Illinois Department of Transportation

To:	Jeffrey Keirn	Attn: District Nine
From:	John Baranzelli	
Subject:	Pavement Design	
Date:	July 20, 2015	

FAP Route 42 (IL 13/127)
Section D-9 Four Lane 2015-1
Jackson County
From Murphysboro to Vergennes

We have reviewed the pavement selection for the above captioned section, which was submitted with your memorandum dated July 6, 2015. The project is greater than two lane-miles, and the Life Cycle Cost Analysis favored a HMA pavement over a jointed PCC pavement by less than 10%. This project qualifies for the alternate bidding process. The approved pavement design is as follows:

IL 13/127 [Pavement Reconstruction]

Option1
- 9 inches of Jointed PCC Pavement with PCC Shoulders
- 4 inches of Stabilized Subbase
- 12 inches of Modified Soil

Option 2
- 11.5 inches of Full Depth HMA Pavement with 8 inches of HMA Shoulders
  - 2 inches of HMA Surface Course, Mix "D", N90
  - 9.5 inches of HMA Binder Course, IL-19.0, N90
- 12 inches of 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: John A. Brandon

Subject: Pavement Design Approval

Date: July 6, 2015

Route: FAP 42 IL13/127
Section: D-9 Four Lane 2015-1
County: Jackson County
Contract #: XXXXX

Project Location: IL 13/127 from Murphysboro to Vergennes.

This project includes a future four-lane facility along existing IL 13/127 north of Murphysboro and south of Vergennes in Jackson County. The lanes will be built adjacent to existing IL 13/127 and will be approximately 5.1 miles. It will begin near the Ava Rd intersection and continue northerly ~5.1 miles north to Gale/Bethel Rd south of Vergennes..

The new full depth pavement ~ 11.50" with 8" HMA Bituminous Shoulders or 9" PCC pavement with 9" PCC shoulder are proposed.

District 9 prefers "alternate bid" on this project. The LCCA has a difference of 7.1% between the two pavement options.

A life-cycle cost analysis comparing concrete and bituminous pavements was performed on the new lanes. The estimated cost of the concrete pavement option is $9.747 million and the estimated cost of the bituminous pavement option is $9.102 million.

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

Mix Designs and Traffic Data are provided on subsequent sheets.

Locations	Hot-Mix Asphalt Surface Course
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:0	D Surface
Quality Management Program:	QCP

Locations	Hot-Mix Asphalt Binder Course
Mixture Use(s):	Hot-Mix Asphalt Binder, N90, IL-19.0mm
AC/PG:	PG64-22
ABR % (Max):	See Special Provision
Design Air Voids:	4.0 %, 90 Gyration Design
Mixture Composition: (Gradation Mixture)	IL-19.0mm
Friction Aggregate:	None
Quality Management Program:	QCP

Locations	Hot-Mix Asphalt Shoulders (Lower Lifts)
Mixture Use(s):	Hot-Mix Asphalt Binder Course, N70, IL-19.0 mm
AC/PG:	PG64-22
ABR % (Max):	See Special Provision
Design Air Voids:	4.0 %, 70 Gyration Design
Mixture Composition: (Gradation Mixture)	IL-19.0 mm
Friction Aggregate:	None
Quality Management Program:	QCP

Locations	Hot-Mix Asphalt Shoulders (Top Lift)
Mixture Use(s):	Hot-Mix Asphalt Surface Course, Mix C, N70
AC/PG:	PG64-22
ABR % (Max):	See Special Provision
Design Air Voids:	4.0 %, 70 Gyration Design
Mixture Composition: (Gradation Mixture)	IL-9.5 mm
Friction Aggregate:	C Surface
Quality Management Program:	QCP

The following information is provided for your use:

2013 Traffic Data		2016 Traffic Data		2026 Traffic Data		2036 Traffic Data	
ADT:	7250	ADT:	7580	ADT:	8800	ADT:	10,210
PV:	6475	PV:	6770	PV:	7860	PV:	9115
SU:	450	SU:	470	SU:	545	SU:	635
MU:	325	MU:	340	MU:	395	MU:	4601

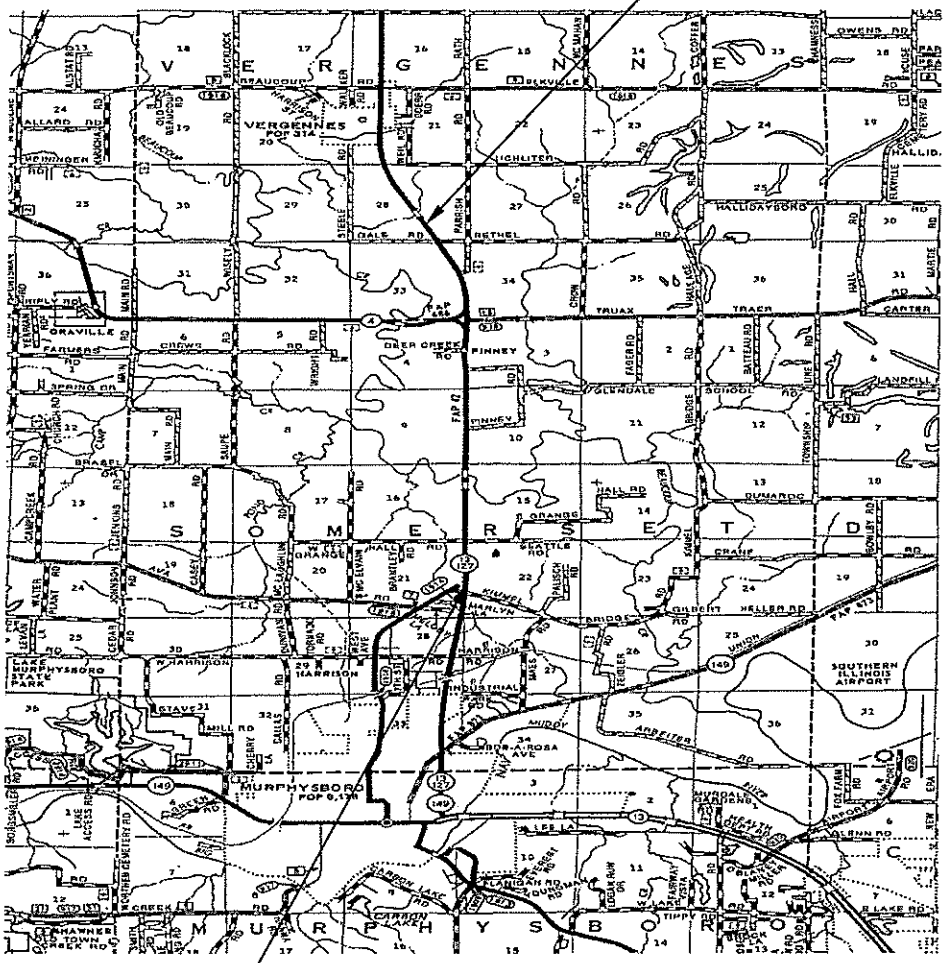
LOCATION MAP

IL-13/127 (FAP 42)
D9 FOUR LANE 2015-1
JACKSON COUNTY

Location: from Murphysboro to Vergennes near IL 13/127
Length = 5.1 Miles

NORTH

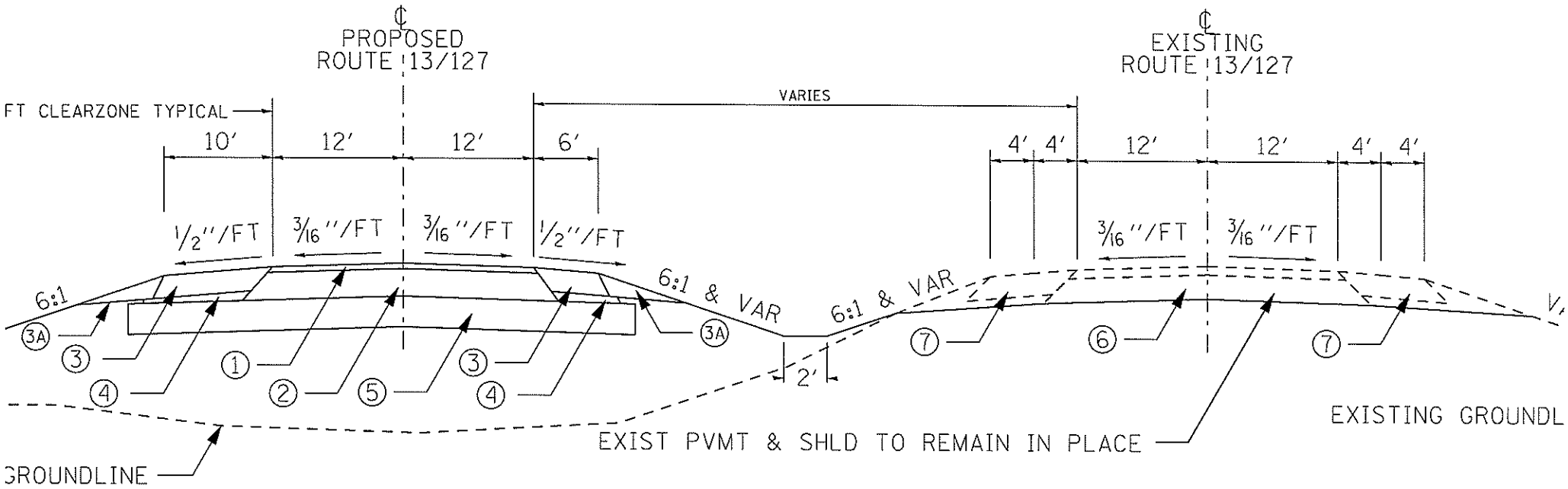
IMPROVEMENT ENDS SOUTH OF VERGENNES NEAR GALE/BETHEL RD



IMPROVEMENT BEGINS NEAR AVA RD

FD HMA PVMT & SHLD

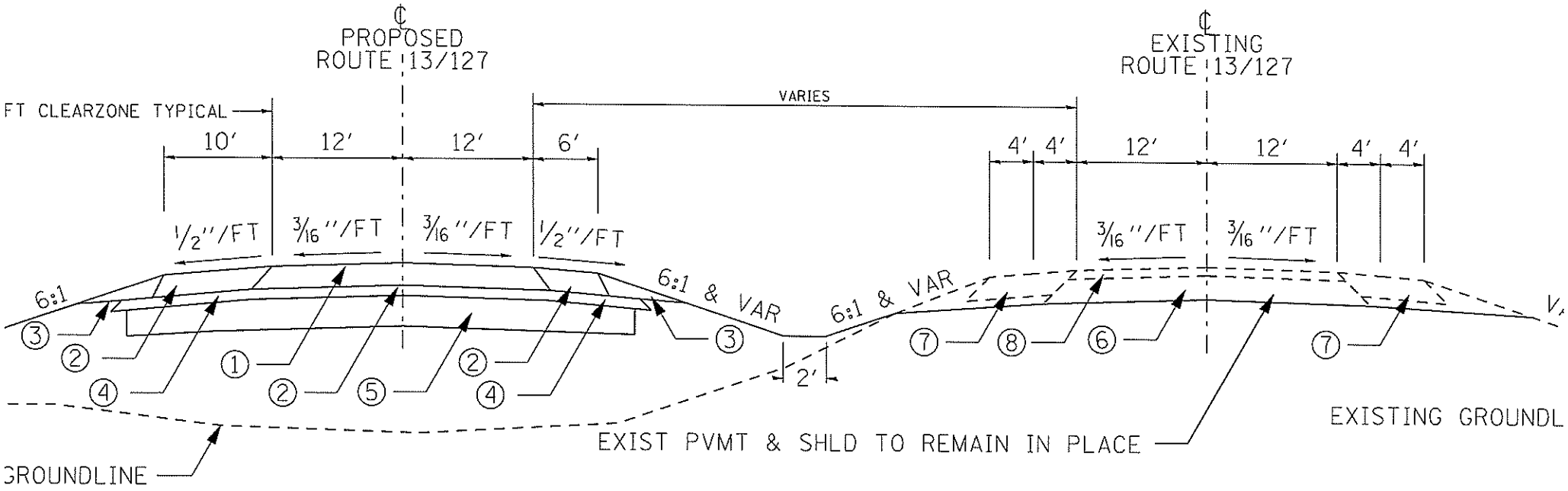
FROM MURPHYSBORO TO VERGENNES



① PROPOSED HMA SURFACE COURSE, 2″
② PROPOSED HMA BINDER COURSE, 9.5″
③ PROPOSED HMA SHOULDER, 8″
③A PROPOSED AGGREGATE SHOULDER TYPE B
④ SUBBASE GRANULAR MATERIAL, TYPE C
⑤ PROPOSED LIME MODIFIED SOILS, 12″
⑥ EXISTING PAVEMENT
⑦ EXISTING SHOULDER

PCC PAVEMENT

FROM MURPHYSBORO TO VERGENNES



① PROPOSED PCC PAVEMENT 9″
② PROPOSED PCC SHOULDERS 9″
③ PROPOSED AGGREGATE SHOULDER TYPE B
④ STABILIZED SUBBASE 4″
⑤ PROPOSED LIME MODIFIED SOILS, 12″
⑥ EXISTING PAVEMENT
⑦ EXISTING SHOULDER
⑧ EXISTING HMA OVERLAY

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

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 07/13/2015

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: IL 13/127 (FAP 42)
Section: D9 FOUR LANE 2015-1
County: JACKSON
Location: FROM MURPHYSBORO TO VERGENNE

Comments:

Design Date: 05/18/2015 JAB <-- BY
Modify Date: <-- BY

	ADT	Year
Current:	-	-
Future:	-	-

Facility Type: Other Marked State Route
# of Lanes = 4
Road Class: I
Subgrade Support Rating (SSR): Poor
Construction Year: 2016
Design Period (DP) = 20 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	7,860	89.3%	P = 32%
SU =	250	545	6.2%	S = 45%
MU =	750	395	4.5%	M = 45%
		Struct. Design ADT = 8,800	(2026)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = 0.15
Csu = 132.5
Cmu = 482.53
TF flexible (Actual) = 2.37 (Actual ADT)
TF flexible (Min) = 3.56 (Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv = 0.15
Csu = 143.81
Cmu = 696.42
TF rigid (Actual) = 3.19 (Actual ADT)
TF rigid (Min) = 5.02 (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 3.56
Goto Map
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}) = 84 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 11.50 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 16.75 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 11.50 inches

JPC Pavement

Use TF rigid = 5.02
Edge Support = Tied Shoulder or C.&G.

Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 5.02
IBR value = 3

CRCP Thickness = 8.00 in. (Fig. 54-4.M)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible = 3.56
Goto Map
HMA Overlay Design Thickness = 8.25 in. (Fig. 54-5.U)
Limiting Strain Criterion Thickness = 11.75 in. (Fig. 54-5.V)

Use HMA Overlay Thickness = 8.25 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	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. 09/05/2013)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 07/13/2015

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: US 40 / IL 33 (Fayette Ave.)
Section: (18Z,J)R
County: Effingham
Location: Raney Street to Banker Street
Comments:
Design Date: 02/06/2015 MAD <-- BY
Modify Date: <-- BY

	ADT	Year
Current:	20,100	2013
Future:	25,500	2034

Facility Type: Other Marked State Route
# of Lanes = 4
Road Class: I
Subgrade Support Rating (SSR): Poor
Construction Year: 2018
Design Period (DP) = 20 years

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	22,184	92.6%	P = 32%
SU =	250	479	2.0%	S = 45%
MU =	750	1,294	5.4%	M = 45%
Struct. Design ADT =		23,957	(2028)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT			RIGID PAVEMENT		
Cpv =	0.15		Cpv =	0.15	
Csu =	132.5		Csu =	143.81	
Cmu =	482.53		Cmu =	696.42	
TF flexible (Actual) =	6.21	(Actual ADT)	TF rigid (Actual) =	8.75	(Actual ADT)
TF flexible (Min) =	3.56	(Min ADT Fig. 54-2.C)	TF rigid (Min) =	5.02	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 6.21
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)
Goto Map
HMA Mixture Temp. = 78.5 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 590 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 71 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 12.25 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 16.50 in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness = 12.25 inches

JPC Pavement

Use TF rigid = 8.75
Edge Support = Tied Shoulder or C.&G.
Rigid Pavt Thick. = 9.75 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 8.75
IBR value = 3
CRCP Thickness = 8.75 in. (Fig. 54-4.M)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible = 6.21
Goto Map
HMA Overlay Design Thickness = 9.00 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: 07/13/2015

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE	IL 13/127 (FAP 42)
SECTION	D9 FOUR LANE 2015-1
COUNTY	JACKSON
LOCATION	FROM MURPHYSBORO TO VERGENNES
FACILITY TYPE	NON-INTERSTATE

PROJECT LENGTH			26928 FT	= = > 5.10 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)	11.50 IN	16.75 IN MAX
SHOULDER THICKNESS	8.00 IN	HMA_SD **Standard Design**
POLICY OVERLAY THICKNESS	2.25 IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	3.56	2.37	3.56

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$93.00 / TON
HMA TOP BINDER	$76.00 / TON
HMA LOWER BINDER	$76.00 / TON
HMA BINDER (LEVELING)	$0.00 / TON
HMA SHOULDER	$74.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(11.50")	71,808	SQ YD	$52.82 / SQ YD	$3,792,581 ~
HMA SURFACE COURSE	(2.00")	8,098	TONS	$93.00 / TON	$0
HMA TOP BINDER COURSE	(2.25")	9,244	TONS	$76.00 / TON	$0
HMA LOWER BINDER COURSE	(7.25")	30,748	TONS	$76.00 / TON	$0
HMA SHOULDER	(8.00")	21,447	TONS	$74.00 / TON	$1,587,053 ~
CURB & GUTTER		0	LIN FT	$0.00 / LIN FT	$0
SUBBASE GRAN MATL TY C (TONS)		5,304	TONS	$24.00 / TON	$127,296
IMPROVED SUBGRADE:	Modified Soil	128,407	SQ YD	$3.30 / SQ YD	$423,743
Reserved For User Supplied Item		0	UNITS	$0.00 / UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00 / UNITS	$0
PAVEMENT REMOVAL		71,808	SQ YD	$7.00 / SQ YD	$502,656
SHOULDER REMOVAL		47,872	SQ YD	$5.50 / SQ YD	$263,296

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$6,696,625
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$53,554

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY				$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix	$10.49 / SQ YD
HMA OVERLAY PVMT		(2.25")		$7.85 / SQ YD
HMA SURFACE MIX		(1.50")	Surface Mix	$7.85 / SQ YD
HMA BINDER MIX		(0.75")	eling Binder Mix	$0.00 / SQ YD
HMA OVERLAY SHLD	(Year 30)	(2.25")	Shoulder Mix	$9.32 / SQ YD
HMA OVERLAY SHLD		(2.00")	Shoulder Mix	$8.29 / SQ YD
MILLING (2.00 IN)				$3.00 / SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)	Surface Mix	$80.42 / SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill Surf)	Shoulder Mix	$78.29 / SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill +2.00 ")	Leveling Binder Mix	$70.00 / SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill +2.00 ")	Shoulder Mix	$78.29 / 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	$9,101,446
FLEXIBLE TOTAL ANNUAL COST PER MILE	$72,785

HMA_SD

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE

07/13/15

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%	53,856	LIN FT	$2.00	$107,712	
	CNTR LINE JOINT R&S	100.00%	26,928	LIN FT	$2.00	$53,856	
	RNDM / THRM CRACK R&S	50.00%	29,621	LIN FT	$2.00	$59,242	
	PD PVMT PATCH M&F SURF	0.10%	72	SQ YD	$80.42	$5,790	
	PWFn =	0.8626		PW =	0.8626 X	$226,600	$195,467
YEAR 10							
	LONG SHLD JT R&S	100.00%	53,856	LIN FT	$2.00	$107,712	
	CNTR LINE JOINT R&S	100.00%	26,928	LIN FT	$2.00	$53,856	
	RNDM / THRM CRACK R&S	50.00%	29,621	LIN FT	$2.00	$59,242	
	PD PVMT PATCH M&F SURF	0.50%	359	SQ YD	$80.42	$28,869	
	PWFn =	0.7441		PW =	0.7441 X	$249,679	$185,785
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	119,680	SQ YD	$3.00	$359,040	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	718	SQ YD	$70.00	$50,260	
	HMA OVERLAY PVMT 2.00"	100.00%	71,808	SQ YD	$10.49	$753,146	
	HMA OVERLAY SHLD 2.00 "	100.00%	47,872	SQ YD	$8.29	$396,763	
	PWFn =	0.6419		PW =	0.6419 X	$1,559,209	$1,000,797
YEAR 20							
	LONG SHLD JT R&S	100.00%	53,856	LIN FT	$2.00	$107,712	
	CNTR LINE JOINT R&S	100.00%	26,928	LIN FT	$2.00	$53,856	
	RNDM / THRM CRACK R&S	50.00%	29,621	LIN FT	$2.00	$59,242	
	PD PVMT PATCH M&F SURF	0.10%	72	SQ YD	$80.42	$5,790	
	PWFn =	0.5537		PW =	0.5537 X	$226,600	$125,463
YEAR 25							
	LONG SHLD JT R&S	100.00%	53,856	LIN FT	$2.00	$107,712	
	CNTR LINE JOINT R&S	100.00%	26,928	LIN FT	$2.00	$53,856	
	RNDM / THRM CRACK R&S	50.00%	29,621	LIN FT	$2.00	$59,242	
	PD PVMT PATCH M&F SURF	0.50%	359	SQ YD	$80.42	$28,869	
	PWFn =	0.4776		PW =	0.4776 X	$249,679	$119,248
HMA_SD							
YEAR 30	NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	119,680	SQ YD	$3.00	$359,040	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	1,436	SQ YD	$70.00	$100,520	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	479	SQ YD	$78.29	$37,500	
	HMA OVERLAY PVMT 2.25 "	100.00%	71,808	SQ YD	$7.85	$563,886	
	HMA OVERLAY SHLD 2.25 "	100.00%	47,872	SQ YD	$9.32	$446,359	
	PWFn =	0.4120		PW =	0.4120 X	$1,507,305	$620,990
YEAR 35							
	LONG SHLD JT R&S	100.00%	53,856	LIN FT	$2.00	$107,712	
	CNTR LINE JOINT R&S	100.00%	26,928	LIN FT	$2.00	$53,856	
	RNDM / THRM CRACK R&S	50.00%	29,621	LIN FT	$2.00	$59,242	
	PD PVMT PATCH M&F SURF	0.10%	72	SQ YD	$80.42	$5,790	
	PWFn =	0.3554		PW =	0.3554 X	$226,600	$80,530
YEAR 40							
	LONG SHLD JT R&S	100.00%	53,856	LIN FT	$2.00	$107,712	
	CNTR LINE JOINT R&S	100.00%	26,928	LIN FT	$2.00	$53,856	
	RNDM / THRM CRACK R&S	50.00%	29,621	LIN FT	$2.00	$59,242	
	PD PVMT PATCH M&F SURF	0.50%	359	SQ YD	$80.42	$28,869	
	PWFn =	0.3066		PW =	0.3066 X	$249,679	$76,541
							$2,404,821
	ROUTINE MAINTENANCE ACTIVITY		10.20	Lane Miles	0.00	$0	$0
					MAINTENANCE LIFE-CYCLE COST		$2,404,821
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE		$19,232

PCC PAVEMENT

JPCP

ROUTE			IL 13/127 (FAP 42)	
SECTION			D9 FOUR LANE 2015-1	
COUNTY			JACKSON	
LOCATION			FROM MURPHYSBORO TO VERGENNES	
FACILITY TYPE			NON-INTERSTATE	
PROJECT LENGTH			26928 FT = = >	5.10 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
	5.02	3.19	5.02
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")	71,808	SQ YD	$45.00	/ SQ YD	$3,231,360
PAVEMENT REINFORCEMENT		0	SQ YD	$0.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	80,784	SQ YD	$23.00	/ SQ YD	$1,858,032
PCC SHOULDERS	(9.00" to 9.00")	47,872	SQ YD	$43.00	/ SQ YD	$2,058,496
CURB & GUTTER		0	LIN FT	$0.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(~ 1.74")	5,633	TONS	$24.00	/ TON	$135,192
IMPROVED SUBGRADE:	Modified Soil Width = 41.0'	122,672	SQ YD	$3.30	/ SQ YD	$404,818
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
PAVEMENT REMOVAL		71,808	SQ YD	$7.00	/ SQ YD	$502,656
SHOULDER REMOVAL		47,872	SQ YD	$5.50	/ SQ YD	$263,296

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$8,453,850
RIGID CONSTRUCTION ANNUAL COST PER MILE	$67,606

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")	1.0087		2.50	$7.85	/ SQ YD
HMA SURFACE MIX	(1.50")	1.0052	Surface Mix	1.50	$7.85	/ SQ YD
HMA BINDER MIX	(1.00")	1.0139	eling Binder Mix	1.00	$0.00	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		Shoulder Mix	2.50	$10.36	/ 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	$77.81	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")			Surface Mix	2.50	$83.02	/ 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	$9,746,620
RIGID TOTAL ANNUAL COST PER MILE	$77,945

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 07/13/15

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%	72	SQ YD	$150.00		$10,800	
	PWFn =	0.7441		PW =	0.7441	X	$10,800	$8,036
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	144	SQ YD	$150.00		$21,600	
	PWFn =	0.6419		PW =	0.6419	X	$21,600	$13,864
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	1,436	SQ YD	$150.00		$215,400	
	SHOULDER PATCH CLASS C	0.50%	239	SQ YD	$145.00		$34,655	
	LONGITUDINAL SHLD JT R&S	100.00%	53,856	LIN FT	$2.00		$107,712	
	CENTERLINE JT R&S	100.00%	26,928	LIN FT	$2.00		$53,856	
	PWFn =	0.5537		PW =	0.5537	X	$411,623	$227,906
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	2,154	SQ YD	$150.00		$323,100	
	SHOULDER PATCH CLASS C	1.00%	479	SQ YD	$145.00		$69,455	
	PWFn =	0.4776		PW =	0.4776	X	$392,555	$187,486
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	2,872	SQ YD	$150.00		$430,800	
	SHOULDER PATCH CLASS C	1.50%	718	SQ YD	$145.00		$104,110	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	71,808	SQ YD	$7.85		$563,886	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	47,872	SQ YD	$10.36		$495,954	
	PWFn =	0.4120		PW =	0.4120	X	$1,594,750	$657,016
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	53,856	LIN FT	$2.00		$107,712	
	CENTERLINE JT R&S	100.00%	26,928	LIN FT	$2.00		$53,856	
	RANDOM CRACK R&S	50.00%	26,928	LIN FT	$2.00		$53,856	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	17,232	LIN FT	$2.00		$34,464	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	72	SQ YD	$83.02		$5,977	
	PWFn =	0.3554		PW =	0.3554	X	$255,865	$90,930
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	359	SQ YD	$150.00		$53,850	
	LONGITUDINAL SHLD JT R&S	100.00%	53,856	LIN FT	$2.00		$107,712	
	CENTERLINE JT R&S	100.00%	26,928	LIN FT	$2.00		$53,856	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	25,848	LIN FT	$2.00		$51,696	
	RANDOM CRACK R&S	50.00%	26,928	LIN FT	$2.00		$53,856	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	359	SQ YD	$83.02		$29,804	
	PWFn =	0.3066		PW =	0.3066	X	$350,774	$107,532
								$1,292,770
	ROUTINE MAINTENANCE ACTIVITY		10.20	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$1,292,770
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$10,338

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : **5/20/15 7:31 AM**

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$8,453,850	$6,696,625
		ANNUAL COST PER MILE	$67,606	$53,554
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$1,292,770	$2,404,821
		ANNUAL COST PER MILE	$10,338	$19,232
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$9,746,620	$9,101,446
		ANNUAL COST PER MILE	$77,945	$72,785

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**HMA**	**$72,785**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**JPCP**	**$77,945**	7.1%