



Illinois Department of Transportation

To: Paul Loete Attn: District Three
From: John D. Baranzelli
Subject: Pavement Design
Date: January 27, 2014

A handwritten signature in black ink, appearing to be 'JDB', enclosed in a hand-drawn oval.

FAP Route 591 (US 34)
Section (13C & 13)R&T
Kendall County
From east of IL 47 in Yorkville to west of Orchard Road in Oswego

We have reviewed the pavement design for the above captioned section submitted to BDE on January 10, 2014. The project will reconstruct US 34 with a cross section of four 12 foot lanes, a 22 foot raised median and curb & gutter. The project will omit the stabilized sub-base due to a storm sewer system and curb & gutter. The life cycle cost analysis favored the rigid design by more than 10%. The approved pavement design is as follows:

US 34 from IL 47 to Orchard Road [new pavement]

10.25 inches of Jointed PCC Pavement with Tied PCC Curb & Gutter
12 inches of Aggregate Subgrade Improvement

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



Illinois Department of Transportation

To: Dave Broviak
From: Brad Duncan
Subject: Pavement Design
Date: December 9, 2013

FAP 591 (US 34)
Section (13C & 13)R & T
Kendall County
Contract No. 66884
D3 #1216
File #1185

This project consists of the reconstruction of US Route 34 to a 4-lane typical section with median/turn lanes from IL Route 47 to Orchard Road. The proposed design for US Route 34 includes storm sewer and B6.24 curb and gutter. A pavement design was originally approved for a 9.75" jointed PCC pavement with tied shoulders (see attachment). Since there is a 5+ year time lapse from the previous approval, BDE policy now requires the pavement design to be revisited.

The results of the mechanistic pavement design indicate that a PCC plain, jointed design of 10.25" or a full-depth bituminous design of 12.75" will be required. The PCC design has an annual life-cycle cost of \$83,060 per mile. The bituminous design has an annual life-cycle cost of \$130,466 per mile. The results indicate a $\pm 30\%$ lower cost for the PCC option versus the HMA option.

Calculations to determine pavement thicknesses and life-cycle costs have been attached and electronic files have been e-mailed for review. While ADT estimates for this current pavement design were similar to those used in the 2007 design, there was an increase in estimated truck traffic from 6.7% to 12% resulting in an increase in the PCC pavement thickness previously approved. The initial costs for both options do not include an improved subgrade since both options will be using Aggregate Subgrade Improvement 12". The district Bureau of Materials and Construction did not require a 4" stabilized subbase. Figure 54-4 D of the BDE Manual also allows the 4" stabilized subbase to be omitted for urban sections with curb & gutter, a storm sewer system and an improved subgrade. This item was not included in the initial PCC option cost. The district is requesting the approval of the 10.25" tied PCC option.

The following facts and assumptions were used in the design:

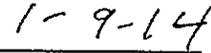
- Design Traffic was based on 2040 projections (CMAP)
- Design Period of 20 years
- Poor Sub-grade
- Polymerized SMA surface mix
- Polymerized 4.75mm level binder
- Polymerized SMA for the lower binder lifts

QA/QC Review



Studies & Plans Engineer

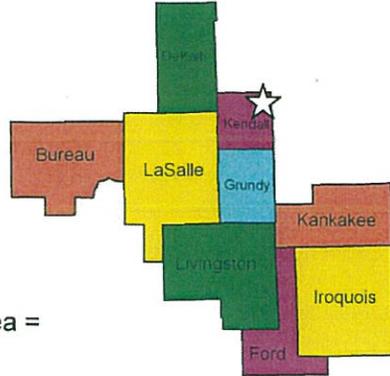
Date



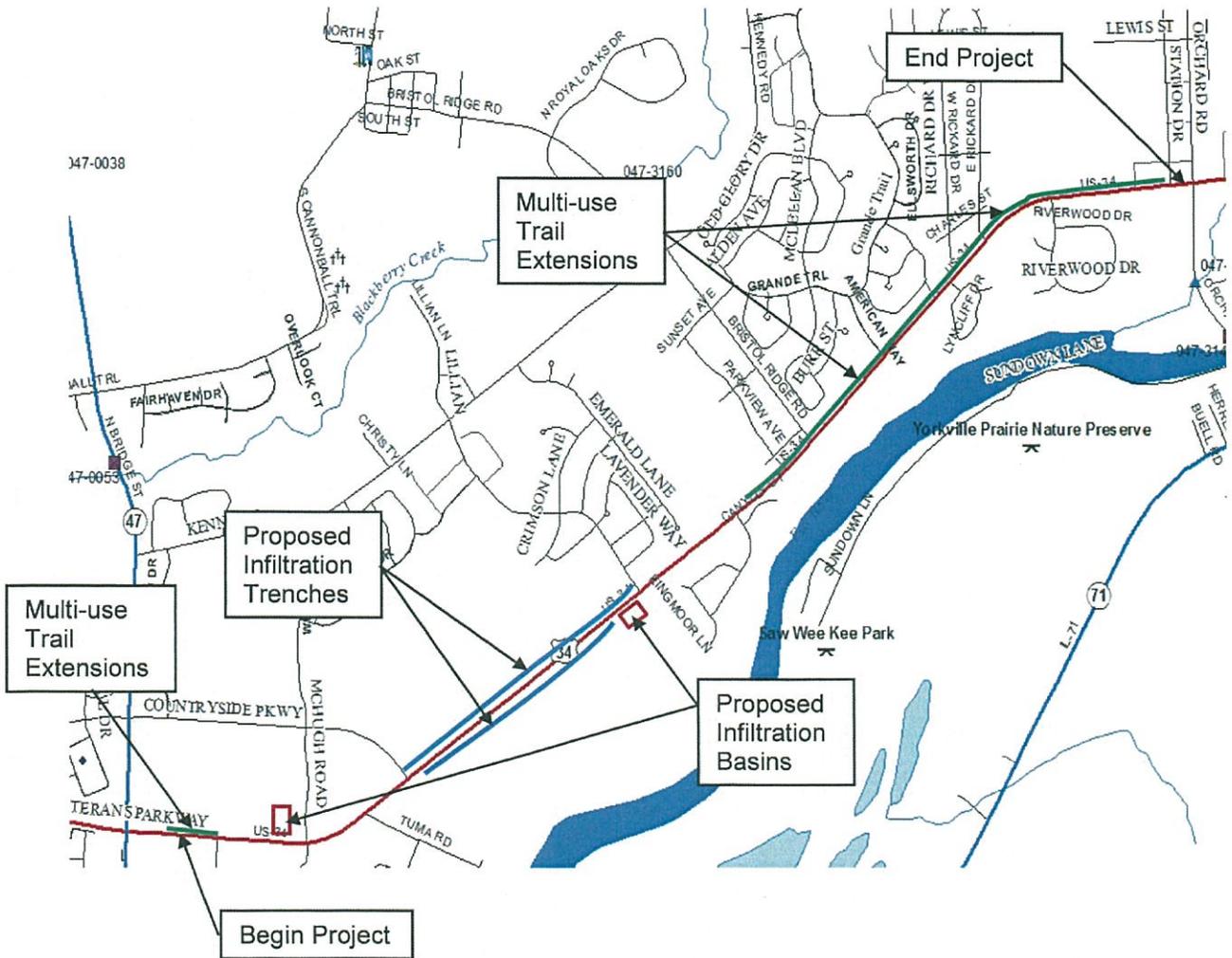
Date

Project Location Map

FAP Route 591 (US 34)
Section (13C & 13)R & T
Kendall County
Reconstruction
IL 47 to Orchard Rd W. of Oswego
Contract No. 66884
Addendum 1



Project Area =



D3# 1216

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: FAP 591 (US 34)	Comments:			
Section: (13C & 13)R & T	Design Date: BDD	<-- BY		
County: Kendall	Modify Date:	<-- BY		
Location: IL 47 to Orchard Rd. West of Oswego		Current:	14,967	2013
Facility Type: Other Marked State Route		Future:	31,000	2040
# of Lanes = 4		Structural Design Traffic		
Road Class: I		Minimum ADT	Actual ADT	Actual % of Total ADT
Subgrade Support Rating (SSR): Poor		PV = 0	19,221	87.0%
Construction Year: 2015		SU = 250	221	1.0%
Design Period (DP) = 20 years		MU = 750	2,651	12.0%
		Struct. Design ADT =	22,093	(2025)
				P = 32%
				S = 45%
				M = 45%

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = 0.15
 Csu = **132.5**
 Cmu = **482.53**
 TF flexible (Actual) = 11.80 (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) = 16.92 (Actual ADT)
 TF rigid (Min) = 5.02 (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement		JPC Pavement	
Use TF flexible = 11.80	PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)	Use TF rigid = 16.92	Edge Support = Tied Shoulder or C.&G.
HMA Mixture Temp. = 75.5 deg. F (Fig. 54-5.C)	Design HMA Mixture Modulus (E _{HMA}) = 680 ksi (Fig. 54-5.D)	Rigid Pavt Thick. = 10.25 in. (Fig. 54-4.E)	
Design HMA Strain (ε _{HMA}) = 59 (Fig. 54-5.E)	Full Depth HMA Design Thickness = 12.75 in. (Fig. 54-5.F)	CRC Pavement	
Limiting Strain Criterion Thickness = 14.75 in. (Fig. 54-5.I)	Use Full-Depth HMA Thickness = 12.75 inches	Use TF rigid = 16.92	IBR value = 3
		CRCP Thickness = 9.75 in. (Fig. 54-4.M)	

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC		Unbonded Concrete Overlay	
Use TF flexible = 11.80	HMA Overlay Design Thickness = 10.00 in. (Fig. 54-5.U)	Review 54-4.03 for limitations and special considerations.	
Limiting Strain Criterion Thickness = 999.00 inches	Use HMA Overlay Thickness = 999.00 inches	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 / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE **FAP 591 (US 34)**
 SECTION **(13C & 13)R & T**
 COUNTY **Kendall**
 LOCATION **IL 47 to Orchard Rd. West of Oswego**

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **18774 FT ==> 3.56 Miles**
 # OF CENTERLINES **2 CL**
 # OF LANES **4 LANES**
 # OF EDGES **4 EP**
 LANE WIDTH - AVERAGE **12 FT**
 SHOULDER WIDTH HMA Inside **0 FT**
 HMA Outside **0 FT**
 Total Width of Paved Shoulders **0 FT**

PAVEMENT THICKNESS (FLEXIBLE) **12.75 IN 14.75 IN MAX**
 SHOULDER THICKNESS **0.00 IN 14.75 IN Standard Design**
 POLICY OVERLAY THICKNESS **2.25 IN**

FLEX PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		7.11	11.16	11.16

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	\$109.39 / TON
HMA TOP BINDER	\$90.74 / TON
HMA LOWER BINDER	\$90.74 / TON
HMA BINDER (LEVELING)	\$85.00 / TON
HMA SHOULDER	\$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(12.75")	100,128 SQ YD *	\$69.76 / SQ YD	\$0
HMA SURFACE COURSE	(2.00")	14,200 TONS *	\$109.39 / TON	\$1,553,338 ~
HMA TOP BINDER COURSE	(2.25")	17,800 TONS *	\$90.74 / TON	\$1,615,172 ~
HMA LOWER BINDER COURSE	(8.50")	60,300 TONS *	\$90.74 / TON	\$5,471,622 ~
HMA SHOULDER	(0.00")	0 TONS	\$72.00 / TON	\$0 ~
CURB & GUTTER		0 LIN FT	\$30.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C (TONS)		0 TONS *	\$25.00 / TON	\$0
IMPROVED SUBGRADE:	Aggregate	0 SQ YD *	\$7.00 / SQ YD	\$0
Reserved For User Supplied Item		0 UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item		0 UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL		100,128 SQ YD	\$0.00 / SQ YD	\$0
SHOULDER REMOVAL		0 SQ YD	\$0.00 / SQ YD	\$0

Note: * Denotes User Supplied Quantity
 FLEXIBLE CONSTRUCTION INITIAL COST \$8,640,132
 FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE \$99,106

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			\$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix	\$12.34 / SQ YD
HMA OVERLAY PVMT	(2.25")	Surface Mix	\$12.85 / SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	\$9.24 / SQ YD
HMA BINDER MIX	(0.75")	Leveling Binder Mix	\$3.62 / SQ YD
HMA OVERLAY SHLD (Year 30)	(2.25")	Shoulder Mix	\$0.00 / SQ YD
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	\$0.00 / SQ YD
MILLING (2.00 IN)			\$3.00 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf)		Surface Mix	\$82.25 / SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill Surf)		Shoulder Mix	\$0.00 / 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	\$0.00 / SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL			\$1.60 / LIN FT
CENTERLINE JOINT ROUT & SEAL			\$1.85 / LIN FT
RANDOM / THERMAL CRACK ROUT & SEAL (100% Rehab = 110.00' / Station / Lane)			\$2.00 / LIN FT

FLEXIBLE TOTAL LIFE-CYCLE COST \$11,372,343
 FLEXIBLE TOTAL ANNUAL COST PER MILE \$130,446

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%	75,096	LIN FT	\$1.60	\$120,154	
	CNTR LINE JOINT R&S	100.00%	37,548	LIN FT	\$1.85	\$69,464	
	RNDM / THRM CRACK R&S	50.00%	41,303	LIN FT	\$2.00	\$82,606	
	PD PVMT PATCH M&F SURF	0.10%	100	SQ YD	\$82.25	\$8,225	
	PWFn =	0.8626		PW =	0.8626 X	\$280,449	\$241,918
YEAR 10							
	LONG SHLD JT R&S	100.00%	75,096	LIN FT	\$1.60	\$120,154	
	CNTR LINE JOINT R&S	100.00%	37,548	LIN FT	\$1.85	\$69,464	
	RNDM / THRM CRACK R&S	50.00%	41,303	LIN FT	\$2.00	\$82,606	
	PD PVMT PATCH M&F SURF	0.50%	501	SQ YD	\$82.25	\$41,208	
	PWFn =	0.7441		PW =	0.7441 X	\$313,432	\$233,223
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	100,128	SQ YD	\$3.00	\$300,384	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	1,001	SQ YD	\$79.52	\$79,600	
	HMA OVERLAY PVMT 2.00"	100.00%	100,128	SQ YD	\$12.34	\$1,235,255	
	HMA OVERLAY SHLD 2.00 "	100.00%	0	SQ YD	\$0.00	\$0	
	PWFn =	0.6419		PW =	0.6419 X	\$1,615,239	\$1,036,760
YEAR 20							
	LONG SHLD JT R&S	100.00%	75,096	LIN FT	\$1.60	\$120,154	
	CNTR LINE JOINT R&S	100.00%	37,548	LIN FT	\$1.85	\$69,464	
	RNDM / THRM CRACK R&S	50.00%	41,303	LIN FT	\$2.00	\$82,606	
	PD PVMT PATCH M&F SURF	0.10%	100	SQ YD	\$82.25	\$8,225	
	PWFn =	0.5537		PW =	0.5537 X	\$280,449	\$155,278
YEAR 25							
	LONG SHLD JT R&S	100.00%	75,096	LIN FT	\$1.60	\$120,154	
	CNTR LINE JOINT R&S	100.00%	37,548	LIN FT	\$1.85	\$69,464	
	RNDM / THRM CRACK R&S	50.00%	41,303	LIN FT	\$2.00	\$82,606	
	PD PVMT PATCH M&F SURF	0.50%	501	SQ YD	\$82.25	\$41,208	
	PWFn =	0.4776		PW =	0.4776 X	\$313,432	\$149,697
HMA_SD							
YEAR 30							
	NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	100,128	SQ YD	\$3.00	\$300,384	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	2,003	SQ YD	\$79.52	\$159,279	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	0	SQ YD	\$0.00	\$0	
	HMA OVERLAY PVMT 2.25 "	100.00%	100,128	SQ YD	\$12.85	\$1,286,955	
	HMA OVERLAY SHLD 2.25 "	100.00%	0	SQ YD	\$0.00	\$0	
	PWFn =	0.4120		PW =	0.4120 X	\$1,746,618	\$719,583
YEAR 35							
	LONG SHLD JT R&S	100.00%	75,096	LIN FT	\$1.60	\$120,154	
	CNTR LINE JOINT R&S	100.00%	37,548	LIN FT	\$1.85	\$69,464	
	RNDM / THRM CRACK R&S	50.00%	41,303	LIN FT	\$2.00	\$82,606	
	PD PVMT PATCH M&F SURF	0.10%	100	SQ YD	\$82.25	\$8,225	
	PWFn =	0.3554		PW =	0.3554 X	\$280,449	\$99,667
YEAR 40							
	LONG SHLD JT R&S	100.00%	75,096	LIN FT	\$1.60	\$120,154	
	CNTR LINE JOINT R&S	100.00%	37,548	LIN FT	\$1.85	\$69,464	
	RNDM / THRM CRACK R&S	50.00%	41,303	LIN FT	\$2.00	\$82,606	
	PD PVMT PATCH M&F SURF	0.50%	501	SQ YD	\$82.25	\$41,208	
	PWFn =	0.3066		PW =	0.3066 X	\$313,432	\$96,085
							\$2,732,211
ROUTINE MAINTENANCE ACTIVITY				14.22 Lane Miles	0.00	\$0	\$0
							MAINTENANCE LIFE-CYCLE COST \$2,732,211
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE		\$31,340

PCC PAVEMENT

JPCP

ROUTE **FAP 591 (US 34)**
 SECTION **(13C & 13)R & T**
 COUNTY **Kendall**
 LOCATION **IL 47 to Orchard Rd. West of Oswego**

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **18774 FT == >** 3.56 Miles
 # OF CENTERLINES **2 CL**
 # OF LANES **4 LANES**
 # OF EDGES **4 EP**
 LANE WIDTH - AVERAGE **12 FT**
 SHOULDER WIDTH PCC Inside **0 FT**
 PCC Outside **0 FT**
 Total Width of Paved Shoulders **0 FT**

PAVEMENT THICKNESS (RIGID) **JPCP 10.25 IN TIED SHLD**
 SHOULDER THICKNESS **10.25 IN**

POLICY OVERLAY THICKNESS **2.50 IN**

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	10.05	16.01	16.01
Worksheet Construction Type is Reconstruction	The Pavement Type is		JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY UNIT	UNIT PRICE	COST
JPC PAVEMENT	(10.25")	126,624 SQ YD *	\$43.07 /SQ YD	\$5,453,696
PAVEMENT REINFORCEMENT		0 SQ YD	\$22.00 /SQ YD	\$0
STABILIZED SUBBASE	(4.00")	0 SQ YD *	\$12.00 /SQ YD	\$0
PCC SHOULDERS	(10.25" to 10.25")	0 SQ YD	\$40.00 /SQ YD	\$0
CURB & GUTTER		0 LIN FT	\$30.00 /LIN FT	\$0
SUBBASE GRAN MATL TY C	(~ 0.00")	0 TONS	\$25.00 /TON	\$0
IMPROVED SUBGRADE:	Aggregate Width = 0.0'	0 SQ YD *	\$7.00 /SQ YD	\$0
Reserved For User Supplied Item		0 UNITS	\$0.00 /UNITS	\$0
Reserved For User Supplied Item		0 UNITS	\$0.00 /UNITS	\$0
PAVEMENT REMOVAL		100,128 SQ YD	\$0.00 /SQ YD	\$0
SHOULDER REMOVAL		0 SQ YD	\$0.00 /SQ YD	\$0

Note: * Denotes User Supplied Quantity
 RIGID CONSTRUCTION INITIAL COST **\$5,453,696**
 RIGID CONSTRUCTION ANNUAL COST PER MILE **\$62,556**

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	\$14.06 /SQ YD
HMA SURFACE MIX	(1.50")	1.0052	1.50	\$9.24 /SQ YD
HMA BINDER MIX	(1.00")	1.0105	1.00	\$4.83 /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	\$79.19 /SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	2.50	\$85.31 /SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				\$1.65 /LIN FT
CENTERLINE JOINT ROUT & SEAL				\$1.85 /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 **\$7,241,275**
 RIGID TOTAL ANNUAL COST PER MILE **\$83,060**

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%	127	SQ YD	\$150.00	\$19,050	
		PWF _n = 0.7441			PW = 0.7441 X	\$19,050	\$14,175
YEAR 15							
	PAVEMENT PATCH CLASS B	0.20%	253	SQ YD	\$150.00	\$37,950	
		PWF _n = 0.6419			PW = 0.6419 X	\$37,950	\$24,359
YEAR 20							
	PAVEMENT PATCH CLASS B	2.00%	2,532	SQ YD	\$150.00	\$379,800	
	SHOULDER PATCH CLASS C	0.50%	0	SQ YD	\$145.00	\$0	
	LONGITUDINAL SHLD JT R&S	100.00%	75,096	LIN FT	\$1.65	\$123,908	
	CENTERLINE JT R&S	100.00%	37,548	LIN FT	\$1.85	\$69,464	
		PWF _n = 0.5537			PW = 0.5537 X	\$573,172	\$317,351
YEAR 25							
	PAVEMENT PATCH CLASS B	3.00%	3,799	SQ YD	\$150.00	\$569,850	
	SHOULDER PATCH CLASS C	1.00%	0	SQ YD	\$145.00	\$0	
		PWF _n = 0.4776			PW = 0.4776 X	\$569,850	\$272,164
YEAR 30							
	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	4.00%	5,065	SQ YD	\$150.00	\$759,750	
	SHOULDER PATCH CLASS C	1.50%	0	SQ YD	\$145.00	\$0	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	100,128	SQ YD	\$14.06	\$1,408,073	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	0	SQ YD	\$0.00	\$0	
		PWF _n = 0.4120			PW = 0.4120 X	\$2,167,823	\$893,114
YEAR 35							
	NON-INTERSTATE						
	LONGITUDINAL SHLD JT R&S	100.00%	75,096	LIN FT	\$1.65	\$123,908	
	CENTERLINE JT R&S	100.00%	37,548	LIN FT	\$1.85	\$69,464	
	RANDOM CRACK R&S	50.00%	37,548	LIN FT	\$2.00	\$75,096	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	24,038	LIN FT	\$2.00	\$48,076	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	127	SQ YD	\$85.31	\$10,835	
		PWF _n = 0.3554			PW = 0.3554 X	\$327,379	\$116,345
YEAR 40							
	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	0.50%	633	SQ YD	\$150.00	\$94,950	
	LONGITUDINAL SHLD JT R&S	100.00%	75,096	LIN FT	\$1.65	\$123,908	
	CENTERLINE JT R&S	100.00%	37,548	LIN FT	\$1.85	\$69,464	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	36,058	LIN FT	\$2.00	\$72,116	
	RANDOM CRACK R&S	50.00%	37,548	LIN FT	\$2.00	\$75,096	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	633	SQ YD	\$85.31	\$54,004	
		PWF _n = 0.3066			PW = 0.3066 X	\$489,538	\$150,071
							\$1,787,579
	ROUTINE MAINTENANCE ACTIVITY		14.22	Lane Miles	\$0.00	\$0	\$0
							MAINTENANCE LIFE-CYCLE COST \$1,787,579
45	YEAR LIFE CYCLE	CRF _n = 0.0407852					MAINTENANCE ANNUAL COST PER MILE \$20,504

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 10/2/13 1:49 PM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$5,453,696	\$8,640,132
		ANNUAL COST PER MILE	\$62,556	\$99,106
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$1,787,579	\$2,732,211
		ANNUAL COST PER MILE	\$20,504	\$31,340
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$7,241,275	\$11,372,343
		ANNUAL COST PER MILE	\$83,060	\$130,446

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	=====>	JPCP	\$83,060	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	HMA	\$130,446	57.1%