



Illinois Department of Transportation

To: John Fortman Attn: District One
From: John D. Baranzelli
Subject: Pavement Design
Date: April 8, 2013

A handwritten signature in black ink, appearing to be 'JDB', with a flourish at the end.

IL Route 64 (North Avenue)
Cook County
Over the Des Plaines River

We have reviewed the pavement design for the above captioned section, which was submitted to BDE on March 15, 2013. This project does not require alternate bidding. Life Cycle Cost Analysis favors a rigid pavement design.

The approved pavement design is as follows:

IL 64 (North Avenue [Reconstruction])
Thatcher Avenue [Reconstruction]

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

IL 64 (North Avenue [Temporary Pavement])

Option 1

10 inches of Full-Depth HMA Pavement
2 inches HMA Surface Course, Mix "D", N50
8 inches HMA Binder Course, IL-19.0, N50
4 inches Aggregate Subgrade Improvement

Option 2

8 inches PCC Pavement
4 inches Aggregate Subgrade Improvement

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



Illinois Department of Transportation

Memorandum

To: John D. Baranzelli Attn: Paul R. Niedernhofer
From: Ken Eng By: Jose Dominguez
Subject: Pavement Analysis*
Date: March 15, 2013

*Route: FAP 307 IL-64 (North Ave.) Section: 541Y-3-B
Location: Over Des Plaines River County: Cook
Contract No.: 60J11 Job No: D-91-183-10
Target letting: 09CY13

We have completed the pavement analysis for the above captioned location. Review by the Central Office is required since the total pavement area for reconstruction exceeds 4,750 Square Yards. The following is the scope of the project:

- a. Reconstructing North Ave. to provide 2 at 36 ft. through lanes of pavement with a 12 ft. center median or turn lane for approximately 897 ft. including approximately 550 ft. west of the Des Plaines River Bridge and 347 ft. east of the Des Plaines River Bridge.
- b. Reconstructing Thatcher Ave. to provide 2 at 21 ft. through lanes of pavement with a 10 ft. turn lane for approximately 262 ft including 115 ft. south of North Ave. and 125 ft. north of IL 64 (North Ave).

A 20-year pavement analysis was performed on the above segments. We recommend a mechanistic-rigid pavement design based on the life cycle cost analysis which favors PCC pavement by over 12 percent.

- a. Reconstruction of IL-64 (North Ave.)
PCC Curb and Gutter (Tied)
Pavement reconstruction:
 9" PCC Pavement (Jointed) ¹
 12" Aggregate Subgrade ²
- b. Reconstruction of Thatcher Ave.
PCC Curb and Gutter (Tied)
Pavement reconstruction:
 9" PCC Pavement (Jointed) ¹
 12" Aggregate Subgrade ²

John Baranzelli
March 15, 2013
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c. IL-64 (North Ave) Temporary Pavement

Option 1)⁴

Temporary Pavement

10" Full Depth Temporary HMA Pavement⁵

2" HMA Surface Course, Mix "D", N50³

8" HMA Binder Course, IL-19.0, N50³

4" Aggregate Subgrade Improvement⁶

Option 2)⁴

Temporary Pavement

8" Temporary PCC Pavement⁵

4" Aggregate Subgrade Improvement⁶

¹Designer Note: Use pay item #42000401, "**PORTLAND CEMENT CONCRETE PAVEMENT, 9" (JOINTED)**", paid in square yards. Transverse contraction joints should be reduced to a maximum of 14 foot spacing for 9" PCC pavement

²Designer Note: Use pay item #30300112, "**AGGREGATE SUBGRADE IMPROVEMENT, 12" "**", paid in square yards.

³Designer Note: Refer to the District One, Bureau of Materials' "Hot-Mix Asphalt – Mix Selection" tables to determine the corresponding HMA mix table requirements for the plans.

⁴Designer Note: The contractor shall have the option of constructing either material type if both Portland cement concrete and HMA are shown in the plans. For quantity estimation purposes, excavation quantities should be estimated assuming the thicker design if both options are shown in the plans..

⁵Designer Note: Use pay item #Z0062456, "**TEMPORARY PAVEMENT**", paid in square yards.

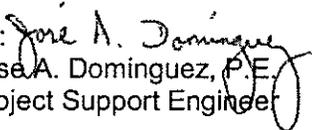
According to the Special Provision for "Temporary Pavement", HMA temporary pavement shall consist of two items, an HMA binder course and an HMA surface course. Make sure to include both items in the HMA mix table requirements.

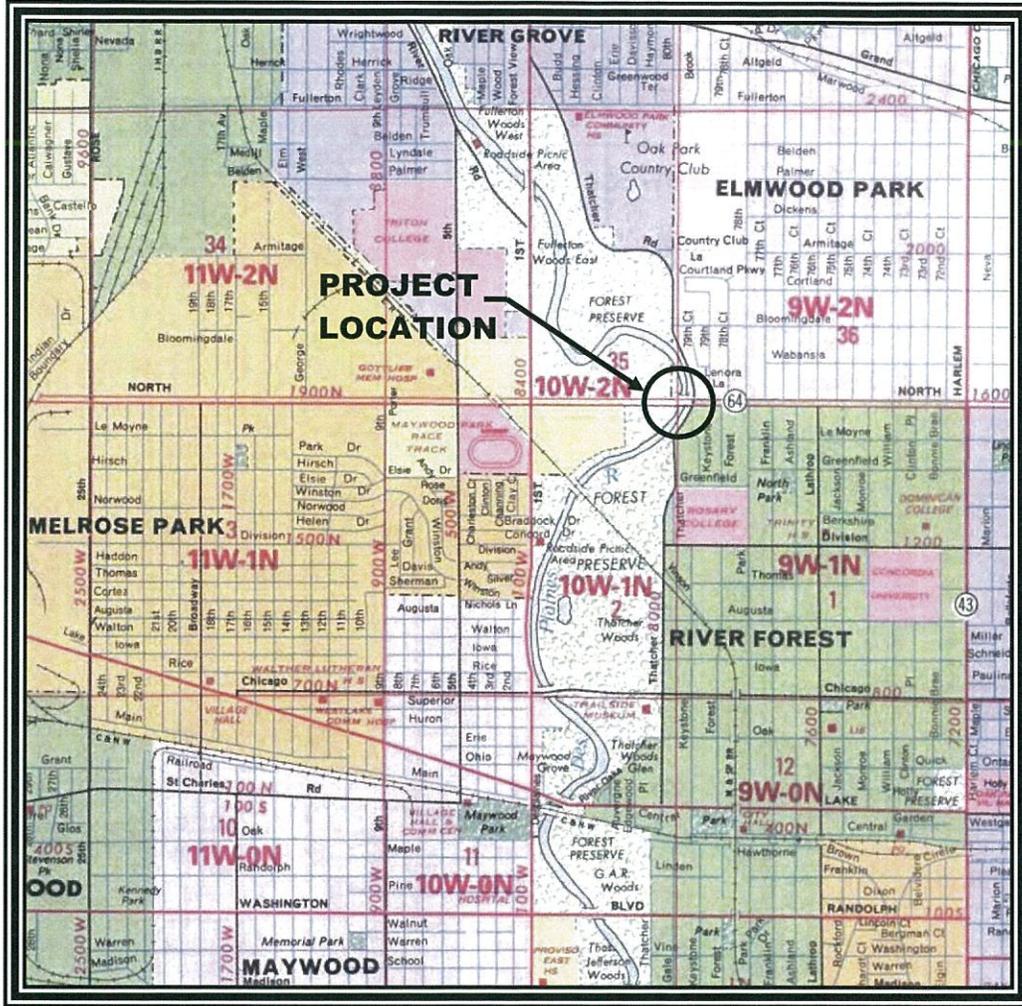
When PC Temp Pavement is used as an option, the following note shall appear on the plans adjacent to the HMA mix table: "PC Concrete temporary pavement shall consist of Class PV Concrete meeting the requirements of Art.1020 of the Standard Specifications, 8" thick. Temporary PCC pavement does not require dowel bars."

John Branzelli
March 15, 2013
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6 **Designer Note:** Use pay item #30300104, "AGGREGATE SUBGRADE IMPROVEMENT, 4" ", paid in square yards.

If you have any questions or need additional information, please contact Jenpai Chang, Interim Pavement Engineer, at (847) 705-4432.

By: 
Jose A. Dominguez, P.E.
Project Support Engineer



Location Map



Proposed Improvement:

Illinois Route 64 over Des Plaines River

Municipality: River Forest

County: Cook

Route: FAP 307

Project #: P-91-141-07

Structure #: (Existing) 016-0501, (Proposed) 016-2627

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: IL Route 64 (North Avenue)	Comments:			
Section: 541Y-3-B	Design Date:	<-- BY		
County: Cook	Modify Date:	<-- BY	ADT	Year
Location: Over Des Plaines River		Current:	54,000	2007
Facility Type: Other Marked State Route	# of Lanes = 6 or more	Future:	56,000	2030
Road Class: I	Rural or Urban?: Urban	Structural Design Traffic		
Subgrade Support Rating (SSR): Poor	Construction Year: 2013	Minimum ADT	Actual ADT	Actual % of Total ADT
Design Period (DP) = 20 years		PV = 0	53,120	95.9%
		SU = 250	1,551	2.8%
		MU = 750	720	1.3%
		Struct. Design ADT = 55,391	(2023)	
				P = 8%
				S = 37%
				M = 37%

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

C_{pv} = 0.15
 C_{su} = **132.5**
 C_{mu} = **482.53**
 TF flexible (Actual) = 4.10 (Actual ADT)
 TF flexible (Min) = 2.92 (Min ADT Fig. 54-2.C)

RIGID PAVEMENT

C_{pv} = 0.15
 C_{su} = **143.81**
 C_{mu} = **696.42**
 TF rigid (Actual) = 5.37 (Actual ADT)
 TF rigid (Min) = 4.13 (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement		JPC Pavement	
Use TF flexible = 4.10	Use TF rigid = 5.37	Edge Support = Tied	Shoulder or C.&G.
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)	HMA Mixture Temp. = 74.0 deg. F (Fig. 54-5.C)	Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)	
Design HMA Mixture Modulus (E _{HMA}) = 720 ksi (Fig. 54-5.D)	Design HMA Strain (ε _{HMA}) = 80 (Fig. 54-5.E)	CRCP Pavement	
Full Depth HMA Design Thickness = 10.25 in. (Fig. 54-5.F)	Limiting Strain Criterion Thickness = 14.50 in. (Fig. 54-5.I)	Use TF rigid = 5.37	IBR value = 3
Use Full-Depth HMA Thickness = 10.25 inches		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		Unbonded Concrete Overlay	
Use TF flexible = 4.10	District = 3,4,5,6	Review 54-4.03 for limitations and special considerations.	
HMA Overlay Design Thickness = 8.50 in. (Fig. 54-5.U)		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 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

Class	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
	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

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)					
	Rural			Urban		
	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 **IL Route 64 (North Avenue)**
 SECTION **541Y-3-B**
 COUNTY **Cook**
 LOCATION **Over Des Plaines River**

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **1122 FT ==> 0.21 Miles**
 # OF CENTERLINES **1 CL**
 # OF LANES **6 LANES**
 # OF EDGES **2 EP**
 LANE WIDTH - AVERAGE **12 FT**
 SHOULDER WIDTH HMA Inside **0 FT**
 HMA Outside **0 FT**

PAVEMENT THICKNESS (FLEXIBLE) **10.25 IN** **14.50 IN MAX**
 SHOULDER THICKNESS **8.00 IN** **Standard Design**
 POLICY OVERLAY THICKNESS **2.25 IN**

FLEX PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		2.92	4.10	4.10

[Read Me!](#)

HMA COST PER TON	UNIT PRICE
HMA SURFACE	\$95.00 / TON
HMA TOP BINDER	\$95.00 / TON
HMA LOWER BINDER	\$80.00 / 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)	(10.25")	8,976	SQ YD	\$50.05 / SQ YD	\$449,270 ~
HMA SURFACE COURSE	(2.00")	1,008	TONS *	\$95.00 / TON	\$0
HMA TOP BINDER COURSE	(2.25")	1,139	TONS *	\$95.00 / TON	\$0
HMA LOWER BINDER COURSE	(6.00")	3,067	TONS *	\$80.00 / TON	\$0
HMA SHOULDER	(8.00")	0	TONS	\$72.00 / TON	\$0 ~
CURB & GUTTER		0	LIN FT	\$30.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C (TONS)		14	TONS	\$25.00 / TON	\$350
IMPROVED SUBGRADE: Modified Soil	W102 = 74.7	9,314	SQ YD	\$7.00 / SQ YD	\$65,198
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL		8,976	SQ YD	\$0.00 / SQ YD	\$0
SHOULDER REMOVAL		0	SQ YD	\$0.00 / SQ YD	\$0
				FLEXIBLE CONSTRUCTION INITIAL COST	\$514,818
				FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	\$98,809

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT	UNIT COST
ROUTINE MAINTENANCE ACTIVITY				\$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix	2.50	\$13.43 / SQ YD
HMA OVERLAY PVMT	(2.25")	Surface Mix	2.20	\$16.79 / SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	1.80	\$10.07 / SQ YD
HMA BINDER MIX	(0.75")	Leveling Binder Mix	0.75	\$5.15 / SQ YD
HMA OVERLAY SHLD (Year 30)	(2.25")	Shoulder Mix	2.20	\$9.07 / SQ YD
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	2.00	\$8.06 / SQ YD
MILLING (2.00 IN)			1.00	\$3.00 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf)		Surface Mix	2.00	\$80.64 / SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill Surf)		Shoulder Mix	2.00	\$78.06 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill +2.00")		Leveling Binder Mix	2.00	\$79.52 / SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill +2.00")		Shoulder Mix	2.00	\$78.06 / 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 \$746,638
 FLEXIBLE TOTAL ANNUAL COST PER MILE \$143,302

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%	2,244	LIN FT	\$2.00	\$4,488	
	CNTR LINE JOINT R&S	100.00%	1,122	LIN FT	\$2.00	\$2,244	
	RNDM / THRM CRACK R&S	50.00%	3,703	LIN FT	\$2.00	\$7,406	
	PD PVMT PATCH M&F SURF	0.10%	9	SQ YD	\$80.64	\$726	
	PWF _n =	0.8626		PW =	0.8626 X	\$14,864	\$12,822
YEAR 10							
	LONG SHLD JT R&S	100.00%	2,244	LIN FT	\$2.00	\$4,488	
	CNTR LINE JOINT R&S	100.00%	1,122	LIN FT	\$2.00	\$2,244	
	RNDM / THRM CRACK R&S	50.00%	3,703	LIN FT	\$2.00	\$7,406	
	PD PVMT PATCH M&F SURF	0.50%	45	SQ YD	\$80.64	\$3,629	
	PWF _n =	0.7441		PW =	0.7441 X	\$17,767	\$13,220
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	8,976	SQ YD	\$3.00	\$26,928	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	90	SQ YD	\$79.52	\$7,157	
	HMA OVERLAY PVMT 2.00"	100.00%	8,976	SQ YD	\$13.43	\$120,548	
	HMA OVERLAY SHLD 2.00"	100.00%	0	SQ YD	\$8.06	\$0	
	PWF _n =	0.6419		PW =	0.6419 X	\$154,633	\$99,253
YEAR 20							
	LONG SHLD JT R&S	100.00%	2,244	LIN FT	\$2.00	\$4,488	
	CNTR LINE JOINT R&S	100.00%	1,122	LIN FT	\$2.00	\$2,244	
	RNDM / THRM CRACK R&S	50.00%	3,703	LIN FT	\$2.00	\$7,406	
	PD PVMT PATCH M&F SURF	0.10%	9	SQ YD	\$80.64	\$726	
	PWF _n =	0.5537		PW =	0.5537 X	\$14,864	\$8,230
YEAR 25							
	LONG SHLD JT R&S	100.00%	2,244	LIN FT	\$2.00	\$4,488	
	CNTR LINE JOINT R&S	100.00%	1,122	LIN FT	\$2.00	\$2,244	
	RNDM / THRM CRACK R&S	50.00%	3,703	LIN FT	\$2.00	\$7,406	
	PD PVMT PATCH M&F SURF	0.50%	45	SQ YD	\$80.64	\$3,629	
	PWF _n =	0.4776		PW =	0.4776 X	\$17,767	\$8,486
HMA SD							
YEAR 30							
	NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	8,976	SQ YD	\$3.00	\$26,928	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	180	SQ YD	\$79.52	\$14,314	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	0	SQ YD	\$78.06	\$0	
	HMA OVERLAY PVMT 2.25"	100.00%	8,976	SQ YD	\$16.79	\$150,707	
	HMA OVERLAY SHLD 2.25"	100.00%	0	SQ YD	\$9.07	\$0	
	PWF _n =	0.4120		PW =	0.4120 X	\$191,949	\$79,080
YEAR 35							
	LONG SHLD JT R&S	100.00%	2,244	LIN FT	\$2.00	\$4,488	
	CNTR LINE JOINT R&S	100.00%	1,122	LIN FT	\$2.00	\$2,244	
	RNDM / THRM CRACK R&S	50.00%	3,703	LIN FT	\$2.00	\$7,406	
	PD PVMT PATCH M&F SURF	0.10%	9	SQ YD	\$80.64	\$726	
	PWF _n =	0.3554		PW =	0.3554 X	\$14,864	\$5,282
YEAR 40							
	LONG SHLD JT R&S	100.00%	2,244	LIN FT	\$2.00	\$4,488	
	CNTR LINE JOINT R&S	100.00%	1,122	LIN FT	\$2.00	\$2,244	
	RNDM / THRM CRACK R&S	50.00%	3,703	LIN FT	\$2.00	\$7,406	
	PD PVMT PATCH M&F SURF	0.50%	45	SQ YD	\$80.64	\$3,629	
	PWF _n =	0.3066		PW =	0.3066 X	\$17,767	\$5,447
							\$231,820
ROUTINE MAINTENANCE ACTIVITY			1.28 Lane Miles	0.00	\$0	\$0	
							\$231,820
45	YEAR LIFE CYCLE	CRF _n = 0.0407852	MAINTENANCE LIFE-CYCLE COST			\$231,820	
							\$44,493

PCC PAVEMENT

JPCP

ROUTE **IL Route 64 (North Avenue)**
 SECTION **541Y-3-B**
 COUNTY **Cook**
 LOCATION **Over Des Plaines River**

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **1122 FT ==> 0.21 Miles**
 # OF CENTERLINES **1 CL**
 # OF LANES **6 LANES**
 # OF EDGES **2 EP**
 LANE WIDTH - AVERAGE **12 FT**
 SHOULDER WIDTH PCC Inside **0 FT**
 PCC Outside **0 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
Worksheet Construction Type is	New Construction	4.13	5.37	JPCP
			The Pavement Type is	

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
JPC PAVEMENT	(9.00")	8,976	SQ YD	\$37.45 / SQ YD	\$336,151
PAVEMENT REINFORCEMENT		0	SQ YD	\$22.00 / SQ YD	\$0
STABILIZED SUBBASE	(4.00")	9,350	SQ YD	\$15.00 / SQ YD	\$140,250
PCC SHOULDERS	(9.00" to 9.00")	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:	Modified Soil (Metric = 75.0)	9,101	SQ YD	\$7.00 / SQ YD	\$63,707
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL		8,976	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 **\$540,108**
 RIGID CONSTRUCTION ANNUAL COST PER MILE **\$103,663**

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			\$0.00 / LANE-MILE / YEAR
HMA POLICY OVERLAY	(2.50")		2.50
HMA POLICY OVERLAY PVMT	(2.50")	1.0026	\$12.78 / SQ YD
HMA SURFACE MIX	(1.50")	1.0017	\$7.99 / SQ YD
HMA BINDER MIX	(1.00")	1.0048	\$4.78 / SQ YD
HMA POLICY OVERLAY SHLD	(2.50")	Shoulder Mix	2.50 \$10.08 / 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 \$77.98 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	2.50 \$83.30 / 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 **\$666,144**
 RIGID TOTAL ANNUAL COST PER MILE **\$127,853**

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%	9	SQ YD	\$150.00	\$1,350	
		PWF _n = 0.7441			PW = 0.7441 X	\$1,350	\$1,005
YEAR 15							
	PAVEMENT PATCH CLASS B	0.20%	18	SQ YD	\$150.00	\$2,700	
		PWF _n = 0.6419			PW = 0.6419 X	\$2,700	\$1,733
YEAR 20							
	PAVEMENT PATCH CLASS B	2.00%	180	SQ YD	\$150.00	\$27,000	
	SHOULDER PATCH CLASS C	0.50%	0	SQ YD	\$145.00	\$0	
	LONGITUDINAL SHLD JT R&S	100.00%	2,244	LIN FT	\$2.00	\$4,488	
	CENTERLINE JT R&S	100.00%	1,122	LIN FT	\$2.00	\$2,244	
		PWF _n = 0.5537			PW = 0.5537 X	\$33,732	\$18,677
YEAR 25							
	PAVEMENT PATCH CLASS B	3.00%	269	SQ YD	\$150.00	\$40,350	
	SHOULDER PATCH CLASS C	1.00%	0	SQ YD	\$145.00	\$0	
		PWF _n = 0.4776			PW = 0.4776 X	\$40,350	\$19,271
YEAR 30 NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	359	SQ YD	\$150.00	\$53,850	
	SHOULDER PATCH CLASS C	1.50%	0	SQ YD	\$145.00	\$0	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	8,976	SQ YD	\$12.78	\$114,676	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	0	SQ YD	\$10.08	\$0	
		PWF _n = 0.4120			PW = 0.4120 X	\$168,526	\$69,430
YEAR 35 NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	2,244	LIN FT	\$2.00	\$4,488	
	CENTERLINE JT R&S	100.00%	1,122	LIN FT	\$2.00	\$2,244	
	RANDOM CRACK R&S	50.00%	3,366	LIN FT	\$2.00	\$6,732	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	2,160	LIN FT	\$2.00	\$4,320	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	9	SQ YD	\$83.30	\$750	
		PWF _n = 0.3554			PW = 0.3554 X	\$18,534	\$6,587
YEAR 40 NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	45	SQ YD	\$150.00	\$6,750	
	LONGITUDINAL SHLD JT R&S	100.00%	2,244	LIN FT	\$2.00	\$4,488	
	CENTERLINE JT R&S	100.00%	1,122	LIN FT	\$2.00	\$2,244	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	3,240	LIN FT	\$2.00	\$6,480	
	RANDOM CRACK R&S	50.00%	3,366	LIN FT	\$2.00	\$6,732	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	45	SQ YD	\$83.30	\$3,749	
		PWF _n = 0.3066			PW = 0.3066 X	\$30,443	\$9,333
							\$126,036
	ROUTINE MAINTENANCE ACTIVITY		1.28	Lane Miles	\$0.00	\$0	\$0
							MAINTENANCE LIFE-CYCLE COST \$126,036
45	YEAR LIFE CYCLE	CRF _n = 0.0407852					MAINTENANCE ANNUAL COST PER MILE \$24,190

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 3/14/13 2:25 PM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$540,108	\$514,818
		ANNUAL COST PER MILE	\$103,663	\$98,809
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$126,036	\$231,820
		ANNUAL COST PER MILE	\$24,190	\$44,493
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$666,144	\$746,638
		ANNUAL COST PER MILE	\$127,853	\$143,302

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	=====>	JPCP	\$127,853	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	HMA	\$143,302	12.1%