Illinois Department of Transportation

To:	Paul Loete	Attn: District Three
From:	John D. Baranzelli	
Subject:	Pavement Design	
Date:	August 1, 2014	

FAS Route 1279 (IL 178)
Section (1) BR
LaSalle County
Over the Illinois River at Utica

We have reviewed the pavement design for the above captioned section submitted to BDE on April 30, 2014.The project will reconstruct a portion of IL 178 in conjunction with the bridge over the Illinois River near Utica. The project will omit the stabilized sub-base, but will be built on a well-drained embankment and utilize geotextile fabric. The life cycle cost analysis favored the rigid design by 6%. Because the difference in cost was within 10%, the Pavement Selection Committee was convened. The bridge approach in Utica has a 4% grade. Trucks have to reduce speed as they enter Utica. After discussion, the rigid design was selected by the Pavement Selection Committee. The approved pavement design is as follows:

IL 178 over the Illinois River near Utica [new pavement]

9 inches of Jointed PCC Pavement with Tied PCC Shoulders
12 inches of Aggregate Subgrade Improvement

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

Illinois Department of Transportation

Memorandum

To:	John Baranzelli	Attn: Paul Niedernhofer
From:	Paul Loete	By: Dave Broviak
Subject:	Pavement Design	
Date:	April 30, 2014	

FAS 1279 (IL 178)
Section (1)BR&I
LaSalle County
Job No. P-93-035-01
File # 1329-110
Ex. SN 050-0088
Contract 66992

Attached is the pavement design for IL 178 over the Illinois River at Utica. Please review the design which will require pavement selection committee review. The district requests approval of the 9.00 inch full depth Jointed Plain Concrete Pavement (JPCP) option. Construction of this project is currently anticipated in FY 2017.

JPCP is the preferred pavement type based on life cycle cost in the attached analysis. The results of the mechanistic pavement design indicate that 9.00 inch JPCP or 10.25 inch full depth hot mix asphalt (HMA) is required. The JPCP design has an annual life-cycle cost of $64,335 per mile while the HMA pavement has an annual life-cycle cost of $68,483 per mile, making the JPCP pavement approximately 6 percent less costly. A concrete pavement is also desirable due to trucks braking on 4 percent mainline grades to make turns onto the local system or to reduce speed to meet speed limit reductions traveling north into Utica. This project is not suitable for the alternative pavement bidding process because it includes less than two lane miles of pavement.

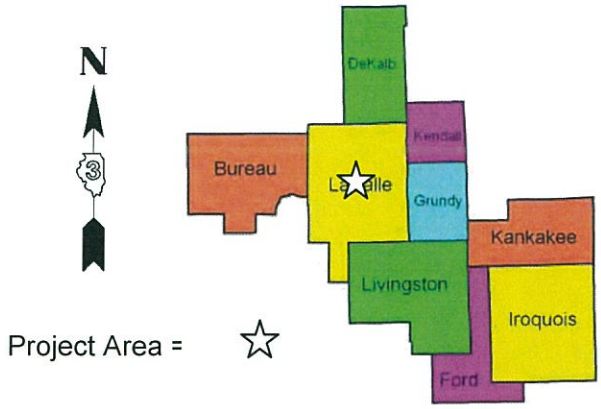
Calculations to determine pavement thicknesses and life-cycle costs are attached and electronic files have been emailed for review. The stabilized subbase was omitted from the JPCP design due to constructability and traffic maintenance concerns. The proposed pavement will be constructed in small segments that are broken by the intersection at Dee Bennett Road and by the bridge itself. Construction of subbase in several short segments, with a total pavement length of less than 0.7 miles after omission of the structure, would not be efficient or cost effective. Section 54-4.01(h) item 2 of the Bureau of Design and Environment Manual explains that subbase serves two purposes, as a separation layer between rigid pavement and pumpable subgrade soils and to resist erosion of fine-graded soils. An aggregate subgrade with

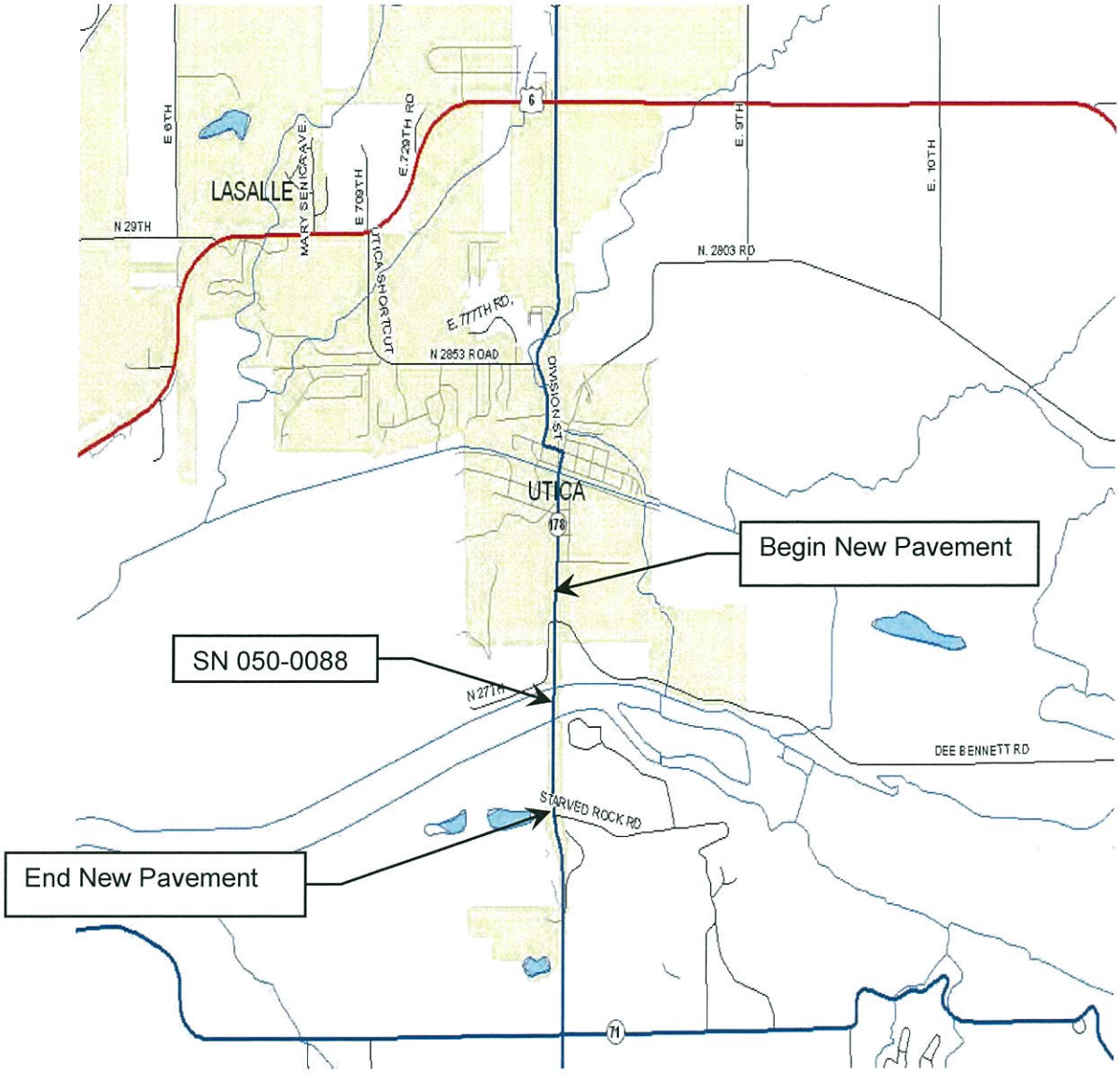
geotextile fabric will be used to reduce the potential for pumping or erosion of fine graded soils under the proposed pavement and the majority of the new pavement will be constructed on a high, well drained embankment built out of approved materials not anticipated to be susceptible to erosion or pumping. The use of eight foot wide paved shoulders will also aid in keeping the subgrade drained and reduces the potential for pumping or erosion.

Rubblization and unbonded overlay were not considered because most of the new pavement is on a shifted alignment.

If you have any questions, please contact Mr. Dave Alexander at 815-434-8468.

Project Location Map
FAS Route 1279 (IL 178)
Section (1)BR&I
LaSalle County
IL 178 over the Illinois River at
Utica, Br. Repl. SN 050-0088
P-93-035-01, File #1329
Contract 66992





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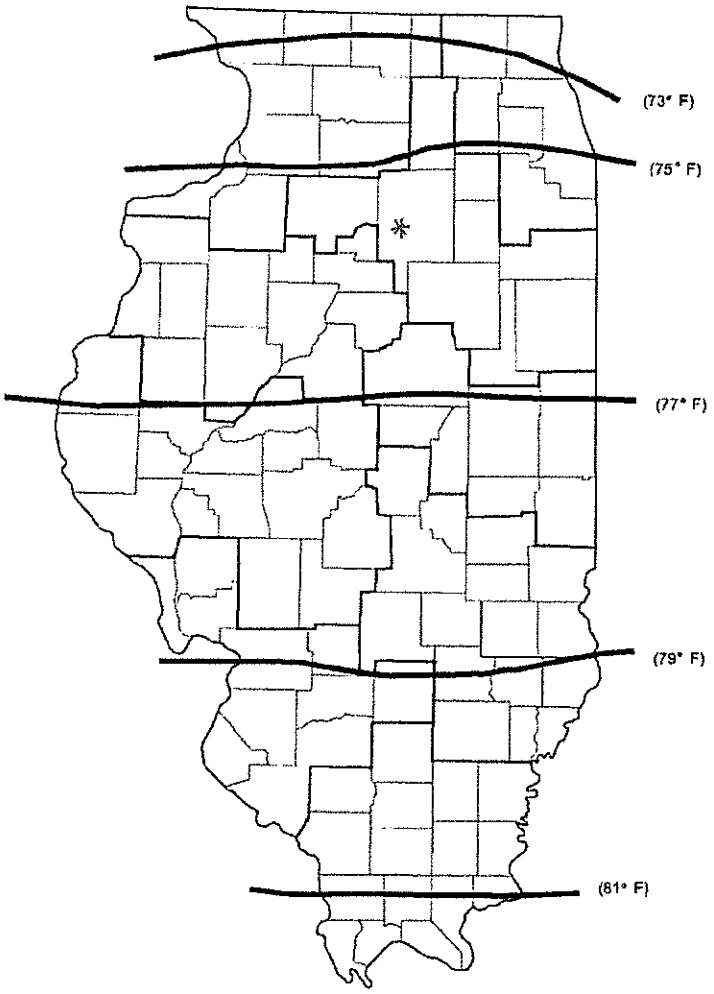
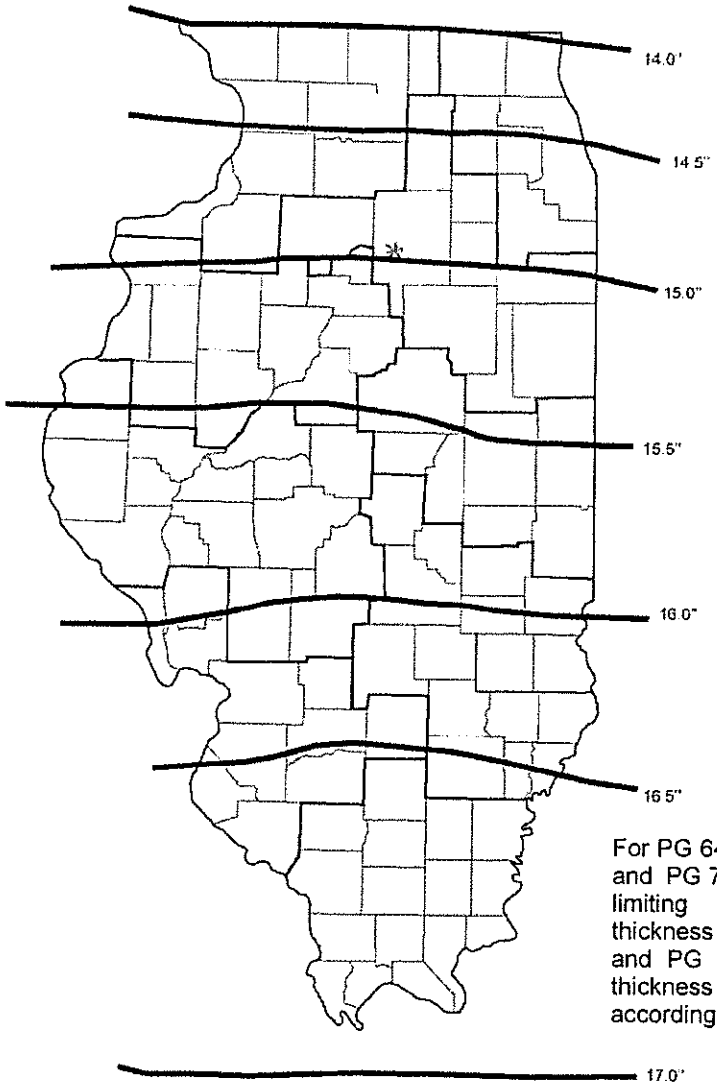


Round up to 76.0°F

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

HMA MIXTURE TEMPERATURE
(Mechanistic Design: Flexible Pavement)

Figure 54-5.C



Round up to 15.0"

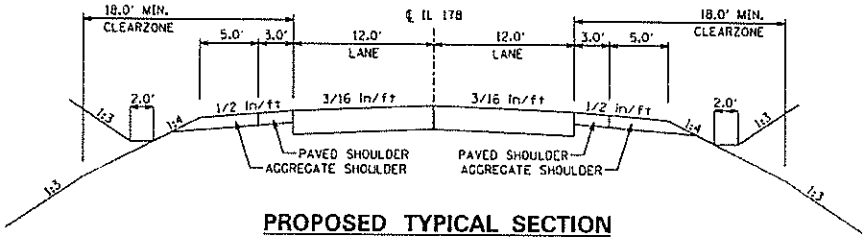
For PG 64-22, PG 70-22, PG 76-22, and PG 76-28 binder grades, read limiting strain criterion design thickness off of map. For PG 64-28 and PG 70-28 binder grades, the thickness should be corrected according to Section 54-5.01(i)8a.

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

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

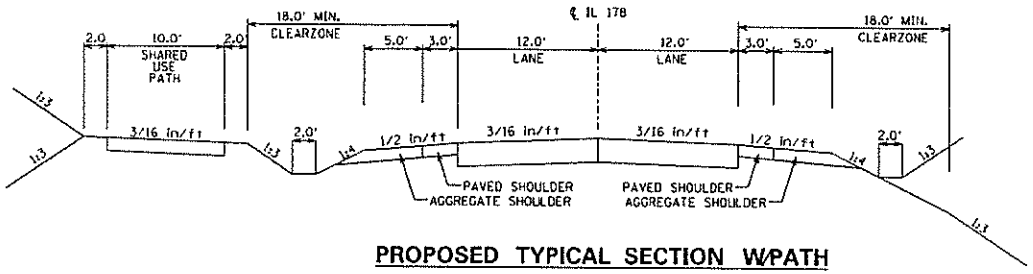
Figure 54-5.I

ILLINOIS 178 – PROPOSED TYPICAL SECTIONS



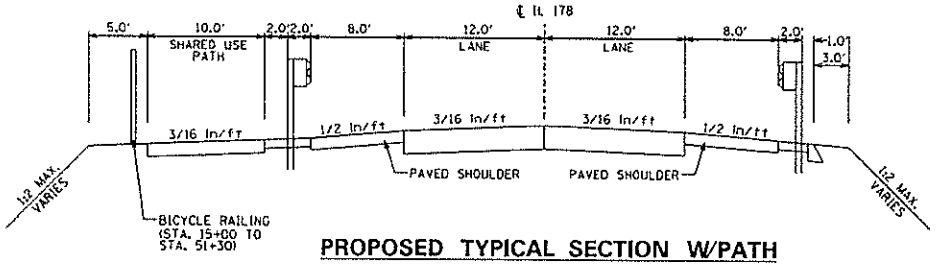
PROPOSED TYPICAL SECTION

(LOOKING SOUTH)



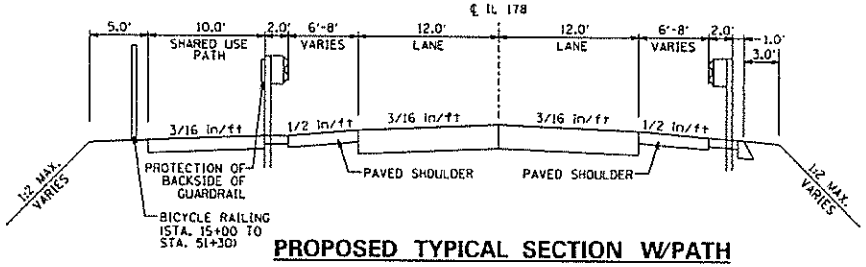
PROPOSED TYPICAL SECTION W/PATH

(LOOKING SOUTH)



PROPOSED TYPICAL SECTION W/PATH

(GUARDRAIL FILL SECTION LOOKING SOUTH)



PROPOSED TYPICAL SECTION W/PATH

(APPROACH TO BRIDGE LOOKING SOUTH)

YEAR	ADT	DHV	S.U.	M.U.
2009	4,000	386	4%	4%
2015	4,350	420	4%	4%
2025	4,700	454	4%	4%
2035	5,800	560	4%	4%

PATRONS BRINCKERHOFF
330 West Monroe Street, Suite 900
Chicago, IL 60606
(312) 782-8150 FAX# (312) 782-1884

	DESIGNED - ADR	REVISED -
	DRAWN - ADR	REVISED -
	CHECKED - RP	REVISED -
PLOT DATE = 10/17/2013	DATE - 10/17/13	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

ILLINOIS 178
EXISTING TYPICAL SECTIONS

SHEET NO. 2 OF 17 SHEETS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
178	(1) BH & 1	LASALLE	17	2
		CONTRACT NO. 66992		
		ILLINOIS FED. AID PROJECT		

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

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 08/12/2014

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: FAS 1279 (IL 178)
Section: (1)BR&I
County: LaSalle
Location: SN 050-0088 over IL River at Utica
Comments:
Design Date: 12/04/2013 DSA <-- BY
Modify Date: <-- BY

	ADT	Year
Current:	4,000	2009
Future:	5,800	2035

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	4,564	87.0%	P = 50%
SU =	250	210	4.0%	S = 50%
MU =	750	472	9.0%	M = 50%
		Struct. Design ADT =	5,246	(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) =	2.06	(Actual ADT)	TF rigid (Actual) =	2.97	(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. = 76.0 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 660 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 86 (Fig. 54-5.E)
Goto Map — Full Depth HMA Design Thickness = 10.25 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 15.00 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 10.25 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
Goto Map — HMA Overlay Design Thickness = 7.50 in. (Fig. 54-5.U)
Limiting Strain Criterion Thickness = in. (Fig. 54-5.V)

Use HMA Overlay Thickness = 999.00 inches

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

JPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

	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: 08/12/2014

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE	FAS 1279 (IL 178)
SECTION	(1)BR&I
COUNTY	LaSalle
LOCATION	SN 050-0088 over IL River at Utica

FACILITY TYPE: NON-INTERSTATE

PROJECT LENGTH			4292	FT ==>	0.81 Miles
# OF CENTERLINES			1	CL	
# OF LANES			2	LANES	
# OF EDGES			2	EP	
LANE WIDTH - AVERAGE			12	FT	
SHOULDER WIDTH	HMA	Left	8	FT	
	HMA	Right	8	FT	
	Total Width of Paved Shoulders		16	FT	

PAVEMENT THICKNESS (FLEXIBLE)	10.25	IN	15.00 IN MAX
SHOULDER THICKNESS	8.00	IN	PMA_SD **Standard Design**
POLICY OVERLAY THICKNESS	2.25	IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	3.17	2.06	3.17

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$91.91 / TON
HMA TOP BINDER	$75.73 / TON
HMA LOWER BINDER	$61.39 / TON
HMA BINDER (LEVELING)	$85.00 / TON
HMA SHOULDER	$78.13 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE	COST	
HMA PAVEMENT (FULL-DEPTH)	(10.25")	11,445	SQ YD		$41.78 / SQ YD	$0	
HMA SURFACE COURSE	(2.00")	1,282	TONS	*	$91.91 / TON	$117,829	~
HMA TOP BINDER COURSE	(4.25")	2,724	TONS	*	$75.73 / TON	$206,289	~
HMA LOWER BINDER COURSE	(4.00")	2,564	TONS	*	$61.39 / TON	$157,404	~
HMA SHOULDER	(8.00")	2,809	TONS	*	$78.13 / TON	$219,467	~
CURB & GUTTER		0	LIN FT		$30.00 / LIN FT	$0	
SUBBASE GRAN MATL TY C (TONS)		379	TONS	*	$19.70 / TON	$7,466	
IMPROVED SUBGRADE:	Aggregate	18,633	SQ YD	*	$12.41 / SQ YD	$231,236	
Reserved For User Supplied Item		0	UNITS		$0.00 / UNITS	$0	
Reserved For User Supplied Item		0	UNITS		$0.00 / UNITS	$0	
PAVEMENT REMOVAL		11,445	SQ YD		$0.00 / SQ YD	$0	
SHOULDER REMOVAL		7,630	SQ YD		$0.00 / SQ YD	$0	

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST $939,691

FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE $47,148

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL		UNIT COST
ROUTINE MAINTENANCE ACTIVITY					$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix	2.00	$10.37 / SQ YD
HMA OVERLAY PVMT		(2.25")		2.25	$11.38 / SQ YD
HMA SURFACE MIX		(1.50")	Surface Mix	1.50	$7.76 / SQ YD
HMA BINDER MIX		(0.75")	eling Binder Mix	0.75	$3.62 / SQ YD
HMA OVERLAY SHLD	(Year 30)	(2.25")	Shoulder Mix	2.25	$9.84 / SQ YD
HMA OVERLAY SHLD		(2.00")	Shoulder Mix	2.00	$8.75 / SQ YD
MILLING (2.00 IN)				2.00	$1.98 / SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)	Surface Mix	2.00	$79.27 / SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill Surf)	Shoulder Mix	2.00	$77.73 / SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill +2.00 ")	Leveling Binder Mix	2.00	$78.50 / SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill +2.00 ")	Shoulder Mix	2.00	$77.73 / SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL					$3.00 / LIN FT
CENTERLINE JOINT ROUT & SEAL					$3.00 / LIN FT
RANDOM / THERMAL CRACK ROUT & SEAL		(100% Rehab = 110.00' / Station / Lane)			$3.00 / LIN FT

FLEXIBLE TOTAL LIFE-CYCLE COST $1,364,923

FLEXIBLE TOTAL ANNUAL COST PER MILE $68,483

HMA_SD

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE

08/12/14

FULL-DEPTH HMA PAVEMENT
HMA OVERLAY OF RUBBLIZED PCC PAVEMENT
Figure 54-7.C
STANDARD DESIGN

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 5							
	LONG SHLD JT R&S	100.00%	8,584	LIN FT	$3.00	$25,752	
	CNTR LINE JOINT R&S	100.00%	4,292	LIN FT	$3.00	$12,876	
	RNDM / THRM CRACK R&S	50.00%	4,721	LIN FT	$3.00	$14,163	
	PD PVMT PATCH M&F SURF	0.10%	11	SQ YD	$79.27	$872	
	PWFn =	0.8626		PW =	0.8626 X	$53,663	$46,290
YEAR 10							
	LONG SHLD JT R&S	100.00%	8,584	LIN FT	$3.00	$25,752	
	CNTR LINE JOINT R&S	100.00%	4,292	LIN FT	$3.00	$12,876	
	RNDM / THRM CRACK R&S	50.00%	4,721	LIN FT	$3.00	$14,163	
	PD PVMT PATCH M&F SURF	0.50%	57	SQ YD	$79.27	$4,519	
	PWFn =	0.7441		PW =	0.7441 X	$57,310	$42,644
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	17,715	SQ YD	$1.98	$35,076	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	114	SQ YD	$78.50	$8,949	
	HMA OVERLAY PVMT 2.00"	100.00%	11,445	SQ YD	$10.37	$118,636	
	HMA OVERLAY SHLD 2.00 "	100.00%	6,270	SQ YD	$8.75	$54,867	
	PWFn =	0.6419		PW =	0.6419 X	$217,528	$139,623
YEAR 20							
	LONG SHLD JT R&S	100.00%	8,584	LIN FT	$3.00	$25,752	
	CNTR LINE JOINT R&S	100.00%	4,292	LIN FT	$3.00	$12,876	
	RNDM / THRM CRACK R&S	50.00%	4,721	LIN FT	$3.00	$14,163	
	PD PVMT PATCH M&F SURF	0.10%	11	SQ YD	$79.27	$872	
	PWFn =	0.5537		PW =	0.5537 X	$53,663	$29,712
YEAR 25							
	LONG SHLD JT R&S	100.00%	8,584	LIN FT	$3.00	$25,752	
	CNTR LINE JOINT R&S	100.00%	4,292	LIN FT	$3.00	$12,876	
	RNDM / THRM CRACK R&S	50.00%	4,721	LIN FT	$3.00	$14,163	
	PD PVMT PATCH M&F SURF	0.50%	57	SQ YD	$79.27	$4,519	
	PWFn =	0.4776		PW =	0.4776 X	$57,310	$27,372
HMA_SD							
YEAR 30	NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	17,715	SQ YD	$1.98	$35,076	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	229	SQ YD	$78.50	$17,977	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	63	SQ YD	$77.73	$4,897	
	HMA OVERLAY PVMT 2.25 "	100.00%	11,445	SQ YD	$11.38	$130,215	
	HMA OVERLAY SHLD 2.25 "	100.00%	6,270	SQ YD	$9.84	$61,725	
	PWFn =	0.4120		PW =	0.4120 X	$249,890	$102,951
YEAR 35							
	LONG SHLD JT R&S	100.00%	8,584	LIN FT	$3.00	$25,752	
	CNTR LINE JOINT R&S	100.00%	4,292	LIN FT	$3.00	$12,876	
	RNDM / THRM CRACK R&S	50.00%	4,721	LIN FT	$3.00	$14,163	
	PD PVMT PATCH M&F SURF	0.10%	11	SQ YD	$79.27	$872	
	PWFn =	0.3554		PW =	0.3554 X	$53,663	$19,071
YEAR 40							
	LONG SHLD JT R&S	100.00%	8,584	LIN FT	$3.00	$25,752	
	CNTR LINE JOINT R&S	100.00%	4,292	LIN FT	$3.00	$12,876	
	RNDM / THRM CRACK R&S	50.00%	4,721	LIN FT	$3.00	$14,163	
	PD PVMT PATCH M&F SURF	0.50%	57	SQ YD	$79.27	$4,519	
	PWFn =	0.3066		PW =	0.3066 X	$57,310	$17,569
							$425,232
	ROUTINE MAINTENANCE ACTIVITY		1.63	Lane Miles	0.00	$0	$0
					MAINTENANCE LIFE-CYCLE COST		$425,232
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE		$21,335

PCC PAVEMENT

JPCP

ROUTE			FAS 1279 (IL 178)		
SECTION			(1)BR&I		
COUNTY			LaSalle		
LOCATION			SN 050-0088 over IL River at Utica		
FACILITY TYPE			NON-INTERSTATE		
PROJECT LENGTH			4292 FT	= = >	0.81 Miles
# OF CENTERLINES			1 CL		
# OF LANES			2 LANES		
# OF EDGES			2 EP		
LANE WIDTH - AVERAGE			12 FT		
SHOULDER WIDTH	PCC	Left	8 FT		
	PCC	Right	8 FT		
	Total Width of Paved Shoulders		16 FT		
PAVEMENT THICKNESS (RIGID)		JPCP	9.00 IN	TIED SHLD	
SHOULDER THICKNESS			9.00 IN		
POLICY OVERLAY THICKNESS			2.50 IN		

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	4.59	2.97	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")	11,445	SQ YD		$43.31	/ SQ YD	$495,683
PAVEMENT REINFORCEMENT		0	SQ YD		$22.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	0	SQ YD	*	$13.00	/ SQ YD	$0
PCC SHOULDERS	(9.00" to 9.00")	7,630	SQ YD		$42.00	/ SQ YD	$320,460
CURB & GUTTER		0	LIN FT		$30.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(~ 1.80")	547	TONS	*	$19.70	/ TON	$10,776
IMPROVED SUBGRADE:	Aggregate Width = 33.0'	18,109	SQ YD	*	$12.41	/ SQ YD	$224,733
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0
PAVEMENT REMOVAL		11,445	SQ YD		$0.00	/ SQ YD	$0
SHOULDER REMOVAL		7,630	SQ YD		$0.00	/ SQ YD	$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$1,051,652
RIGID CONSTRUCTION ANNUAL COST PER MILE	$52,765

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")	1.0067		2.50	$12.59	/ SQ YD
HMA SURFACE MIX	(1.50")	1.0052	Surface Mix	1.50	$7.76	/ SQ YD
HMA BINDER MIX	(1.00")	1.0139	Leveling Binder Mix	1.00	$4.83	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		Shoulder Mix	2.50	$10.94	/ SQ YD
CLASS A PAVEMENT PATCHING					$195.00	/ SQ YD
CLASS B PAVEMENT PATCHING					$130.00	/ SQ YD
CLASS C SHOULDER PATCHING					$110.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)			Surface Mix	1.50	$76.70	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")			Surface Mix	2.50	$81.85	/ SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL					$3.00	/ LIN FT
CENTERLINE JOINT ROUT & SEAL					$3.00	/ LIN FT
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL					$3.00	/ LIN FT
RANDOM CRACK ROUT & SEAL	(100% Rehab = 100.00' / Station / Lane)				$3.00	/ LIN FT

RIGID TOTAL LIFE-CYCLE COST	$1,282,240
RIGID TOTAL ANNUAL COST PER MILE	$64,335

JPCP MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 08/12/14

JOINTED PLAIN CONCRETE PAVEMENT
UNBONDED JOINTED PLAIN CONCRETE OVERLAY
Figure 54-7.A

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST		COST	PRESENT WORTH
YEAR 10								
	PAVEMENT PATCH CLASS B	0.10%	11	SQ YD	$130.00		$1,430	
	PWFn =	0.7441		PW =	0.7441	X	$1,430	$1,064
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	23	SQ YD	$130.00		$2,990	
	PWFn =	0.6419		PW =	0.6419	X	$2,990	$1,919
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	229	SQ YD	$130.00		$29,770	
	SHOULDER PATCH CLASS C	0.50%	38	SQ YD	$110.00		$4,180	
	LONGITUDINAL SHLD JT R&S	100.00%	8,584	LIN FT	$3.00		$25,752	
	CENTERLINE JT R&S	100.00%	4,292	LIN FT	$3.00		$12,876	
	PWFn =	0.5537		PW =	0.5537	X	$72,578	$40,185
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	343	SQ YD	$130.00		$44,590	
	SHOULDER PATCH CLASS C	1.00%	76	SQ YD	$110.00		$8,360	
	PWFn =	0.4776		PW =	0.4776	X	$52,950	$25,289
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	458	SQ YD	$130.00		$59,540	
	SHOULDER PATCH CLASS C	1.50%	114	SQ YD	$110.00		$12,540	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	11,445	SQ YD	$12.59		$144,060	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	6,270	SQ YD	$10.94		$68,583	
	PWFn =	0.4120		PW =	0.4120	X	$284,723	$117,302
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	8,584	LIN FT	$3.00		$25,752	
	CENTERLINE JT R&S	100.00%	4,292	LIN FT	$3.00		$12,876	
	RANDOM CRACK R&S	50.00%	4,292	LIN FT	$3.00		$12,876	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	2,746	LIN FT	$3.00		$8,238	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	11	SQ YD	$81.85		$900	
	PWFn =	0.3554		PW =	0.3554	X	$60,642	$21,551
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	57	SQ YD	$130.00		$7,410	
	LONGITUDINAL SHLD JT R&S	100.00%	8,584	LIN FT	$3.00		$25,752	
	CENTERLINE JT R&S	100.00%	4,292	LIN FT	$3.00		$12,876	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	4,118	LIN FT	$3.00		$12,354	
	RANDOM CRACK R&S	50.00%	4,292	LIN FT	$3.00		$12,876	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	57	SQ YD	$81.85		$4,665	
	PWFn =	0.3066		PW =	0.3066	X	$75,933	$23,278
								$230,588
	ROUTINE MAINTENANCE ACTIVITY		1.63	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$230,588
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$11,569

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 1/23/14 8:14 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$1,051,652	$939,691
		ANNUAL COST PER MILE	$52,765	$47,148
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$230,588	$425,232
		ANNUAL COST PER MILE	$11,569	$21,335
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$1,282,240	$1,364,923
		ANNUAL COST PER MILE	$64,335	$68,483

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**JPCP**	**$64,335**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**HMA**	**$68,483**	6.4%

P:\Pavement Design Stuff\D-3\IL 178 in Utica\[IL 178 over the Illinois River in Utica pavement design - unprotected mode.xlsm]LifeCycleCost