Illinois Department of Transportation

Memorandum

To:	Jeffrey Keirn	Attn: District Eight
From:	Maureen M. Addis	
Subject:	Pavement Design	
Date:	February 28, 2017	

IL 143 over Indian Creek
Madison County
Structure Replacement

We have reviewed the pavement selection for the above captioned section, which was submitted with your memorandum dated July 27, 2016. The project is less than 2 lane-miles and is not subject to alternate bidding. This project will replace the structure over Indian Creek and provide a profile raise. The LCCA for IL 143 favored a flexible design by 9.4%. Because the difference between a flexible and rigid design is less than 10%, this project was discussed by the Pavement Selection Committee. Due to the lower cost and constructability, a flexible design was requested by the district. The PSC concurred with the district's request to use the HMA option.

The approved pavement design for IL 413 over Indian Creek is as follows:

IL 143 over Indian Creek [Pavement Reconstruction]

11 inches of HMA Pavement with HMA Shoulders
- 2 inches of HMA Surface Course, Mix "D", N90
- 9 inches of HMA Binder Course, IL-90 N70

12 inches of Aggregate Subgrade Improvement

If you have any questions, please contact Paul Niedernhofer at (217) 785-0345.

Illinois Department of Transportation

Memorandum

To:	Herve Gelin	Attn: Rob Harbaugh
From:	Tim Padgett	
Subject:	Pavement Design Report	
Date:	July 27, 2016	

FAP 789 (IL 143)
Section 125B-2
Madison County
Job No.: D-98-008-16
76G56

Bridge replacement along IL 143 over Indian Creek 0.3 mile east of Wanda Road

The attached pavement design was prepared for the grade raise along IL 143 at Indian Creek

Per BDE Section 54-8.01, pavement designs requiring more than 4,750 square yards of pavement must be submitted to BDE for final approval. Since this project only has 3127 square yards, we will only need the District's approval.

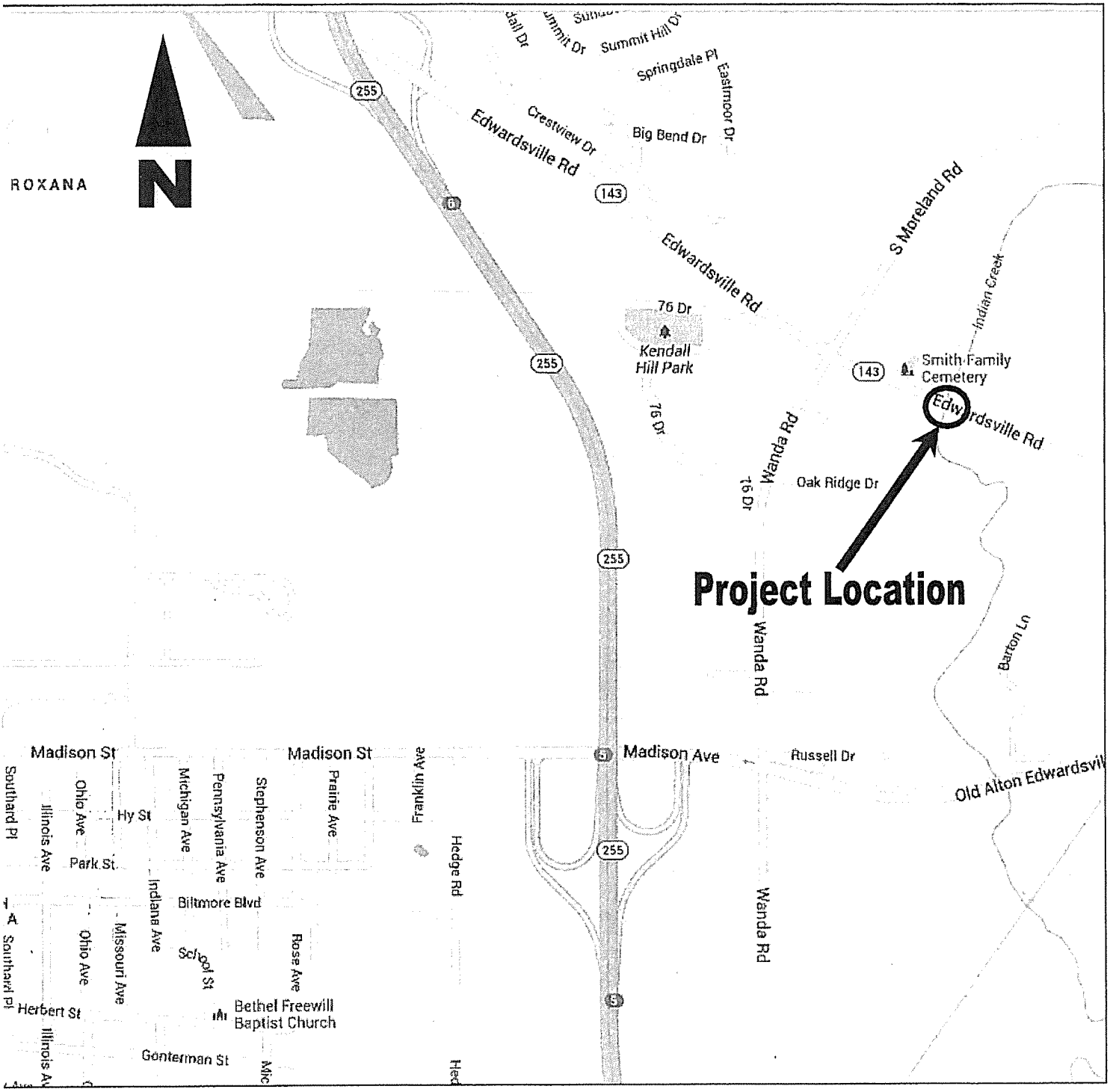
The existing pavement is PCC (9"-7"-9") with HMA overlay. The design requires the proposed thickness be a minimum of 11" HMA pavement (surface course – 2" and binder course – 9") and 12" subbase granular material to meet the current BDE pavement design criteria.

Project Information

- Estimated area of 4019 square yards of pavement. Life-Cycle Cost Analysis are over $500,000, therefore, BDE approval is required.
- Pavement widths vary from 24' to 36' with 6' shoulders.
- The subgrade support ratio (SSR) for this location is poor.

The preliminary pavement design was tentatively approved on April 21, 2016. Also provided in this report is the Life Cycle Cost Analysis for the pavement design.

Please review the pavement design report and provide your comments and/or final approval. If you have any questions, please contact Liz Burnside (3280).



IL 143 over Indian Creek

Location Map

BDE 5401 Template (Rev. 09/05/2013) **IDOT MECHANISTIC PAVEMENT DESIGN** Printed: 02/27/2017

PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells)

Route: FAP 789 (IL 143) Comments:
Section: 125B-2
County: Madison Design Date: Liz Burnside <-- BY
Location: Over Indian Creek 0.3 mi E of Wanda Rd Modify Date: <-- BY

	ADT	Year
Current:	10,000	2015
Future:	11,700	2037

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: 2017
Design Period (DP) = 20 years

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	9,835	90.0%	P = 50%
SU =	250	273	2.5%	S = 50%
MU =	750	820	7.5%	M = 50%
Struct. Design ADT =		10,927	(2027)	

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) =	3.48	(Actual ADT)	TF rigid (Actual) =	5.03	(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 = 3.48
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)
Goto Map — HMA Mixture Temp. = 79.0 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 580 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 84 (Fig. 54-5.E)
Goto Map — Full Depth HMA Design Thickness = 11.00 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 16.25 in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness = 11.00 inches

JPC Pavement

Use TF rigid = 5.03
Edge Support = Tied Shoulder or C.&G.
Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 5.03
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 = 3.48
Goto Map — HMA Overlay Design Thickness = 8.00 in. (Fig. 54-5.U)
Limiting Strain Criterion Thickness = 11.45 in. (Fig. 54-5.V)
Use HMA Overlay Thickness = 8.00 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)

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

	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. 09/05/2013) Printed: 02/27/2017

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE		**FAP 789 (IL 143)**	
SECTION		**125B-2**	
COUNTY		**Madison**	
LOCATION		**Over Indian Creek 0.3 mi E of Wanda Rd**	
FACILITY TYPE		NON-INTERSTATE	
PROJECT LENGTH		**1120** FT = = >	0.21 Miles
# OF CENTERLINES		**2** CL	
# OF LANES		**3** LANES	
# OF EDGES		**2** EP	
LANE WIDTH - AVERAGE		**12** FT	
SHOULDER WIDTH	HMA Left	**6** FT	
	HMA Right	**6** FT	
	Total Width of Paved Shoulders	**12** FT	
PAVEMENT THICKNESS (FLEXIBLE)		**11.00** IN	16.25 IN MAX
SHOULDER THICKNESS		**8.00** IN	**Standard Design**
POLICY OVERLAY THICKNESS		**2.25** IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	3.17	**3.48**	**3.48**

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	**$91.00** / TON
HMA TOP BINDER	**$86.00** / TON
HMA LOWER BINDER	**$81.25** / TON
HMA BINDER (LEVELING)	**$85.00** / TON
HMA SHOULDER	**$76.50** / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE		COST	
HMA PAVEMENT (FULL-DEPTH)	(11.00")	4,480	SQ YD	**$53.03**	/ SQ YD	$237,568	~
HMA SURFACE COURSE	(2.00")	504	TONS	**$91.00**	/ TON	$0	
HMA TOP BINDER COURSE	(2.25")	573	TONS	**$86.00**	/ TON	$0	
HMA LOWER BINDER COURSE	(6.75")	1,753	TONS	**$81.25**	/ TON	$0	
HMA SHOULDER	(8.00")	669	TONS	**$76.50**	/ TON	$51,180	~
CURB & GUTTER		0	LIN FT	**$30.00**	/ LIN FT	$0	
SUBBASE GRAN MATL TY C (TONS)		158	TONS	**$0.00**	/ TON	$0	
IMPROVED SUBGRADE:	Modified Soil	6,326	SQ YD	**$0.00**	/ SQ YD	$0	
Sub-base Granular Material Ty A 12"		5,400	SQ YD *	**$15.00**	/ SQ YD	$81,000	
Reserved For User Supplied Item		0	UNITS	**$0.00**	/ UNITS	$0	
PAVEMENT REMOVAL		4,480	SQ YD	**$10.00**	/ SQ YD	$44,800	
SHOULDER REMOVAL		1,493	SQ YD	**$12.00**	/ SQ YD	$17,916	

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$432,464
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$83,151

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY				**$0.00**	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix	**$10.24**	/ SQ YD
HMA OVERLAY PVMT		(2.25")		**$11.27**	/ SQ YD
HMA SURFACE MIX		(1.50")	Surface Mix	**$7.67**	/ SQ YD
HMA BINDER MIX		(0.75")	eling Binder Mix	**$3.60**	/ SQ YD
HMA OVERLAY SHLD	(Year 30)	(2.25")	Shoulder Mix	**$9.64**	/ SQ YD
HMA OVERLAY SHLD		(2.00")	Shoulder Mix	**$8.57**	/ SQ YD
MILLING (2.00 IN)				**$3.00**	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)	Surface Mix	**$80.19**	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill Surf)	Shoulder Mix	**$78.57**	/ 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	**$78.57**	/ 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	$566,498
FLEXIBLE TOTAL ANNUAL COST PER MILE	$108,922

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 02/27/17

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%	2,240	LIN FT	$2.00		$4,480	
	CNTR LINE JOINT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	RNDM / THRM CRACK R&S	50.00%	1,848	LIN FT	$2.00		$3,696	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$80.19		$321	
	PWFn =	0.8626		PW =	0.8626	X	$12,977	$11,194
YEAR 10								
	LONG SHLD JT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	CNTR LINE JOINT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	RNDM / THRM CRACK R&S	50.00%	1,848	LIN FT	$2.00		$3,696	
	PD PVMT PATCH M&F SURF	0.50%	22	SQ YD	$80.19		$1,764	
	PWFn =	0.7441		PW =	0.7441	X	$14,420	$10,730
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	5,973	SQ YD	$3.00		$17,919	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	45	SQ YD	$79.52		$3,578	
	HMA OVERLAY PVMT 2.00"	100.00%	4,480	SQ YD	$10.24		$45,872	
	HMA OVERLAY SHLD 2.00 "	100.00%	1,493	SQ YD	$8.57		$12,795	
	PWFn =	0.6419		PW =	0.6419	X	$80,164	$51,454
YEAR 20								
	LONG SHLD JT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	CNTR LINE JOINT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	RNDM / THRM CRACK R&S	50.00%	1,848	LIN FT	$2.00		$3,696	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$80.19		$321	
	PWFn =	0.5537		PW =	0.5537	X	$12,977	$7,185
YEAR 25								
	LONG SHLD JT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	CNTR LINE JOINT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	RNDM / THRM CRACK R&S	50.00%	1,848	LIN FT	$2.00		$3,696	
	PD PVMT PATCH M&F SURF	0.50%	22	SQ YD	$80.19		$1,764	
	PWFn =	0.4776		PW =	0.4776	X	$14,420	$6,887
	HMA_SD							
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	5,973	SQ YD	$3.00		$17,919	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	90	SQ YD	$79.52		$7,157	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	15	SQ YD	$78.57		$1,179	
	HMA OVERLAY PVMT 2.25 "	100.00%	4,480	SQ YD	$11.27		$50,496	
	HMA OVERLAY SHLD 2.25 "	100.00%	1,493	SQ YD	$9.64		$14,394	
	PWFn =	0.4120		PW =	0.4120	X	$91,145	$37,551
YEAR 35								
	LONG SHLD JT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	CNTR LINE JOINT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	RNDM / THRM CRACK R&S	50.00%	1,848	LIN FT	$2.00		$3,696	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$80.19		$321	
	PWFn =	0.3554		PW =	0.3554	X	$12,977	$4,612
YEAR 40								
	LONG SHLD JT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	CNTR LINE JOINT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	RNDM / THRM CRACK R&S	50.00%	1,848	LIN FT	$2.00		$3,696	
	PD PVMT PATCH M&F SURF	0.50%	22	SQ YD	$80.19		$1,764	
	PWFn =	0.3066		PW =	0.3066	X	$14,420	$4,421
								$134,034
	ROUTINE MAINTENANCE ACTIVITY		0.64	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$134,034
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$25,771

PCC PAVEMENT

JPCP

ROUTE		**FAP 789 (IL 143)**	
SECTION		**125B-2**	
COUNTY		**Madison**	
LOCATION		**Over Indian Creek 0.3 mi E of Wanda Rd**	
FACILITY TYPE		**NON-INTERSTATE**	
PROJECT LENGTH		**1120** FT = = >	0.21 Miles
# OF CENTERLINES		**2** CL	
# OF LANES		**3** LANES	
# OF EDGES		**2** EP	
LANE WIDTH - AVERAGE		**12** FT	
SHOULDER WIDTH	PCC Left	**6** FT	
	PCC Right	**6** FT	
	Total Width of Paved Shoulders	**12** 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	**5.03**	**5.03**
Worksheet Construction Type is Reconstruction		**The Pavement Type is**	**JPCP**

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST
JPC PAVEMENT	(9.00")	4,480	SQ YD		**$54.25**	/ SQ YD	$243,040
PAVEMENT REINFORCEMENT		0	SQ YD		**$0.00**	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	4,853	SQ YD		**$19.00**	/ SQ YD	$92,207
PCC SHOULDERS	(9.00" to 9.00")	1,493	SQ YD		**$41.80**	/ SQ YD	$62,407
CURB & GUTTER		0	LIN FT		**$30.00**	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(1.86")	197	TONS		**$0.00**	/ TON	$0
IMPROVED SUBGRADE:	Modified Soil	6,098	SQ YD		**$0.00**	/ SQ YD	$0
Sub-Base Granular Material TY A 12"		5,400	**SQ YD**	*	**$15.00**	/ SQ YD	$81,000
Reserved For User Supplied Item		0	**UNITS**		**$0.00**	/ UNITS	$0
PAVEMENT REMOVAL		4,480	SQ YD		**$10.00**	/ SQ YD	$44,800
SHOULDER REMOVAL		1,493	SQ YD		**$12.00**	/ SQ YD	$17,916

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$541,370
RIGID CONSTRUCTION ANNUAL COST PER MILE	$104,091

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")		**$12.47** / SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	**$7.67** / SQ YD
HMA BINDER MIX	(1.00")	eling Binder Mix	**$4.80** / SQ YD
HMA POLICY OVERLAY SHLD	(2.50")	Shoulder Mix	**$10.71** / 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	**$77.64** / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	**$82.74** / 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	$619,914
RIGID TOTAL ANNUAL COST PER MILE	$119,193

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 02/27/17

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%	9	SQ YD	$150.00		$1,350	
	PWFn = 0.6419			PW =	0.6419	X	$1,350	$867
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	90	SQ YD	$150.00		$13,500	
	SHOULDER PATCH CLASS C	0.50%	7	SQ YD	$145.00		$1,015	
	LONGITUDINAL SHLD JT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	CENTERLINE JT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	PWFn = 0.5537			PW =	0.5537	X	$23,475	$12,998
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	134	SQ YD	$150.00		$20,100	
	SHOULDER PATCH CLASS C	1.00%	15	SQ YD	$145.00		$2,175	
	PWFn = 0.4776			PW =	0.4776	X	$22,275	$10,639
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	179	SQ YD	$150.00		$26,850	
	SHOULDER PATCH CLASS C	1.50%	22	SQ YD	$145.00		$3,190	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	4,480	SQ YD	$12.47		$55,886	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	1,493	SQ YD	$10.71		$15,994	
	PWFn = 0.4120			PW =	0.4120	X	$101,920	$41,990
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	CENTERLINE JT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	RANDOM CRACK R&S	50.00%	1,680	LIN FT	$2.00		$3,360	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	1,080	LIN FT	$2.00		$2,160	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	4	SQ YD	$82.74		$331	
	PWFn = 0.3554			PW =	0.3554	X	$14,811	$5,264
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	22	SQ YD	$150.00		$3,300	
	LONGITUDINAL SHLD JT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	CENTERLINE JT R&S	100.00%	2,240	LIN FT	$2.00		$4,480	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	1,620	LIN FT	$2.00		$3,240	
	RANDOM CRACK R&S	50.00%	1,680	LIN FT	$2.00		$3,360	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	22	SQ YD	$82.74		$1,820	
	PWFn = 0.3066			PW =	0.3066	X	$20,680	$6,340
								$78,544
	ROUTINE MAINTENANCE ACTIVITY		0.64	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$78,544
45	YEAR LIFE CYCLE CRFn = 0.0407852				MAINTENANCE ANNUAL COST PER MILE			$15,102

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

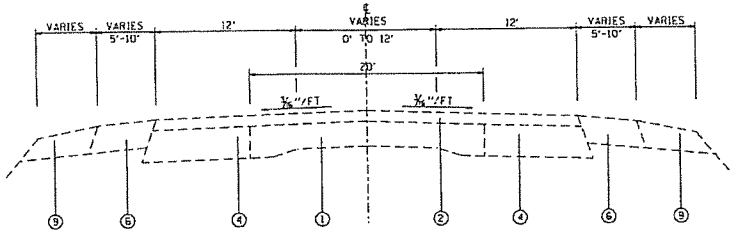
Calculated / Revised : **4/29/16 7:37 AM**

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$541,370	$432,464
		ANNUAL COST PER MILE	$104,091	$83,151
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$78,544	$134,034
		ANNUAL COST PER MILE	$15,102	$25,771
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$619,914	$566,498
		ANNUAL COST PER MILE	$119,193	$108,922

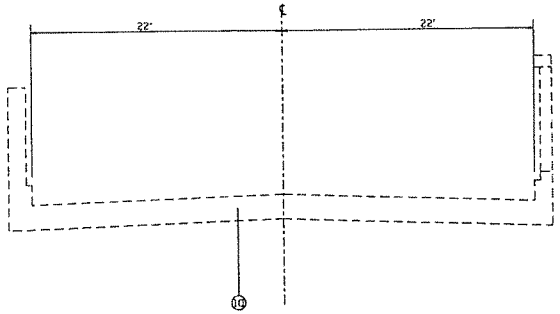
LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**HMA**	**$108,922**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**JPCP**	**$119,193**	9.4%

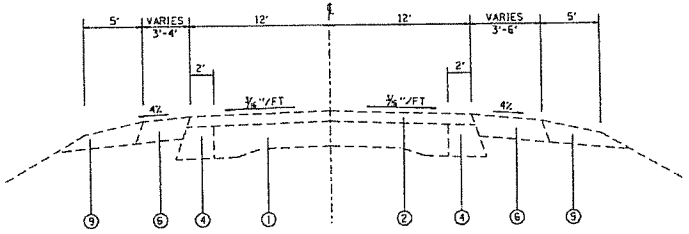
C:\Users\NIEDERNHOFERPR\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\0CGSX6SL\[76G56 - Pavement Design Calculations - Es



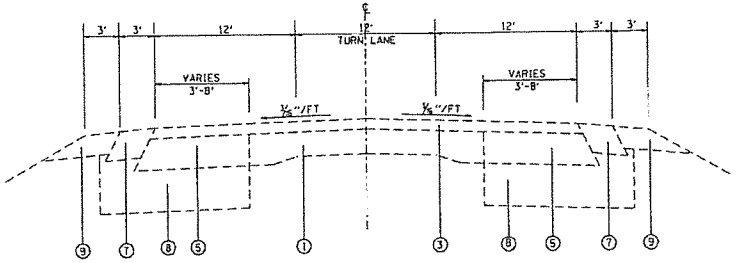
EXISTING ROADWAY SECTION
STA. 230+61 TO STA. 236+32



EXISTING BRIDGE SECTION
STA. 236+32 TO STA. 239+14



EXISTING ROADWAY SECTION
STA. 239+14 TO STA. 240+37

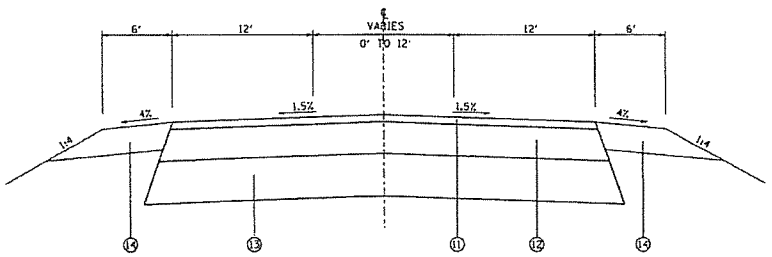


EXISTING ROADWAY SECTION
STA. 240+37 TO STA. 243+06

LEGEND

1. EXISTING PCC PAVEMENT (9"-7"-9")
2. EXISTING RESURFACING 3"
3. EXISTING RESURFACING 4"
4. EXISTING BITUMINOUS BASE COURSE WIDENING, 9"
5. EXISTING BITUMINOUS BASE COURSE WIDENING SUPERPAVE, 10-3/4"
6. EXISTING BITUMINOUS SHOULDER, 6"
7. EXISTING BITUMINOUS SHOULDER SUPERPAVE, 8"
8. EXISTING LIME MODIFIED SOIL, 12"
9. EXISTING AGGREGATE SHOULDER
10. EXISTING BRIDGE CONCRETE SLAB, 9-1/4"
11. PROPOSED HMA SURFACE, 2"
12. PROPOSED HMA BINDER, 9"
13. PROPOSED SUB-BASE GRANULAR MATERIAL, 12"
14. PROPOSED HMA SHOULDER, 8"

FILE NAME =	USER NAME = burnsdam	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	TYPICAL SECTIONS – EXISTING	F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CHECKED -	REVISED -			789	1258-2	MADISON		
Default	PLOT SCALE = 1.0000 ' / in.	DATE -	REVISED -		SCALE: SHEET OF SHEETS STA. TO STA.			CONTRACT NO. 76G5		
	PLOT DATE = 5/11/2016							ILLINOIS FED. AID PROJECT		



PROPOSED ROADWAY SECTION

STA. 230+61 TO STA. 236+32
STA. 239+14 TO STA. 243+06

LEGEND

1. EXISTING PCC PAVEMENT (9"-7"-9")
2. EXISTING RESURFACING 3"
3. EXISTING RESURFACING 4"
4. EXISTING BITUMINOUS BASE COURSE WIDENING, 9"
5. EXISTING BITUMINOUS BASE COURSE WIDENING SUPERPAVE, 10-3/4"
6. EXISTING BITUMINOUS SHOULDER, 6"
7. EXISTING BITUMINOUS SHOULDER SUPERPAVE, 8"
8. EXISTING LIME MODIFIED SOIL, 12"
9. EXISTING AGGREGATE SHOULDER
10. EXISTING BRIDGE CONCRETE SLAB, 9-1/4"
11. PROPOSED HMA SURFACE, 2"
12. PROPOSED HMA BINDER, 9"
13. PROPOSED SUB-BASE GRANUALR MATERIAL, 12"
14. PROPOSED HMA SHOULDER, 8"

FILE NAME =	USER NAME = burnsidean	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	TYPICAL SECTIONS – PROPOSED	F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	PLOT SCALE = 100.0000 ' / in.	CHECKED -	REVISED -			789	1258-2	MADISON		
Defaults	PLOT DATE = 5/4/2016	DATE -	REVISED -		SCALE:	SHEET OF SHEETS STA.	TO STA.	ILLINOIS FED. AID PROJECT		CONTRACT NO. 76G58