Illinois Department of Transportation

To:	Kensil A. Garnett	Attn: Karen Dvorsky	
From:	Jack A. Elston	By: Michael Brand	MDB
Subject:	Pavement Design Approval		
Date:	July 12, 2019		

Route:	IL 78	Job No.:	D-94-092-07
Section:	(48B-1)BR	Contract No.:	68758
County:	Knox	Target Letting:	
Limits:	over Kickapoo Creek		

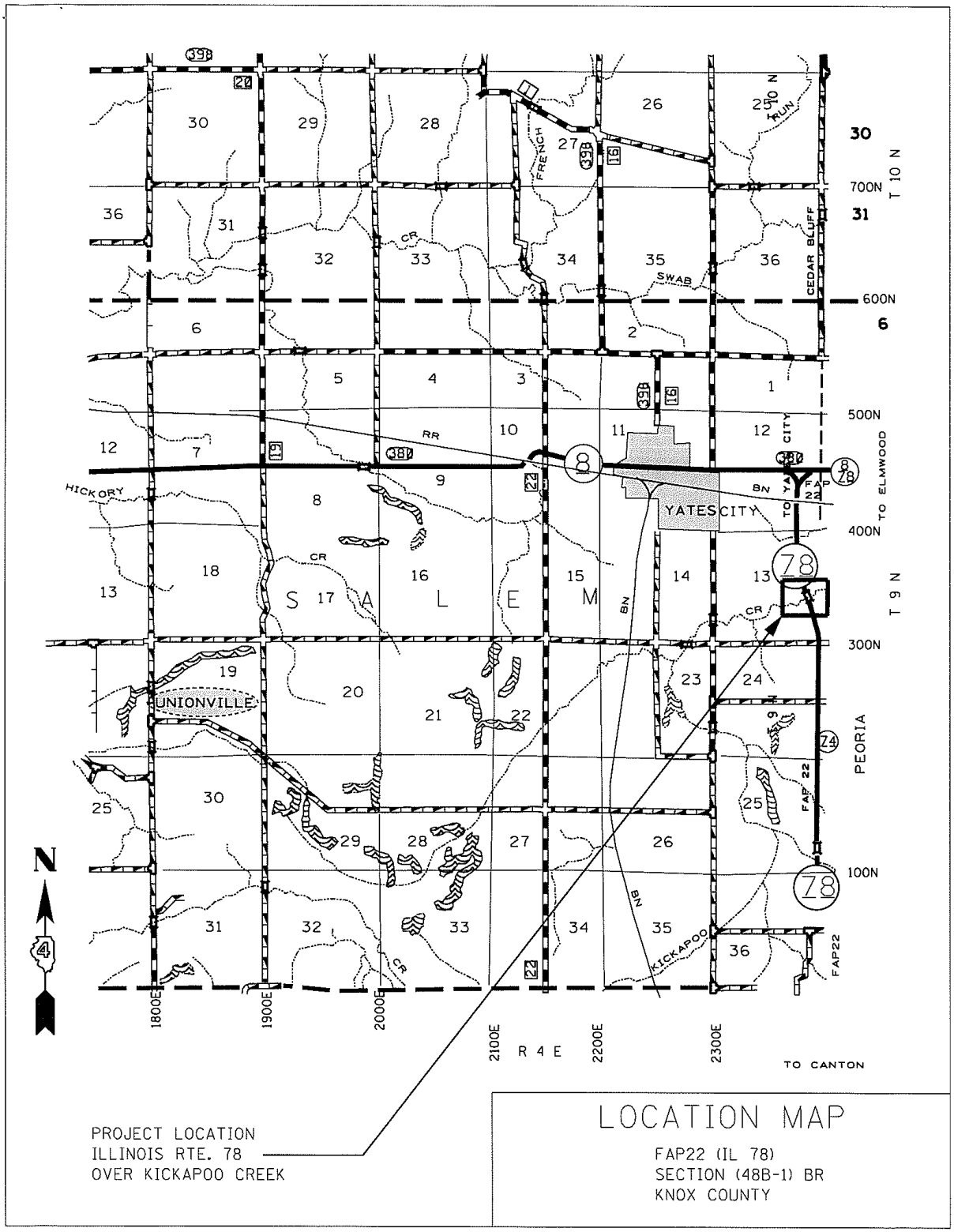
On July 9, 2019, the Pavement Selection Committee met to review the pavement design for the above referenced project which was submitted on April 29, 2019. The scope of the project includes replacement of the structure over Kickapoo Creek and raising the profile approximately 2 feet. To accommodate the grade raise, approximately 460 lineal feet of IL 78 will be removed and replaced, and an additional 575 lineal feet will be milled and overlaid.

For the replacement areas, the pavement designed compared 10.25" full-depth HMA and 9" PCC pavements. The life cycle cost analysis resulted in the two options being within 10% of each other and thus alternate bidding should be considered. However given the short length, staging needs, and existence of HMA overlaid pavement on either side of the improvement, the District requested approval to use HMA.

The Pavement Selection Committee agreed with the District. In summary the pavement design selected for this projectis:

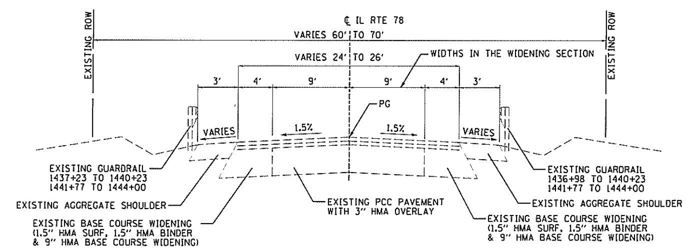
10.25" Full-Depth HMA Pavement
12" Aggregate Subgrade

If you have any questions, please contact Mike Brand at (217) 782-7651.



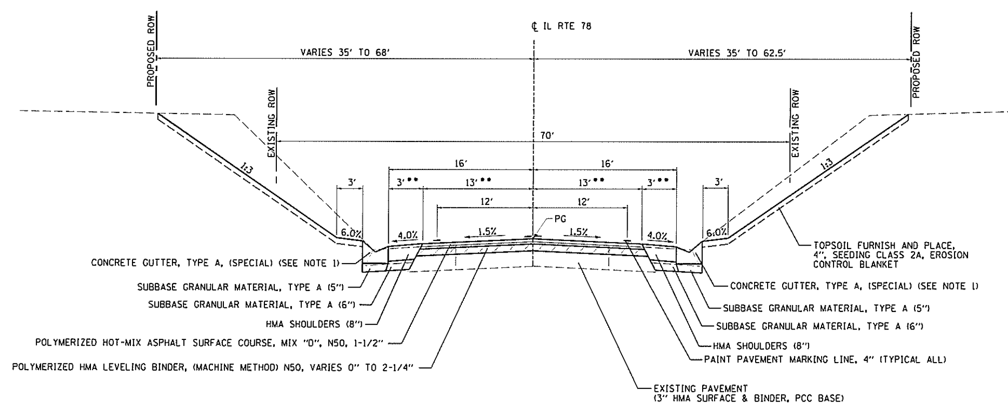
LOCATION MAP

FAP22 (IL 78)
SECTION (48B-1) BR
KNOX COUNTY


℄ IL RTE 78
EXISTING ROW
VARIES 60' TO 70'
VARIES 24' TO 26'
WIDTHS IN THE WIDENING SECTION
3' 4' 9' 9' 4' 3'
PG
VARIES
1.5%
EXISTING GUARDRAIL 1437+23 TO 1440+23 1441+77 TO 1444+00
EXISTING AGGREGATE SHOULDER
EXISTING BASE COURSE WIDENING (1.5" HMA SURF, 1.5" HMA BINDER & 9" HMA BASE COURSE WIDENING)
EXISTING PCC PAVEMENT WITH 3" HMA OVERLAY
EXISTING GUARDRAIL 1436+98 TO 1440+23 1441+77 TO 1444+00
EXISTING AGGREGATE SHOULDER
EXISTING BASE COURSE WIDENING (1.5" HMA SURF, 1.5" HMA BINDER & 9" HMA BASE COURSE WIDENING)

EXISTING TYPICAL ROADWAY SECTION

STA 1431+75 TO STA 1440+48.87
BRIDGE OMISSION
STA 1441+51.90 TO STA 1444+00.00
NOT TO SCALE


℄ IL RTE 78
PROPOSED ROW
VARIES 35' TO 68'
VARIES 35' TO 62.5'
EXISTING ROW
70'
16' 16'
3'•• 13'•• 13'•• 3'••
3' 3'
12' 12'
PG
1:3
6.0% 4.0% 1.5% 1.5% 4.0% 6.0%
CONCRETE GUTTER, TYPE A, (SPECIAL) (SEE NOTE 1)
SUBBASE GRANULAR MATERIAL, TYPE A (5")
SUBBASE GRANULAR MATERIAL, TYPE A (6")
HMA SHOULDERS (8")
POLYMERIZED HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N50, 1-1/2"
POLYMERIZED HMA LEVELING BINDER, (MACHINE METHOD) N50, VARIES 0" TO 2-1/4"
TOPSOIL FURNISH AND PLACE, 4", SEEDING CLASS 2A, EROSION CONTROL BLANKET
CONCRETE GUTTER, TYPE A, (SPECIAL) (SEE NOTE 1)
SUBBASE GRANULAR MATERIAL, TYPE A (5")
SUBBASE GRANULAR MATERIAL, TYPE A (6")
HMA SHOULDERS (8")
PAINT PAVEMENT MARKING LINE, 4" (TYPICAL ALL)
EXISTING PAVEMENT (3" HMA SURFACE & BINDER, PCC BASE)

PROPOSED TYPICAL ROADWAY SECTION (MILL AND OVERLAY)

STA 1431+75 TO STA 1436+00
NOT TO SCALE

NOTES:

1. CONCRETE GUTTER, TYPE A STARTS DIVERTING AWAY FROM PAVEMENT AT STA 1434+48

• HMA PAVEMENT (FULL DEPTH), 10.25" CONSISTS OF POLYMERIZED HMA SURFACE COURSE, MIX "D", N50, 1-1/2"; POLYMERIZED HMA LEVELING BINDER, (MACHINE METHOD) N50, 2-1/4" AND HMA BINDER COURSE, IL 19.0, N50, 6-1/2"

•• MATCH EXISTING PAVEMENT WIDTH FROM STA 1431+75 TO STA 1434+48. SHOULDER WIDTH VARIES WITH PAVEMENT WIDTH.

HMA SURFACE REMOVAL (VARIABLE DEPTH)

PAVEMENT REMOVAL

PAVEMENT BREAKING

CHASTAIN & ASSOCIATES LLC
CONSULTING ENGINEERS

DECATUR (217) 422-8544
SCHAUMBURG (773) 714-0050
ROCKFORD (815) 489-0050
184-001397

FILE NAME = I:\IDOT\5497.03 IL 78 Phase II\CADD\... Default	USER NAME = jbuening	DESIGNED - CHASTAIN	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	TYPICAL SECTIONS ILLINOIS ROUTE 78	
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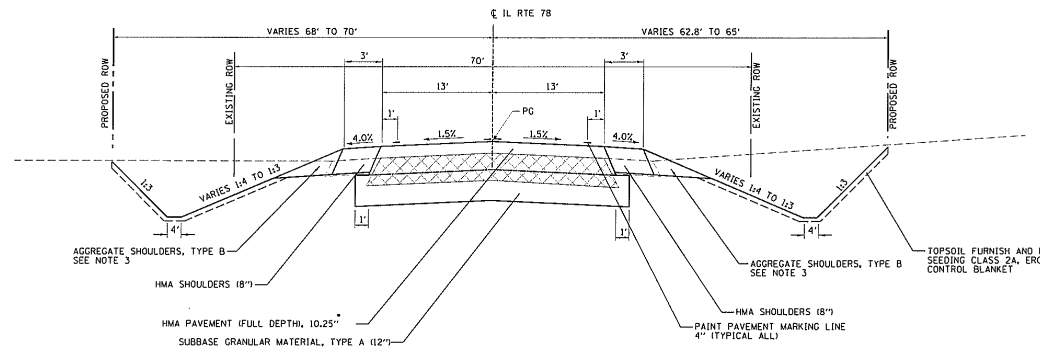
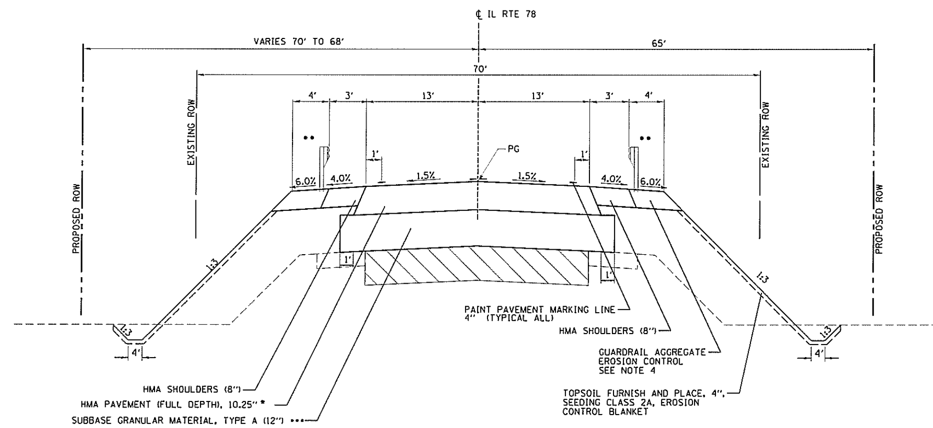
	PLOT DATE = 6/11/2018	DATE - 10/16	REVISED -			

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
22	48(B-1)BR;(CR)	KNOX	85	13
		CONTRACT NO. 68758		
	ILLINOIS FED. AID PROJECT			


℄ IL RTE 78
VARIES 68' TO 70'
VARIES 62.8' TO 65'
PROPOSED ROW
EXISTING ROW
3'
70'
13'
13'
3'
PG
1'
4.0%
1.5%
1.5%
4.0%
1:3
VARIES 1:4 TO 1:3
4'
1'
AGGREGATE SHOULDERS, TYPE B
SEE NOTE 3
HMA SHOULDERS (8")
HMA PAVEMENT (FULL DEPTH), 10.25" *
SUBBASE GRANULAR MATERIAL, TYPE A (12")
TOPSOIL FURNISH AND PLACE, 4", SEEDING CLASS 2A, EROSION CONTROL BLANKET
PAINT PAVEMENT MARKING LINE
4" (TYPICAL ALL)

PROPOSED TYPICAL ROADWAY SECTION (PAVEMENT REMOVAL AND RECONSTRUCTION)

STA 1436+00 TO STA 1437+75
NOT TO SCALE


℄ IL RTE 78
VARIES 70' TO 68'
65'
70'
4'
3'
13'
13'
3'
4'
EXISTING ROW
PROPOSED ROW
PG
**
1'
6.0%
4.0%
1.5%
1.5%
4.0%
6.0%
1:3
4'
PAINT PAVEMENT MARKING LINE
4" (TYPICAL ALL)
HMA SHOULDERS (8")
GUARDRAIL AGGREGATE EROSION CONTROL
SEE NOTE 4
TOPSOIL FURNISH AND PLACE, 4", SEEDING CLASS 2A, EROSION CONTROL BLANKET
HMA SHOULDERS (8")
HMA PAVEMENT (FULL DEPTH), 10.25" *
SUBBASE GRANULAR MATERIAL, TYPE A (12") ***

PROPOSED TYPICAL ROADWAY SECTION (PAVEMENT BREAKING)

STA 1437+75 TO STA 1440+04.58
NOT TO SCALE

NOTES:

1 BRIDGE APPROACH PAVEMENT CONNECTOR SHALL BE LOCATED FROM STA 1439+94.58 TO STA 1440+04.58 AND FROM STA 1441+75.08 TO STA 1441+85.08

2 THE PROPOSED BRIDGE STRUCTURE SHALL BE LOCATED FROM STA 1440+04.58 TO STA 1441+75.08

3 AGGREGATE SHOULDERS, TYPE B END AT:
LT STA 1438+86.18
RT STA 1438+23.58

4 GUARDRAIL AGGREGATE EROSION CONTROL BEGINS AT:
LT STA 1438+86.18
RT STA 1438+23.58

* HMA PAVEMENT (FULL DEPTH), 10.25" CONSISTS OF POLYMERIZED HMA SURFACE COURSE, MIX "D", N50, 1-1/2"; POLYMERIZED HMA LEVELING BINDER, (MACHINE METHOD) N50, 2-1/4" AND HMA BINDER COURSE, IL 19.0, N50, 6-1/2"

** PROPOSED GUARDRAIL LIMITS ARE 1438+01.43 TO 1444+00.00

*** VARY DEPTH OF SUBBASE GRANULAR MATERIAL, TYPE A, 12" MINIMUM FOR PROFILE RAISE

HMA SURFACE REMOVAL (VARIABLE DEPTH)

PAVEMENT REMOVAL

PAVEMENT BREAKING

CHASTAIN & ASSOCIATES LLC
CONSULTING ENGINEERS
DECATUR (217) 422-8544
SCHAUMBURG (773) 714-0050
ROCKFORD (815) 489-0050
184-001397

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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

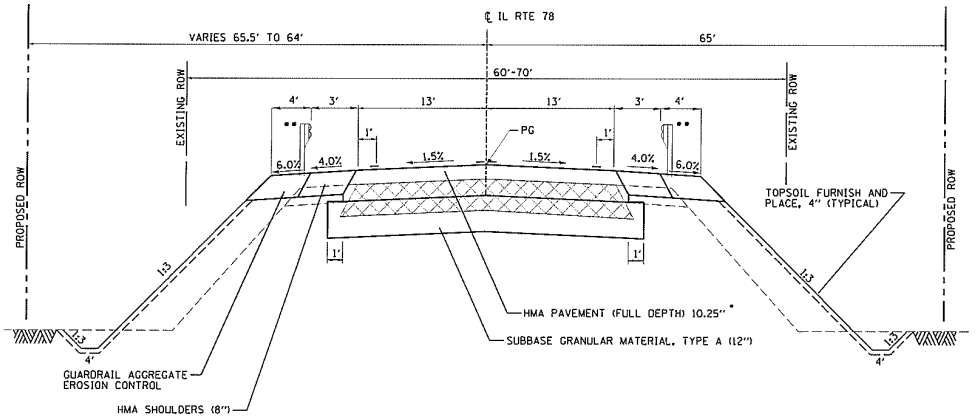
TYPICAL SECTIONS
ILLINOIS ROUTE 78

SCALE: NONE | SHEET NO. 2 OF 3 SHEETS | STA. 1436+00 TO STA. 1439+94.58

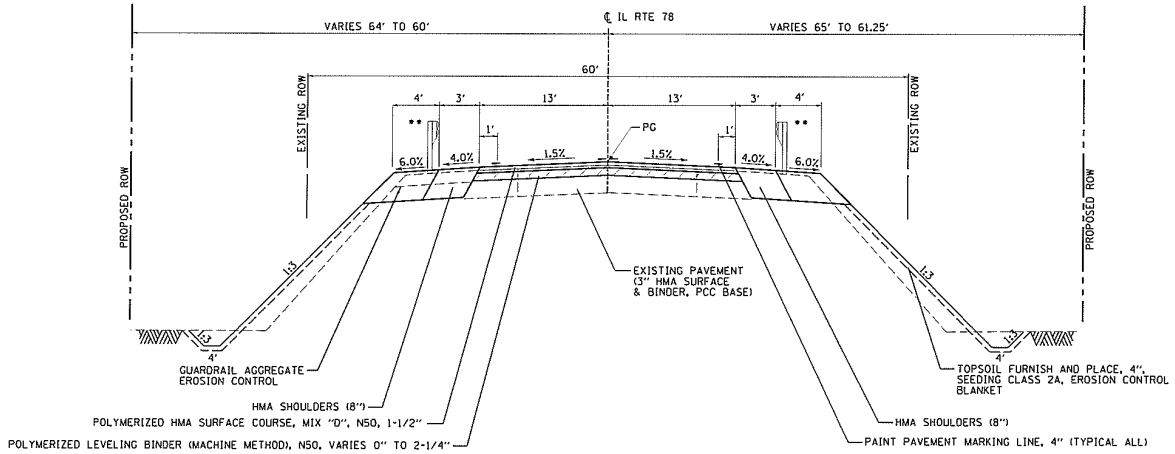
F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
22	48(B-1)BR;CR)	KNOX	85	14

CONTRACT NO. 68758

ILLINOIS FED. AID PROJECT



PROPOSED TYPICAL ROADWAY SECTION (PAVEMENT REMOVAL AND RECONSTRUCTION)
STA 1441+75.08 TO STA 1442+50
NOT TO SCALE



PROPOSED TYPICAL ROADWAY SECTION (MILL AND OVERLAY)
STA 1442+50 TO STA 1444+00
NOT TO SCALE

NOTES:

1 BRIDGE APPROACH PAVEMENT CONNECTOR SHALL BE LOCATED FROM STA 1439+94.58 TO STA 1440+04.58 AND FROM STA 1441+75.08 TO STA 1441+85.08

2 THE PROPOSED BRIDGE STRUCTURE SHALL BE LOCATED FROM STA 1440+04.58 TO STA 1441+75.08

* HMA PAVEMENT (FULL DEPTH), 10.25" CONSISTS OF POLYMERIZED HMA SURFACE COURSE, MIX "D", N50, 1-1/2"; POLYMERIZED HMA LEVELING BINDER, (MACHINE METHOD) N50, 2-1/4" AND HMA BINDER COURSE, IL 19.0, N50, 6-1/2"

** PROPOSED NORTHBOUND AND SOUTHBOUND GUARDRAILS SHALL BE CONNECTED TO EXISTING GUARDRAILS THAT CONTINUE BEYOND THE PROJECT TERMINI.

HMA SURFACE REMOVAL (VARIABLE DEPTH)

PAVEMENT REMOVAL

PAVEMENT BREAKING

CHASTAIN & ASSOCIATES LLC
CONSULTING ENGINEERS
DECATUR (217) 422-8544
SCHAUMBURG (773) 714-0050
ROCKFORD (815) 489-9090
184-001397

FILE NAME =	USER NAME = jbuening	DESIGNED - CHASTAIN	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	TYPICAL SECTIONS ILLINOIS ROUTE 78
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	PLOT DATE = 6/11/2018	DATE - 10/16	REVISED -		

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
22	48(B-1)BR,CR)	KNOX	85	15
		CONTRACT NO. 68758		
		ILLINOIS FED. AID PROJECT		

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

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 04/26/2019

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: IL 78 over Kickapoo Creek
Section: 48[(B-1)BR;CR]
County: Knox
Location: Illinois Rte. 78 over Kickapoo Creek
Comments:
Design Date: 01/24/2019 CRO <-- BY
Modify Date: <-- BY

	ADT	Year
Current:	1,600	2018
Future:	1,803	2030

READ ME

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

RESET

Subgrade Support Rating (SSR): Poor
Construction Year: 2020
Design Period (DP) = 20 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	1,735	96.3%	P = 50%
SU =	250	23	1.3%	S = 50%
MU =	750	45	2.5%	M = 50%

Struct. Design ADT = 1,803 (2030)

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) =	0.20	(Actual ADT)	TF rigid (Actual) =	0.29	(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. = 76.5 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 650 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 = 15.25 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
HMA Overlay Design Thickness = 7.50 in. (Fig. 54-5.U)
Goto Map
Limiting Strain Criterion Thickness = 11.00 in. (Fig. 54-5.V)

Use HMA Overlay Thickness = 7.50 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)

	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%

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCT

FULL-DEPTH HMA PAVEMENT

PLEASE READ

Reset / Setup Worksheet

Print Menu

ROUTE	IL 78 over Kickapoo Creek
SECTION	48[(B-1)BR;CR]
COUNTY	Knox
LOCATION	Illinois Rte. 78 over Kickapoo Creek
FACILITY TYPE	I / N — NON-INTERSTATE

PROJECT LENGTH			460	FT = = >	0.09 Miles
# OF CENTERLINES			1	CL	
# OF LANES			2	LANES	
# OF EDGES			2	EP	
LANE WIDTH - AVERAGE			13	FT	
SHOULDER WIDTH	HMA	Left	3	FT	
	HMA	Right	3	FT	
	Total Width of Paved Shoulders		6	FT	

PAVEMENT THICKNESS (FLEXIBLE)	10.25	IN	15.25 IN MAX
SHOULDER THICKNESS	8.00	IN	HMA_SD **Standard Design**
POLICY OVERLAY THICKNESS	2.25	IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	3.16	0.20	3.16

Read Me

HMA COST PER TON	UNIT PRICE	
HMA SURFACE	$152.61	/ TON
HMA TOP BINDER	$133.02	/ TON
HMA LOWER BINDER	$104.63	/ TON
HMA BINDER (LEVELING)		/ TON
HMA SHOULDER		/ TON

INITIAL COSTS

Read Me — Selection Toggle

ITEM	THICKNESS		100% QUANTITY	UNIT		UNIT PRICE		COST
HMA PAVEMENT (FULL-DEPTH)	(10.25")	1329	1,329	SQ YD		$71.09	/ SQ YD	$0
HMA SURFACE COURSE	(2.00")	1.0064	112	TONS	*	$152.61	/ TON	$17,092
HMA TOP BINDER COURSE	(2.25")	1.0200	167	TONS	*	$133.02	/ TON	$22,214
HMA LOWER BINDER COURSE	(6.00")	1.0465	484	TONS	*	$104.63	/ TON	$50,641
HMA SHOULDER	(8.00")	307	137	TONS		$0.00	/ TON	$0
CURB & GUTTER			0	LIN FT		$30.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C (TONS)			29	TONS			/ TON	$0
IMPROVED SUBGRADE:	Aggregate	Width = 34.7'	1,774	SQ YD			/ SQ YD	$0
Sub Base Granular Material Type A, 12"			1,038	**Ton**	*	$46.10	/ Ton	$47,852
Reserved For User Supplied Item			0	**UNITS**		$0.00	/ UNITS	$0
PAVEMENT REMOVAL			1,329	SQ YD		$0.00	/ SQ YD	$0
SHOULDER REMOVAL			307	SQ YD		$0.00	/ SQ YD	$0

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$137,799
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$64,510

MAINTENANCE COSTS:

ITEM		THICKNESS		MATERIAL	T	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY						$0.00	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	1.0064	Surface Mix	2.00	$17.20	/ SQ YD
HMA OVERLAY PVMT		(2.25")	1.0072		2.25	$12.88	/ SQ YD
HMA SURFACE MIX		(1.50")	1.0048	Surface Mix	1.50	$12.88	/ SQ YD
HMA BINDER MIX		(0.75")	1.0120	eling Binder Mix	0.75	$0.00	/ SQ YD
HMA OVERLAY SHLD	(Year 30)	(2.25")		Shoulder Mix	2.25	$0.00	/ SQ YD
HMA OVERLAY SHLD		(2.00")		Shoulder Mix	2.00	$0.00	/ SQ YD
MILLING (2.00 IN)					2.00	$3.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)		Surface Mix	2.00	$87.09	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill Surf)		Shoulder Mix	2.00	$70.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill +2.00 ")		Leveling Binder Mix	2.00	$70.00	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill +2.00 ")		Shoulder Mix	2.00	$70.00	/ 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	$179,679
FLEXIBLE TOTAL ANNUAL COST PER MILE	$84,115

PCC PAVEMENT

JPCP

ROUTE			IL 78 over Kickapoo Creek		
SECTION			48[(B-1)BR;CR]		
COUNTY			Knox		
LOCATION			Illinois Rte. 78 over Kickapoo Creek		
FACILITY TYPE			NON-INTERSTATE		
PROJECT LENGTH			460 FT	= = >	0.09 Miles
# OF CENTERLINES			1 CL		
# OF LANES			2 LANES		
# OF EDGES			2 EP		
LANE WIDTH - AVERAGE			13 FT		
SHOULDER WIDTH	PCC	Left	3 FT		
	PCC	Right	3 FT		
	Total Width of Paved Shoulders		6 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
4.54	0.29	4.54

Worksheet Construction Type is Reconstruction — **The Pavement Type is** JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST
JPC PAVEMENT	(9.00")	1,329	SQ YD		$75.37	/ SQ YD	$100,167
PAVEMENT REINFORCEMENT		0	SQ YD			/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	1,482	SQ YD			/ SQ YD	$0
PCC SHOULDERS		307	SQ YD			/ SQ YD	$0
CURB & GUTTER		0	LIN FT		$30.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(~ 1.51")	40	TONS			/ TON	$0
IMPROVED SUBGRADE:	Modified Soil Width = 33.0'	1,687	SQ YD			/ SQ YD	$0
Sub Base Granular Material Type A, 12"		978	Ton	*	$48.07	/ Ton	$47,012
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0
PAVEMENT REMOVAL		1,329	SQ YD		$0.00	/ SQ YD	$0
SHOULDER REMOVAL		307	SQ YD		$0.00	/ SQ YD	$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST $147,179

RIGID CONSTRUCTION ANNUAL COST PER MILE $68,901

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")	1.0080		2.50	$12.88	/ SQ YD
HMA SURFACE MIX	(1.50")	1.0048	Surface Mix	1.50	$12.88	/ SQ YD
HMA BINDER MIX	(1.00")	1.0128	eling Binder Mix	1.00	$0.00	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		Shoulder Mix	2.50	$0.00	/ 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	$82.82	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")			Surface Mix	2.50	$91.37	/ 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 $168,722

RIGID TOTAL ANNUAL COST PER MILE $78,986

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%	920	LIN FT	$2.00		$1,840	
	CNTR LINE JOINT R&S	100.00%	460	LIN FT	$2.00		$920	
	RNDM / THRM CRACK R&S	50.00%	506	LIN FT	$2.00		$1,012	
	PD PVMT PATCH M&F SURF	0.10%	1	SQ YD	$87.09		$87	
	PWFn =	0.8626		PW =	0.8626	X	$3,859	$3,329
YEAR 10								
	LONG SHLD JT R&S	100.00%	920	LIN FT	$2.00		$1,840	
	CNTR LINE JOINT R&S	100.00%	460	LIN FT	$2.00		$920	
	RNDM / THRM CRACK R&S	50.00%	506	LIN FT	$2.00		$1,012	
	PD PVMT PATCH M&F SURF	0.50%	7	SQ YD	$87.09		$610	
	PWFn =	0.7441		PW =	0.7441	X	$4,382	$3,261
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	1,636	SQ YD	$3.00		$4,908	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	13	SQ YD	$70.00		$910	
	HMA OVERLAY PVMT 2.00"	100.00%	1,329	SQ YD	$17.20		$22,859	
	HMA OVERLAY SHLD 2.00 "	100.00%	307	SQ YD	$0.00		$0	
	PWFn =	0.6419		PW =	0.6419	X	$28,677	$18,407
YEAR 20								
	LONG SHLD JT R&S	100.00%	920	LIN FT	$2.00		$1,840	
	CNTR LINE JOINT R&S	100.00%	460	LIN FT	$2.00		$920	
	RNDM / THRM CRACK R&S	50.00%	506	LIN FT	$2.00		$1,012	
	PD PVMT PATCH M&F SURF	0.10%	1	SQ YD	$87.09		$87	
	PWFn =	0.5537		PW =	0.5537	X	$3,859	$2,137
YEAR 25								
	LONG SHLD JT R&S	100.00%	920	LIN FT	$2.00		$1,840	
	CNTR LINE JOINT R&S	100.00%	460	LIN FT	$2.00		$920	
	RNDM / THRM CRACK R&S	50.00%	506	LIN FT	$2.00		$1,012	
	PD PVMT PATCH M&F SURF	0.50%	7	SQ YD	$87.09		$610	
	PWFn =	0.4776		PW =	0.4776	X	$4,382	$2,093
	HMA_SD							
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	1,636	SQ YD	$3.00		$4,908	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	27	SQ YD	$70.00		$1,890	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	3	SQ YD	$70.00		$210	
	HMA OVERLAY PVMT 2.25 "	100.00%	1,329	SQ YD	$12.88		$17,117	
	HMA OVERLAY SHLD 2.25 "	100.00%	307	SQ YD	$0.00		$0	
	PWFn =	0.4120		PW =	0.4120	X	$24,125	$9,939
YEAR 35								
	LONG SHLD JT R&S	100.00%	920	LIN FT	$2.00		$1,840	
	CNTR LINE JOINT R&S	100.00%	460	LIN FT	$2.00		$920	
	RNDM / THRM CRACK R&S	50.00%	506	LIN FT	$2.00		$1,012	
	PD PVMT PATCH M&F SURF	0.10%	1	SQ YD	$87.09		$87	
	PWFn =	0.3554		PW =	0.3554	X	$3,859	$1,371
YEAR 40								
	LONG SHLD JT R&S	100.00%	920	LIN FT	$2.00		$1,840	
	CNTR LINE JOINT R&S	100.00%	460	LIN FT	$2.00		$920	
	RNDM / THRM CRACK R&S	50.00%	506	LIN FT	$2.00		$1,012	
	PD PVMT PATCH M&F SURF	0.50%	7	SQ YD	$87.09		$610	
	PWFn =	0.3066		PW =	0.3066	X	$4,382	$1,343
								$41,880
	ROUTINE MAINTENANCE ACTIVITY		0.17	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$41,880
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$19,606

JPCP

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 06/13/19

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%	1	SQ YD	$150.00		$150	
	PWFn =	0.7441		PW =	0.7441	X	$150	$112
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	3	SQ YD	$150.00		$450	
	PWFn =	0.6419		PW =	0.6419	X	$450	$289
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	27	SQ YD	$150.00		$4,050	
	SHOULDER PATCH CLASS C	0.50%	2	SQ YD	$145.00		$290	
	LONGITUDINAL SHLD JT R&S	100.00%	920	LIN FT	$2.00		$1,840	
	CENTERLINE JT R&S	100.00%	460	LIN FT	$2.00		$920	
	PWFn =	0.5537		PW =	0.5537	X	$7,100	$3,931
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	40	SQ YD	$150.00		$6,000	
	SHOULDER PATCH CLASS C	1.00%	3	SQ YD	$145.00		$435	
	PWFn =	0.4776		PW =	0.4776	X	$6,435	$3,073
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	53	SQ YD	$150.00		$7,950	
	SHOULDER PATCH CLASS C	1.50%	5	SQ YD	$145.00		$725	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	1,329	SQ YD	$12.88		$17,117	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	307	SQ YD	$0.00		$0	
	PWFn =	0.4120		PW =	0.4120	X	$25,792	$10,626
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	920	LIN FT	$2.00		$1,840	
	CENTERLINE JT R&S	100.00%	460	LIN FT	$2.00		$920	
	RANDOM CRACK R&S	50.00%	460	LIN FT	$2.00		$920	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	322	LIN FT	$2.00		$644	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	1	SQ YD	$91.37		$91	
	PWFn =	0.3554		PW =	0.3554	X	$4,415	$1,569
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	7	SQ YD	$150.00		$1,050	
	LONGITUDINAL SHLD JT R&S	100.00%	920	LIN FT	$2.00		$1,840	
	CENTERLINE JT R&S	100.00%	460	LIN FT	$2.00		$920	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	484	LIN FT	$2.00		$968	
	RANDOM CRACK R&S	50.00%	460	LIN FT	$2.00		$920	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	7	SQ YD	$91.37		$640	
	PWFn =	0.3066		PW =	0.3066	X	$6,338	$1,943
								$21,543
	ROUTINE MAINTENANCE ACTIVITY		0.17	Lane Miles	$0.00		$0	$0
							MAINTENANCE LIFE-CYCLE COST	$21,543
45	YEAR LIFE CYCLE	CRFn = 0.0407852					MAINTENANCE ANNUAL COST PER MILE	$10,085

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 4/17/19 2:29 PM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$147,179	$137,799
		ANNUAL COST PER MILE	$68,901	$64,510
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$21,543	$41,880
		ANNUAL COST PER MILE	$10,085	$19,606
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$168,722	$179,679
		ANNUAL COST PER MILE	$78,986	$84,115

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>		**JPCP**	**$78,986**	
OTHER OPTIONS (LOWEST TO HIGHEST):		TYPE / PERCENTAGE	**HMA**	**$84,115**	6.5%