	50.00%	4,740	LIN FT	$2.00		$9,480	
	PD PVMT PATCH M&F SURF	0.50%	57	SQ YD	$77.40		$4,412	
	PWFn =	0.7441		PW =	0.7441	X	$39,746	$29,575
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	19,152	SQ YD	$2.00		$38,304	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	115	SQ YD	$76.84		$8,837	
	HMA OVERLAY PVMT 2.00"	100.00%	11,491	SQ YD	$8.46		$97,195	
	HMA OVERLAY SHLD 2.00 "	100.00%	7,661	SQ YD	$7.28		$55,770	
	PWFn =	0.6419		PW =	0.6419	X	$200,106	$128,440
YEAR 20								
	LONG SHLD JT R&S	100.00%	8,618	LIN FT	$2.00		$17,236	
	CNTR LINE JOINT R&S	100.00%	4,309	LIN FT	$2.00		$8,618	
	RNDM / THRM CRACK R&S	50.00%	4,740	LIN FT	$2.00		$9,480	
	PD PVMT PATCH M&F SURF	0.10%	11	SQ YD	$77.40		$851	
	PWFn =	0.5537		PW =	0.5537	X	$36,185	$20,035
YEAR 25								
	LONG SHLD JT R&S	100.00%	8,618	LIN FT	$2.00		$17,236	
	CNTR LINE JOINT R&S	100.00%	4,309	LIN FT	$2.00		$8,618	
	RNDM / THRM CRACK R&S	50.00%	4,740	LIN FT	$2.00		$9,480	
	PD PVMT PATCH M&F SURF	0.50%	57	SQ YD	$77.40		$4,412	
	PWFn =	0.4776		PW =	0.4776	X	$39,746	$18,983
	HMA_SD							
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	19,152	SQ YD	$2.00		$38,304	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	230	SQ YD	$76.84		$17,673	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	77	SQ YD	$76.28		$5,874	
	HMA OVERLAY PVMT 2.25 "	100.00%	11,491	SQ YD	$9.31		$106,994	
	HMA OVERLAY SHLD 2.25 "	100.00%	7,661	SQ YD	$8.19		$62,741	
	PWFn =	0.4120		PW =	0.4120	X	$231,586	$95,410
YEAR 35								
	LONG SHLD JT R&S	100.00%	8,618	LIN FT	$2.00		$17,236	
	CNTR LINE JOINT R&S	100.00%	4,309	LIN FT	$2.00		$8,618	
	RNDM / THRM CRACK R&S	50.00%	4,740	LIN FT	$2.00		$9,480	
	PD PVMT PATCH M&F SURF	0.10%	11	SQ YD	$77.40		$851	
	PWFn =	0.3554		PW =	0.3554	X	$36,185	$12,860
YEAR 40								
	LONG SHLD JT R&S	100.00%	8,618	LIN FT	$2.00		$17,236	
	CNTR LINE JOINT R&S	100.00%	4,309	LIN FT	$2.00		$8,618	
	RNDM / THRM CRACK R&S	50.00%	4,740	LIN FT	$2.00		$9,480	
	PD PVMT PATCH M&F SURF	0.50%	57	SQ YD	$77.40		$4,412	
	PWFn =	0.3066		PW =	0.3066	X	$39,746	$12,184
								$348,700
	ROUTINE MAINTENANCE ACTIVITY		1.63	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$348,700
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$17,426

PCC PAVEMENT

JPCP

ROUTE		IL 13 / 127	
SECTION		13B-1	
COUNTY		Jackson	
LOCATION		Beaucoup Creek Bridge	
FACILITY TYPE		NON-INTERSTATE	
PROJECT LENGTH		4309.14 FT	==> 0.82 Miles
# OF CENTERLINES		1 CL	
# OF LANES		2 LANES	
# OF EDGES		2 EP	
LANE WIDTH - AVERAGE		12 FT	
SHOULDER WIDTH	PCC Left	6 FT	
	PCC Right	10 FT	
	Total Width of Paved Shoulders	16 FT	
PAVEMENT THICKNESS (RIGID)	JPCP	9.00 IN	TIED SHLD
SHOULDER THICKNESS		9.00 IN	
POLICY OVERLAY THICKNESS		2.50 IN	

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	11.17	1.94	11.17
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")	11,491	SQ YD	$39.00	/ SQ YD	$448,149
PAVEMENT REINFORCEMENT		0	SQ YD	$0.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	12,927	SQ YD	$15.00	/ SQ YD	$193,905
PCC SHOULDERS	(9.00" to 9.00")	7,661	SQ YD	$36.00	/ SQ YD	$275,796
CURB & GUTTER		0	LIN FT	$0.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(~ 1.74")	901	TONS	$25.00	/ TON	$22,525
IMPROVED SUBGRADE:	Modified Soil Width = 41.0'	19,631	SQ YD	$4.50	/ SQ YD	$88,340
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
PAVEMENT REMOVAL		11,510	SQ YD *	$7.00	/ SQ YD	$80,569
SHOULDER REMOVAL		3,908	SQ YD *	$6.00	/ SQ YD	$23,446

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$1,132,730
RIGID CONSTRUCTION ANNUAL COST PER MILE	$56,607

MAINTENANCE COSTS:

ITEM	THICKNESS		MATERIAL	T	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY					$0.00	/ LANE-MILE / YEAR
HMA POLICY OVERLAY	(2.50")			2.50		
HMA POLICY OVERLAY PVMT	(2.50")	1.9087		2.50	$10.31	/ SQ YD
HMA SURFACE MIX	(1.50")	1.9052	Surface Mix	1.50	$6.33	/ SQ YD
HMA BINDER MIX	(1.00")	1.0139	eling Binder Mix	1.00	$3.97	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		Shoulder Mix	2.50	$9.10	/ 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	$75.30	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")			Surface Mix	2.50	$79.50	/ 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	$1,347,134
RIGID TOTAL ANNUAL COST PER MILE	$67,322

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 07/25/14

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%	11	SQ YD	$150.00		$1,650	
	PWFn =	0.7441		PW =	0.7441	X	$1,650	$1,228
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	23	SQ YD	$150.00		$3,450	
	PWFn =	0.6419		PW =	0.6419	X	$3,450	$2,214
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	230	SQ YD	$150.00		$34,500	
	SHOULDER PATCH CLASS C	0.50%	38	SQ YD	$145.00		$5,510	
	LONGITUDINAL SHLD JT R&S	100.00%	8,618	LIN FT	$2.00		$17,236	
	CENTERLINE JT R&S	100.00%	4,309	LIN FT	$2.00		$8,618	
	PWFn =	0.5537		PW =	0.5537	X	$65,864	$36,467
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	345	SQ YD	$150.00		$51,750	
	SHOULDER PATCH CLASS C	1.00%	77	SQ YD	$145.00		$11,165	
	PWFn =	0.4776		PW =	0.4776	X	$62,915	$30,049
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	460	SQ YD	$150.00		$69,000	
	SHOULDER PATCH CLASS C	1.50%	115	SQ YD	$145.00		$16,675	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	11,491	SQ YD	$10.31		$118,441	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	7,661	SQ YD	$9.10		$69,712	
	PWFn =	0.4120		PW =	0.4120	X	$273,828	$112,814
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	8,618	LIN FT	$2.00		$17,236	
	CENTERLINE JT R&S	100.00%	4,309	LIN FT	$2.00		$8,618	
	RANDOM CRACK R&S	50.00%	4,309	LIN FT	$2.00		$8,618	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	2,755	LIN FT	$2.00		$5,510	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	11	SQ YD	$79.50		$875	
	PWFn =	0.3554		PW =	0.3554	X	$40,857	$14,520
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	57	SQ YD	$150.00		$8,550	
	LONGITUDINAL SHLD JT R&S	100.00%	8,618	LIN FT	$2.00		$17,236	
	CENTERLINE JT R&S	100.00%	4,309	LIN FT	$2.00		$8,618	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	4,133	LIN FT	$2.00		$8,266	
	RANDOM CRACK R&S	50.00%	4,309	LIN FT	$2.00		$8,618	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	57	SQ YD	$79.50		$4,532	
	PWFn =	0.3066		PW =	0.3066	X	$55,820	$17,112
								$214,404
	ROUTINE MAINTENANCE ACTIVITY		1.63	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$214,404
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$10,715

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : **2/7/14 2:43 PM**

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$1,132,730	$1,000,089
		ANNUAL COST PER MILE	$56,607	$49,979
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$214,404	$348,700
		ANNUAL COST PER MILE	$10,715	$17,426
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$1,347,134	$1,348,789
		ANNUAL COST PER MILE	$67,322	$67,405

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**JPCP**	**$67,322**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**HMA**	**$67,405**	0.1%

P:\Pavement Design Stuff\D-9\IL 13-127 at Beaucoup Creek [Bridge]\IL 13-127 at Beaucoup Creek [Bridge] revised design 06-01-14\[78215 2014-02-07 IDOT MPD