Illinois Department of Transportation

To:	Omer Osman	Attn: District Nine
From:	John D. Baranzelli	
Subject:	Pavement Design	
Date:	March 29, 2012	

FAP Route 869 (IL Route 34)
Section 105R-1
Saline County
From Ellis Road to the Levee, north of Harrisburg

We have reviewed the pavement selection for the above captioned section, which was submitted with your memorandum dated March 15, 2012. Based on life cycle cost, the rigid design was the most economical choice for the calculated pavement designs. The district requested the alternate bid option for this project to receive competitive bids. BDE concurs with the alternate bid request. The approved pavement designs are as follows:

IL Route 34 (Pavement Reconstruction)

Option 1:

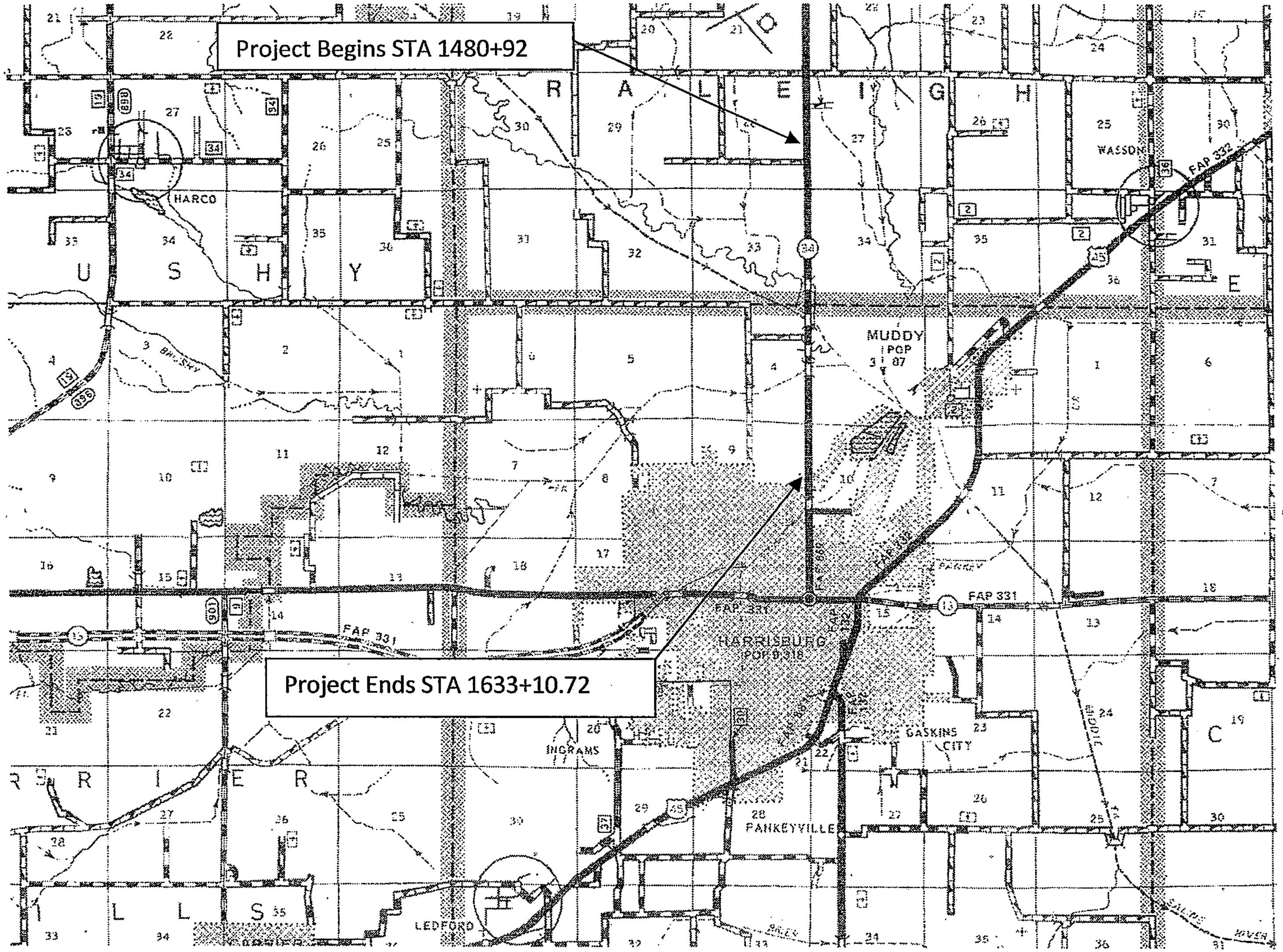
15.75 inches of HMA Pavement
- 2 inches of Polymerized HMA Surface Course, Mix "D", N105
- 2.25 inches of Polymerized HMA binder course, IL-19.0, N105
- 11.5 inches of HMA Binder Course, IL-19.0, N90

16 inches of Lime Stabilization

Option 2:

10.5 inches of Jointed PCC Pavement built 14' wide to eliminate the need for tied shoulders
4 inches of Stabilized Sub-Base
16 inches of Lime Stabilization

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


Project Begins STA 1480+92
Project Ends STA 1633+10.72
HARCO
WASSON
MUDDY
HARRISBURG
GASKINS CITY
PANKEYVILLE
INGRAMS
LEDFORD
FAP 331
FAP 332

PAVEMENT DESIGN CALC CWS

ILL 34 CLASS II STREET DATE 2-22-12

SHEET 1 OF 4

EXIST 2011 ADT		RAW DATA 6-29-11	RAW DATA W/O MINE	2012 (1.50%)
ADT	4300	4604	4504	5225
SU	215	214	214	248
MU	900	1057	57	66
PV	3185	3333	3333	3866

MINE OPERATOR ESTIMATES THEY WILL BE SENDING OUT 900 TRUCKS PER DAY BY JUNE 2012 - ASSUME THIS IS THE MAX CAPACITY FOR THE MINE - REDUCE RAW DATA MU's BY PRESENT MINE TRAFFIC OF 500 TRUCKS

Flexible

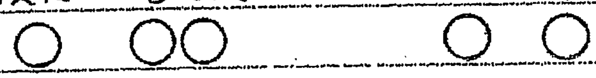
$$\text{NORMAL TF} = 20\left[\frac{(0.15)(0.5)(3866)+(112.06)(0.5)(248)+(385.44)(0.5)(66)}{1{,}000{,}000}\right]$$

NORMAL TF = 0.53 ✓

MINE OPERATOR STATED TRUCKS WERE LOADED SO THAT THE TOTAL WEIGHT OF THE TRUCK IS 80,000 LBS.

ASSUME TYPICAL AXLE LOAD DISTRIBUTION IS THE SAME AS THE EXAMPLE

12K 32K 18K 18K



FLEXIBLE PAVEMENT ESAL VALUES (TABLE 1)

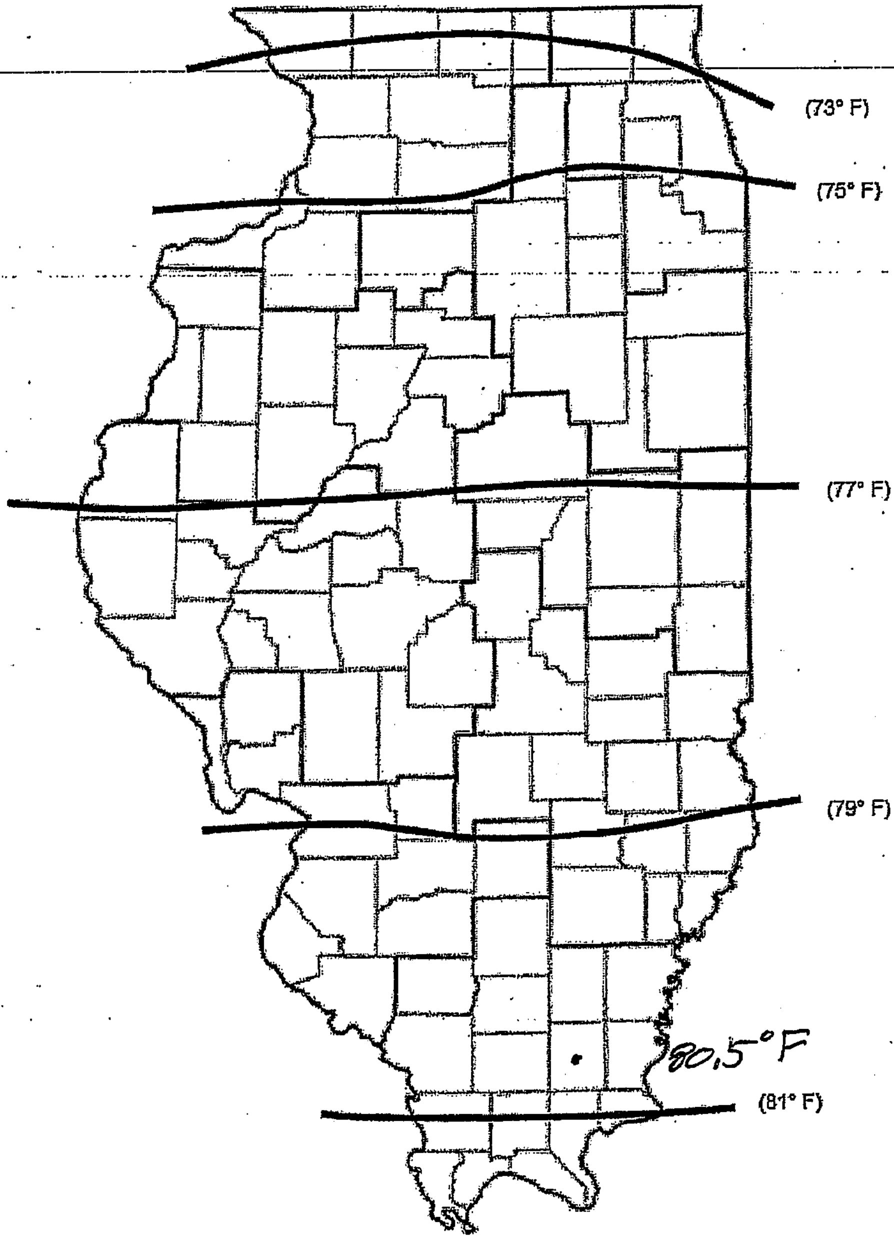
0.19 0.86 1.00 1.00

EQUIVALENCY FACTOR (ESAL/VEH) = 3.05

MINE OPERATOR STATED THE MINE OPERATES 24 HOURS A DAY, 7 DAYS A WEEK - ASSUME HOLIDAYS ON NEW YEARS, 4TH OF JULY, MEMORIAL DAY, THANKSGIVING, & CHRISTMAS - 360 WORKING DAYS

$$\text{MINE TF} = \frac{900 \times 3.05 \times 360 \times 20}{1{,}000{,}000} = 19.76$$

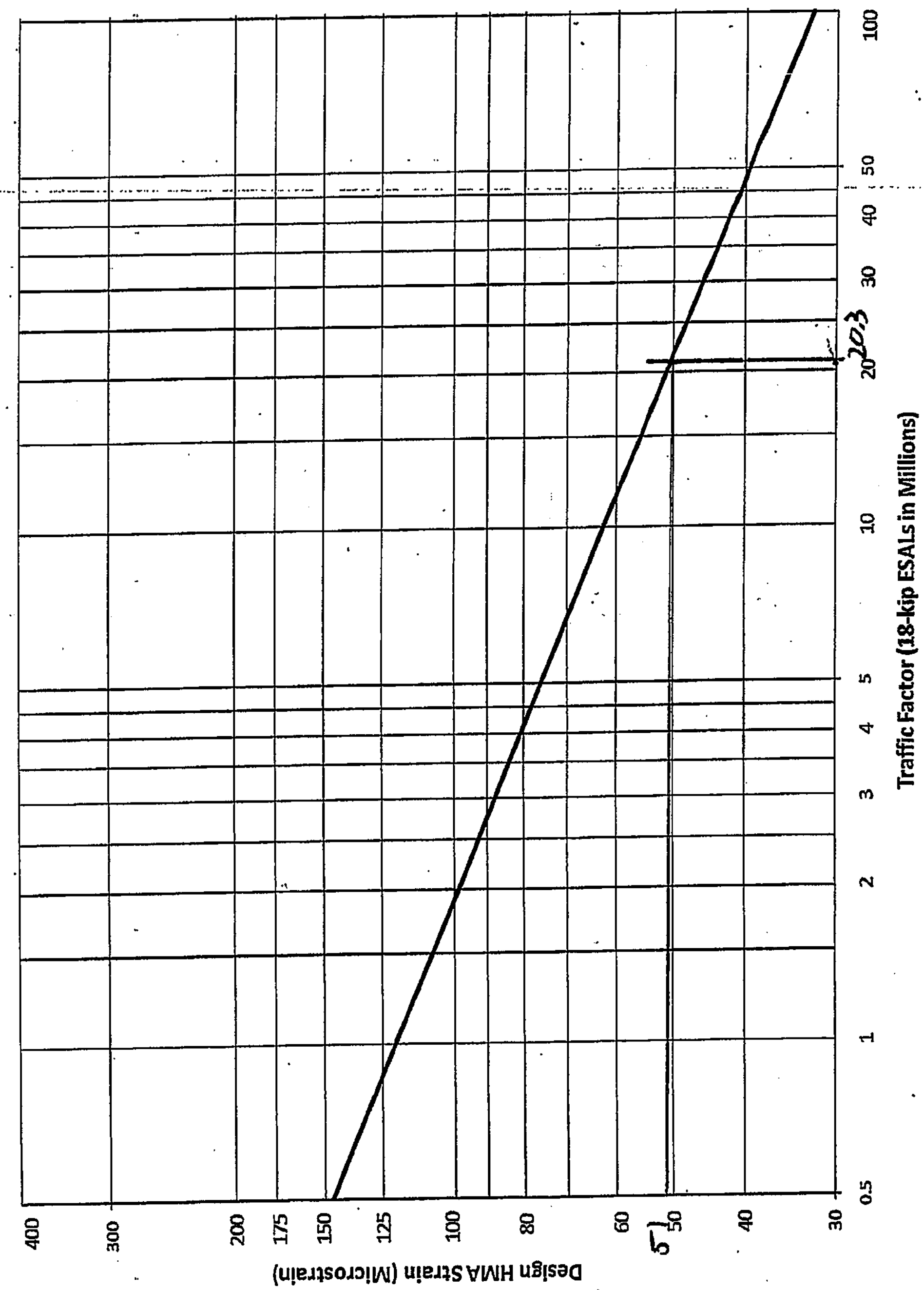
$$\text{DESIGN TF} = 19.76 + 0.53 = 20.29$$



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

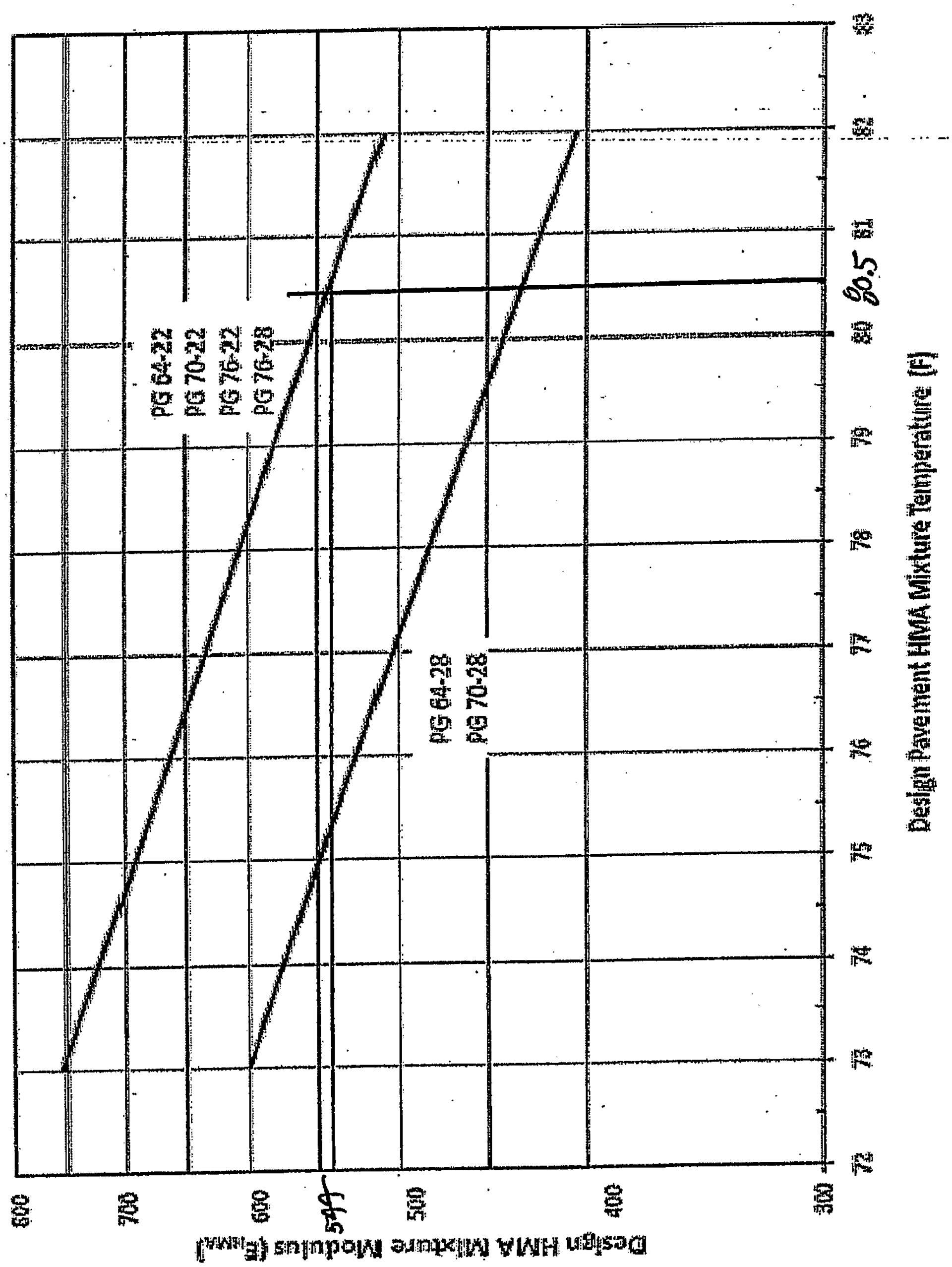
HMA MIXTURE TEMPERATURE
(Mechanistic Design: Flexible Pavement)

Figure 54-5.C



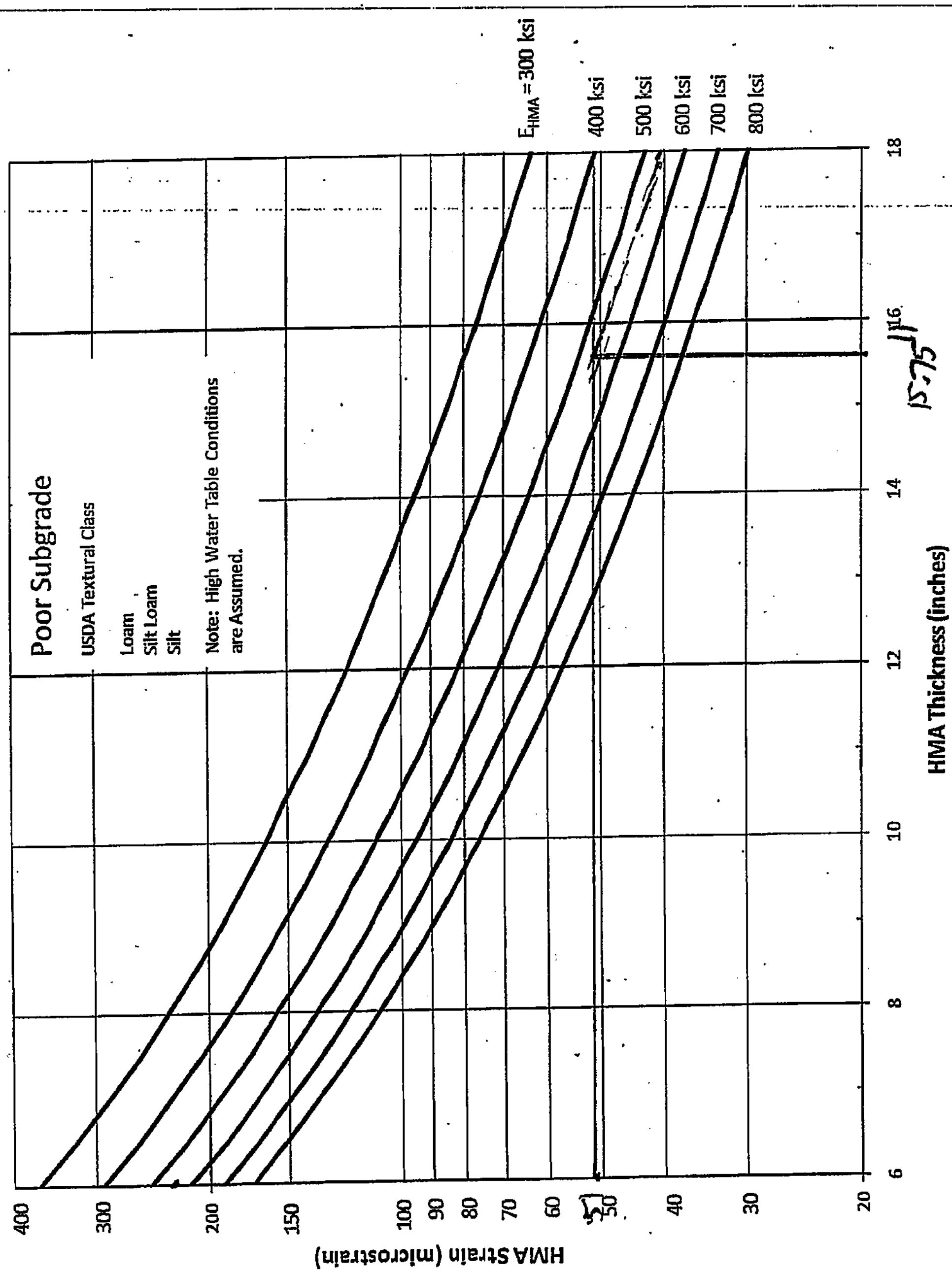
DESIGN HMA STRAIN
(Mechanistic Design: Flexible Pavement)

Figure 54-5.E



HMA MIXTURE MODULUS (E_{HMA})
(Mechanistic Design: Flexible Pavement)

Figure 54-5.D



HMA THICKNESS DESIGN CHART
(Mechanistic Design: Flexible Pavement: SSR = Poor)

Figure 54-5.F

SSR = POOR

BINDER GRADE = PG 64-22

MIX TEMPERATURE = 80.5° ✓ FIG 54-5.C

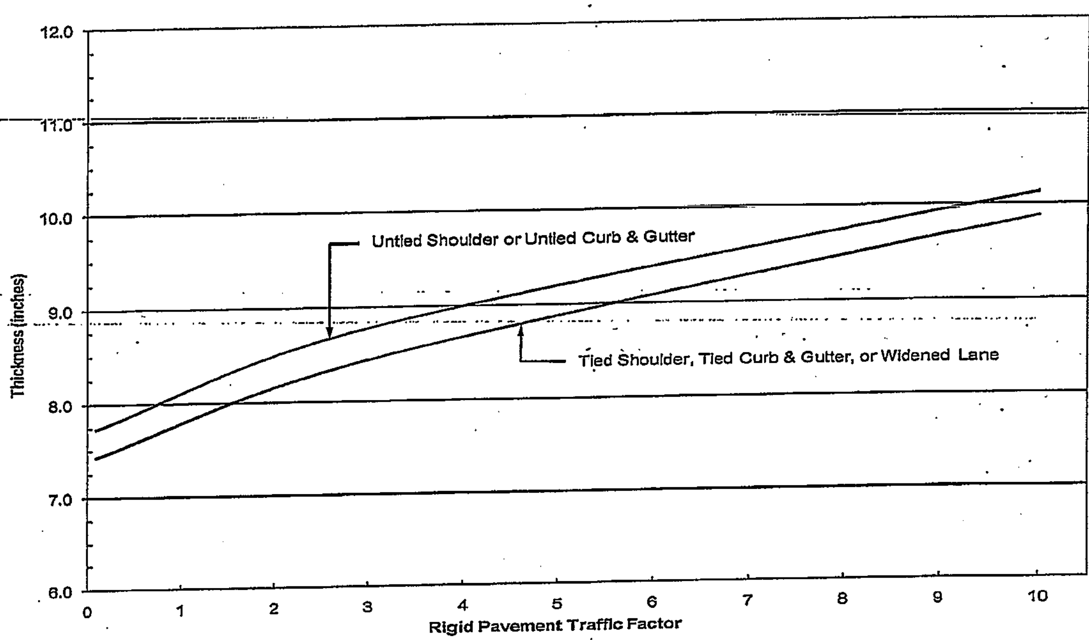
E_{HMA} = 544 ✓ FIG 54-5.D

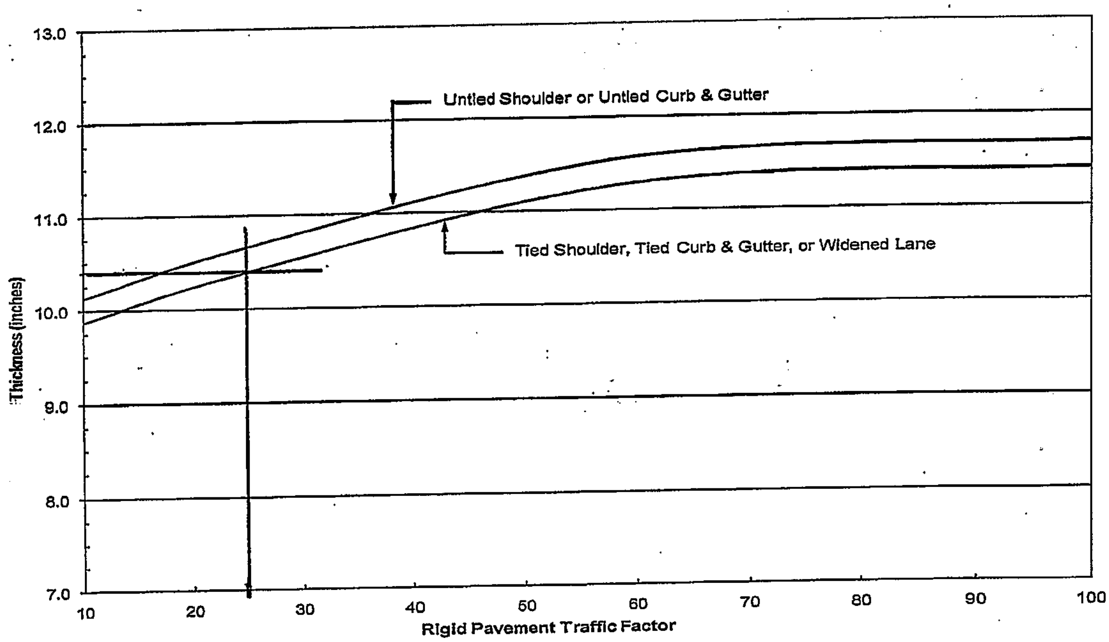
HMA STRAIN = 51 ✓ FIG 54-5.E

THICKNESS = 15.75" ✓ FIG 54-5.F

LIMITING STRAIN = 16.75" ✓ FIG 54-5.I

USE 15.75" ✓





Note: Use of untied shoulder design requires BDE approval. use 10.5"

RIGID PAVEMENT DESIGN CHART
(Mechanistic Design: SSR = Poor)

Figure 54-4.E

PCC PAVEMENT DESIGN

TIED SHOULDER

$$TF = 20\left[\frac{(0.15)(0.5)(3866) + (1357.8)(0.5)(248) + (567.21)(0.5)(66)}{1,000,000}\right]$$

TF = 0.72 ✓

USE THE SAME AXLE LOAD DISTRIBUTION AS HMA

RIDGID PAVEMENT ESAL VALUES (TABLE 1)

0.19 1.49 1.00 1.00

EQUIVALENCY FACTOR (ESAL/VEH) = 3.67 3.68

$$MINE\ TF = \frac{900 \times 3.67 \times 360 \times 20}{1,000,000} = 23.78 \quad 23.85$$

DESIGN TF = 23.78 + 0.72 = 24.50 24.57

POOR SOIL

THICKNESS 10.5" ✓ FIG 54-4.E

PAVEMENT DESIGN — CALC CWS

ILL 34 CLASS II STREET — DATE 2-22-12

EXIST 2011 ADT		RAW DATA 6-29-11	RAW DATA W/O MINE	2012 (1.50%)
ADT	4300	4604	4504	5225
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$$\text{NORMAL TF} = 20\left[\frac{(0.15)(0.5)(3866)+(112.06)(0.5)(248)+(385.44)(0.5)(66)}{1{,}000{,}000}\right]$$

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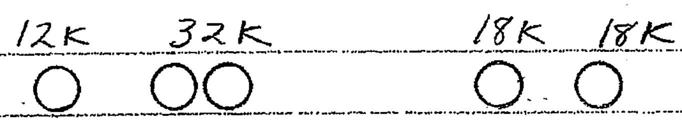

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MINE $TF = \dfrac{900 \times 3.05 \times 360 \times 20}{1,000,000} = 19.76$

DESIGN $TF = 19.76 + 0.53 = 20.29$

SSR = POOR

BINDER GRADE = PG 64-22

MIX TEMPERATURE = 80.5° FIG 54-5.C

E_{HMA} = 544 FIG 54-5.D

HMA STRAIN = 51 FIG 54-5.E

THICKNESS = 15.75" FIG 54-5.F

LIMITING STRAIN = 16.75" FIG 54-5.1

USE 15.75"

PCC PAVEMENT DESIGN

TIED SHOULDER

$$TF = 20\left[\frac{(0.15)(0.5)(3866) + (135.78)(0.5)(248) + (567.21)(0.5)(66)}{1{,}000{,}000}\right]$$

$TF = 0.72$

USE THE SAME AXLE LOAD DISTRIBUTION AS HMA

RIDGID PAVEMENT ESAL VALUES (TABLE 1)

0.19 1.49 1.00 1.00

EQUIVALENCY FACTOR (ESAL/VEH) = 3.67

$$MINE\ TF = \frac{900 \times 3.67 \times 360 \times 20}{1{,}000{,}000} = 23.78$$

DESIGN TF = 23.78 + 0.72 = 24.50

POOR SOIL

THICKNESS 10.5" FIG 54-4.E

Spreadsheet by Uehle - Revised 2011

IDOT MECHANISTIC PAVEMENT DESIGN

Print Date: 02/22/2012

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: ILL 34
Section:
County: Saline
Location: North of Harrisburg

Comments:

Design Date: 02/14/2012 C Stein <-- BY
Modified Date: <-- BY

	ADT	Year
Current:	-	-
Future:	-	-

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: 2012
Design Period (DP) = 20 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual % of Total ADT	% of ADT in Design Lane	
PV =	0	3,866	92.5%	P =	50%
SU =	250	248	5.9%	S =	50%
MU =	750	66	1.6%	M =	50%
Struct. Design ADT =		4,180	(2022)		

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = -
Csu = -
Cmu = -
TF flexible (Actual) = - (Actual ADT)
TF flexible (Min) = - (Min ADT Fig 54-2.C)

RIGID PAVEMENT

Cpv = -
Csu = -
Cmu = -
TF rigid (Actual) = - (Actual ADT)
TF rigid (Min) = - (Min ADT Fig 54-2.C)

ADDITIONAL DESIGN INPUTS AND FLEXIBLE & RIGID PAVEMENT THICKNESS CALCULATIONS

HMA Pavement

Use TF flexible = 20.29
PG Grade Lower Binder Lifts = PG 64-22 (Figure 53-4.R)
Goto Map
HMA Mixture Temp. = 80.5 deg. F (Figure 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 544 ksi (Figure 54-5.D)
Design HMA Strain (ε_{HMA}) = 51 (Figure 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 15.53 in. (Figure 54-5.F)
Limiting Strain Criterion Thickness = 16.75 in. (Figure 54-5.I)
Use Full Depth HMA Thickness = 15.53 inches

15.75

JPCP Pavement

Use TF rigid = 24.50
Edge Support = Tied Shoulder or C.&G.
Rigid Pavt Thick. = 10.40 in. (Figure 54-4.E)
10.50

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 Supplemental 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 (Figure 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: FULL-DEPTH FLEXIBLE PAVEMENT vs PCC PAVEMENT

FULL-DEPTH HMA PAVEMENT & HMA OVERLAY OF RUBBLIZED PCC PAVEMENT

ROUTE			I 34
SECTION			103R-1
COUNTY			Saline
LOCATION			North of Harrisburg
FACILITY TYPE			NON-INTERSTATE
PROJECT LENGTH			10100 FT ==> 1.91 Miles
# OF CENTERLINES			1 CL
# OF LANES			2 LANES
# OF EDGES			2 EP
LANE WIDTH - AVERAGE			14 FT
SHLDER WIDTH	HMA	Inside	0 FT
	HMA	Outside	0 FT
	AGG	Inside	0 FT
	AGG	Outside	0 FT
SHOULDER THICKNESS			8.00 IN
PAVEMENT THICKNESS (FLEXIBLE)			15.75 IN — 17.00 IN MAX
POLICY OVERLAY THICKNESS			2.25 IN — Standard Design

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	20.82	1.00	20.82

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$100.19 /TON
HMA BINDER	$80.15 /TON
HMA BINDER (LEVELING)	$80.00 /TON
HMA SHOULDER	$72.00 /TON

INITIAL COSTS

Selection Status: OK

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL DEPTH)	(15.75")	31,422	SQ YD	$72.98 /SQ YD	2,293,184
HMA SURFACE COURSE	(2.00")	3,540	TONS	$0.00 /TON	0
		31,422	SQ YD	$0.00 /SQ YD	0
HMA BINDER COURSE	(13.75")	25,473	TONS	$0.00 /TON	0
		31,422	SQ YD	$0.00 /SQ YD	0
HMA SHOULDER MIX	(8.00")	0	TONS	$0.00 /TON	0
		0	SQ YD	$0.00 /SQ YD	0
SHOULDER - AGG		0	TONS	$25.00 /TON	0
SUBBASE GRAN MATL TY C (TONS)		404	TONS	$0.00 /TON	0
PROCESS LIME MODIFIED SOILS (SQ YD)		35,507	SQ YD	$8.28 /SQ YD	293,288
Reserved For User Supplied Item		0		$0.00	0

Note: * Denotes User Supplied Quantity

CONSTRUCTION INITIAL COST $2,585,482
CONSTRUCTION ANNUAL COST $55,147

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			$0.00 /LANE-MILE/YEAR
HMA OVERLAY PVMT SURF	(2.00")	(HMA SURFACE MIX)	$11.22 /SQ YD
HMA OVERLAY PVMT	(2.25")		$11.77 /SQ YD
HMA SURFACE MIX	(1.50")	(HMA SURFACE MIX)	$8.41 /SQ YD
HMA BINDER MIX	(0.75")	(Use Leveling Binder)	$3.36 /SQ YD
HMA OVERLAY SHLD	(2.00")	(HMA SHLD MIX)	$8.06 /SQ YD
HMA OVERLAY SHLD (Year 30)	(2.25")	(HMA SHLD MIX)	$9.07 /SQ YD
MILLING (2.00 IN)			$3.00 /SQ YD
PARTIAL DEPTH PVMT PATCH (M&F Surf)		(HMA SURFACE MIX)	$81.22 /SQ YD
PARTIAL DEPTH SHLD PATCH (M&F Surf)		(HMA SHLD MIX)	$78.06 /SQ YD
PARTIAL DEPTH PVMT PATCH (M&F FR +2.00")		(HMA BINDER)	$78.96 /SQ YD
PARTIAL DEPTH SHLD PATCH (M&F FR +2.00")		(HMA SHLD MIX)	$78.06 /SQ YD
LONGITUDINAL SHOULDER JOINT ROUTE & SEAL			$2.00 /LIN FT
CENTERLINE JOINT ROUTE & SEAL			$2.00 /LIN FT
RANDOM / THERMAL CRACK ROUTE & SEAL		(100% Rehab = 110.07 / Station / Lane)	$2.00 /LIN FT

TOTAL LIFE CYCLE COST: $3,398,077
ANNUAL COST PER MILE: $72,452

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 03/15/12

List Named Cells

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

MAINTENANCE COSTS: ITEM		%	QUANTITY	UNIT COST	COST	PRESENT WORTH
YEAR 5						
LONG SHLD JT R&S	LIN FT	100.00%	20,200	2.00	40,400	
CNTR LINE JOINT R&S	LIN FT	100.00%	10,100	2.00	20,200	
RNDM / THRM CRACK R&S	LIN FT	50.00%	11,110	2.00	22,220	
PD PVMT PATCH M&F SURF	SQ YD	0.10%	31	81.22	2,518	
	PWFn =	0.8626		0.8626 X	85,338	73,613
YEAR 10						
LONG SHLD JT R&S	LIN FT	100.00%	20,200	2.00	40,400	
CNTR LINE JOINT R&S	LIN FT	100.00%	10,100	2.00	20,200	
RNDM / THRM CRACK R&S	LIN FT	50.00%	11,110	2.00	22,220	
PD PVMT PATCH M&F SURF	SQ YD	0.50%	157	81.22	12,751	
	PWFn =	0.7441		0.7441 X	95,571	71,114
YEAR 15						
MILL PVMT & SHLD 2.00"	SQ YD	100.00%	31,422	3.00	94,266	
PD PVMT PATCH M&F ADD'L 2.00"	SQ YD	1.00%	314	78.96	24,793	
HMA OVERLAY PVMT 2.00"	SQ YD	100.00%	31,422	11.22	352,489	
HMA OVERLAY SHLD 2.00"	SQ YD	100.00%	0	8.06	0	
	PWFn =	0.6419		0.6419 X	471,548	302,689
YEAR 20						
LONG SHLD JT R&S	LIN FT	100.00%	20,200	2.00	40,400	
CNTR LINE JOINT R&S	LIN FT	100.00%	10,100	2.00	20,200	
RNDM / THRM CRACK R&S	LIN FT	50.00%	11,110	2.00	22,220	
PD PVMT PATCH M&F SURF	SQ YD	0.10%	31	81.22	2,518	
	PWFn =	0.5537		0.5537 X	85,338	47,250
YEAR 25						
LONG SHLD JT R&S	LIN FT	100.00%	20,200	2.00	40,400	
CNTR LINE JOINT R&S	LIN FT	100.00%	10,100	2.00	20,200	
RNDM / THRM CRACK R&S	LIN FT	50.00%	11,110	2.00	22,220	
PD PVMT PATCH M&F SURF	SQ YD	0.50%	157	81.22	12,751	
	PWFn =	0.4776		0.4776 X	95,571	45,645
YEAR 30 NON-INTERSTATE						
MILL PVMT & SHLD 2.00"	SQ YD	100.00%	31,422	3.00	94,266	
PD PVMT PATCH M&F ADD'L 2.00"	SQ YD	2.00%	628	78.96	49,587	
PD SHLD PATCH M&F ADD'L 2.00"	SQ YD	1.00%	0	78.06	0	
HMA OVERLAY PVMT 2.25"	SQ YD	100.00%	31,422	11.77	369,945	
HMA OVERLAY SHLD 2.25"	SQ YD	100.00%	0	9.07	0	
	PWFn =	0.4120		0.4120 X	513,798	211,678
YEAR 35						
LONG SHLD JT R&S	LIN FT	100.00%	20,200	2.00	40,400	
CNTR LINE JOINT R&S	LIN FT	100.00%	10,100	2.00	20,200	
RNDM / THRM CRACK R&S	LIN FT	50.00%	11,110	2.00	22,220	
PD PVMT PATCH M&F SURF	SQ YD	0.10%	31	81.22	2,518	
	PWFn =	0.3554		0.3554 X	85,338	30,328
YEAR 40						
LONG SHLD JT R&S	LIN FT	100.00%	20,200	2.00	40,400	
CNTR LINE JOINT R&S	LIN FT	100.00%	10,100	2.00	20,200	
RNDM / THRM CRACK R&S	LIN FT	50.00%	11,110	2.00	22,220	
PD PVMT PATCH M&F SURF	SQ YD	0.50%	157	81.22	12,751	
	PWFn =	0.3066		0.3066 X	95,571	29,298
						$811,595
X ROUTINE MAINTENANCE ACTIVITY			3.83	0.00	0	

TOTAL MAINTANENCE LIFE CYCLE COST $811,595
45 YEARS CRFn = 0.040785 MAINTANENCE ANNUAL COST PER MILE $17,304

PCC PAVEMENT TYPE \ REHAB SCHEDULE

JPCP

ROUTE			I 34
SECTION			103R-1
COUNTY			Saline
LOCATION			North of Harrisburg
FACILITY TYPE			NON-INTERSTATE
PROJECT LENGTH			10100 FT ==> 1.91 Miles
# OF CENTERLINES			1 CL
# OF LANES			2 LANES
# OF EDGES			2 EP
LANE WIDTH - AVERAGE			14 FT
SHLDER WIDTH	PCC	Inside	0 FT
	PCC	Outside	0 FT
	AGG	Inside	0 FT
	AGG	Outside	0 FT
SHOULDER THICKNESS			10.50 IN
PAVEMENT THICKNESS (RIGID)	JPCP		10.50 IN — TIED SHLD
POLICY OVERLAY THICKNESS			2.50 IN

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	10.50	1.00	10.50
	Based on Traffic Factor, The Pavement Type is		JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
PAVEMENT	(10.50")	31,422	SQ YD	$46.38 /SQ YD	$1,457,352
SUB BASE (STABILIZED)	(4.00")	34,789	SQ YD	$18.06 /SQ YD	$628,289
SHOULDERS	(10.50")	0	SQ YD	$0.00 /SQ YD	$0
SHOULDER - AGG	(10.50")	0	TONS	$0.00 /TON	0
SUBBASE GRAN MATL TY C	(~-2.26")	(433)	TONS	$0.00 /TON	$0
SHOULDER SEAL		20,200	LIN FT	$2.00 /LIN FT	$40,400
PROCESS LIME MODIFIED SOILS		35,270	SQ YD	$8.29 /SQ YD	$292,388
STEEL for PAVEMENT REINFORCEMENT		0	SQ YD	$0.00 /SQ YD	$0
Reserved For User Supplied Item		0		$0.00	$0

Note: * Denotes User Supplied Quantity

CONSTRUCTION INITIAL COST $2,418,429
CONSTRUCTION ANNUAL COST PER MILE $51,564

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")		$12.90 /SQ YD
HMA SURFACE MIX	(1.50")	(HMA SURFACE MIX)	$8.41 /SQ YD
HMA BINDER MIX	(1.00")	Use Leveling Binder	$4.49 /SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		$10.08 /SQ YD
CLASS A PAVEMENT PATCHING			$200.00 /SQ YD
CLASS B PAVEMENT PATCHING			$170.00 /SQ YD
CLASS C SHOULDER PATCHING			$145.00 /SQ YD
PARTIAL DEPTH PVMT PATCH (M&F FD HMA Surf)		(HMA SURFACE MIX)	$78.41 /SQ YD
PARTIAL DEPTH PVMT PATCH (M&F FD HMA 2.50")		(HMA SURFACE MIX)	$84.02 /SQ YD
LONGITUDINAL SHOULDER JOINT ROUTE & SEAL			$2.00 /LIN FT
CENTERLINE JOINT ROUTE & SEAL			$2.00 /LIN FT
REFLECTIVE TRANSVERSE CRACK ROUTE & SEAL			$2.00 /LIN FT
RANDOM CRACK ROUTE & SEAL		(100% Rehab = 100.37 / Station / Lane)	$2.00 /LIN FT

TOTAL LIFE CYCLE COST $2,932,437
ANNUAL COST PER MILE $62,524

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 03/15/12

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

MAINTENANCE COSTS: ITEM		%	QUANTITY	UNIT COST	COST	PRESENT WORTH
YEAR 10						
PAVEMENT PATCH CLASS B	SQ YD	0.10%	31	170.00	5,270	
	PWFn =	0.7441		0.7441 X	5,270	3,921
YEAR 15						
PAVEMENT PATCH CLASS B	SQ YD	0.20%	63	170.00	10,710	
	PWFn =	0.6419		0.6419 X	10,710	6,874
YEAR 20						
PAVEMENT PATCH CLASS B	SQ YD	2.00%	628	170.00	106,760	
SHOULDER PATCH CLASS C	SQ YD	0.50%	0	145.00	0	
LONGITUDINAL SHLD JT R&S	LIN FT	100.00%	20,200	2.00	40,400	
CENTERLINE JT R&S	LIN FT	100.00%	10,100	2.00	20,200	
	PWFn =	0.5537	PW =	0.5537 X	167,360	92,663
YEAR 25						
PAVEMENT PATCH CLASS B	SQ YD	3.00%	943	170.00	160,310	
SHOULDER PATCH CLASS C	SQ YD	1.00%	0	145.00	0	
	PWFn =	0.4776	PW =	0.4776 X	160,310	76,565
YEAR 30 NON-INTERSTATE						
PAVEMENT PATCH CLASS B	SQ YD	4.00%	1,257	170.00	213,690	
SHOULDER PATCH CLASS C	SQ YD	1.50%	0	145.00	0	
HMA POLICY OVERLAY 2.5" (PVMT)	SQ YD	100.00%	31,422	12.90	405,402	
HMA POLICY OVERLAY 2.5" (SHLD)	SQ YD	100.00%	0	10.08	0	
	PWFn =	0.4120	PW =	0.4120 X	619,092	255,058
YEAR 35 NON-INTERSTATE						
LONGITUDINAL SHLD JT R&S	LIN FT	100.00%	20,200	2.00	40,400	
CENTERLINE JT R&S	LIN FT	100.00%	10,100	2.00	20,200	
RANDOM CRACK R&S	LIN FT	50.00%	10,100	2.00	20,200	
REFLECTIVE TRANSVERSE CRACK R&S	LIN FT	40.00%	7,538	2.00	15,076	
PD PVMT PATCH M&F HMA 2.50"	SQ YD	0.10%	31	84.02	2,605	
	PWFn =	0.3554		0.3554 X	98,481	34,999
YEAR 40 NON-INTERSTATE						
PAVEMENT PATCH CLASS B	SQ YD	0.50%	157	170.00	26,690	
LONGITUDINAL SHLD JT R&S	LIN FT	100.00%	20,200	2.00	40,400	
CENTERLINE JT R&S	LIN FT	100.00%	10,100	2.00	20,200	
REFLECTIVE TRANSVERSE CRACK R&S	LIN FT	50.00%	11,306	2.00	22,612	
RANDOM CRACK R&S	LIN FT	50.00%	10,100	2.00	20,200	
PD PVMT PATCH M&F HMA 2.50"	SQ YD	0.50%	157	84.02	13,192	
	PWFn =	0.3066		0.3066 X	143,294	43,928
						$514,008
X ROUTINE MAINTENANCE ACTIVITY			3.83	0.00	0	

TOTAL MAINTANENCE LIFE CYCLE COST $514,008
45 YEARS CRFn = 0.040785 MAINTANENCE ANNUAL COST PER MILE $10,959

LIFE CYCLE COST ANALYSIS: SUMMARY

Calculated / Revised: 2:04 PM 10/06/2011

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$2,418,429	$2,585,482
		ANNUAL COST PER MILE	$51,564	$55,147
MAINTANENCE	LIFE CYCLE COST	PRESENT WORTH	$514,008	$811,595
		ANNUAL COST PER MILE	$10,959	$17,304
TOTAL	LIFE CYCLE COST	PRESENT WORTH	$2,932,437	$3,398,077
		ANNUAL COST PER MILE	$62,524	$72,452
		MATERIAL TYPE / PERCENTAGE	JPCP:	15.88%