



Illinois Department of Transportation

To: Paul Loete Attn: District Three
From: John D. Baranzelli
Subject: Pavement Design 
Date: January 23, 2014

FAP Route 311 (IL 71)
Section (1, 1-1)
Kendall County
From west 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 December 23, 2013. The project will reconstruct IL 71 with a cross section of four 12 foot lanes, a 22 foot raised median and curb & gutter. Three of the intersections [IL 47, IL 126 and Van Emmon/Reservation Road] meet the criteria for high stress intersections. 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:

IL 71 from IL 47 to Orchard Road [new pavement]]

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

At The IL 47 intersection, the pavement thickness will be increased to match the IL 47 pavement reconstruction project, which had higher traffic factors than those of IL 71.

IL 71 at IL 47 [intersection new pavement]]

10 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

Memorandum

To: John Baranzelli Attn: Paul Niedernhofer
From: Paul Loete By: Dan Mestelle
Subject: Pavement Design *
Date: December 18, 2013

* FAP Route 311 (IL 71)
Section (1, 1-1)
Kendall County
PTB 153/038
Contract No. 66883
File No. 1584
D3# 1239

RECEIVED
DEC 23 2013
BUREAU OF
DESIGN & ENVIRONMENT

The attached pavement design is provided for your approval. The project consists of reconstructing 5.55 miles of Illinois Route 71 from approximately 1,000' west of IL 47 in Yorkville to 900' west of Orchard Road in Oswego. The proposed typical section consists of four 12' lanes, a 22' wide raised median, and curb and gutter. The estimated quantity of new pavement is 200,000 square yards.

This section of IL 71 contains signalized intersections at IL 47, IL 126, and Van Emmon/Reservation Road. All three of these intersections meet the criteria for a high stress intersection since the design lane MU ADT is greater than 200 vehicles per BDE Section 54-1.05(a).

The district proposes to use 9.5" concrete JPC pavement constructed on top of an aggregate subgrade improvement, 12". The exception would be at the IL 47 and IL 71 intersection, which has higher traffic factors on the north and south legs of IL 47. The pavement design requires 11.75" of HMA or 10" PCC on these legs. It is recommended to use the 10" PCC pavement for this intersection since the project to the north on IL 47 (which is currently being constructed) is using this thickness.

The following facts and assumptions were used in the design:

- "New Construction" was assumed for the life cycle cost spreadsheet, due to the proposed removal of the existing two lanes.
- Design Traffic was based on 2026 CMAP projections.
- Design Period of 20 years.
- Poor Sub-grade.
- PG grade 64-28 for top lifts of binder and the surface course.
- PG 64-22 for the lower binder lifts.
- The JPC design would not use the optional 4" stabilized sub-base.

John Baranzelli Attn: Paul Niedernhofer
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December 18, 2013

The results of the mechanistic pavement design indicate that a full depth bituminous (HMA) design of 11" or concrete JPC design of 9.5" will be required. The annual life-cycle cost for the bituminous is \$104,241 per mile while the concrete design is \$78,161. The life cycle cost spreadsheet calculated that the concrete JPC design is 33.4% less in cost.

The following items are attached per BDE Manual 54-8:

1. Location Map
2. Typical Sections
3. Design Calculations & Traffic Counts
4. Economic Analysis
5. Unit Cost Sheets

If you have any questions or require additional information, please contact Mr. Duane Lukkari at (815) 434-8565.

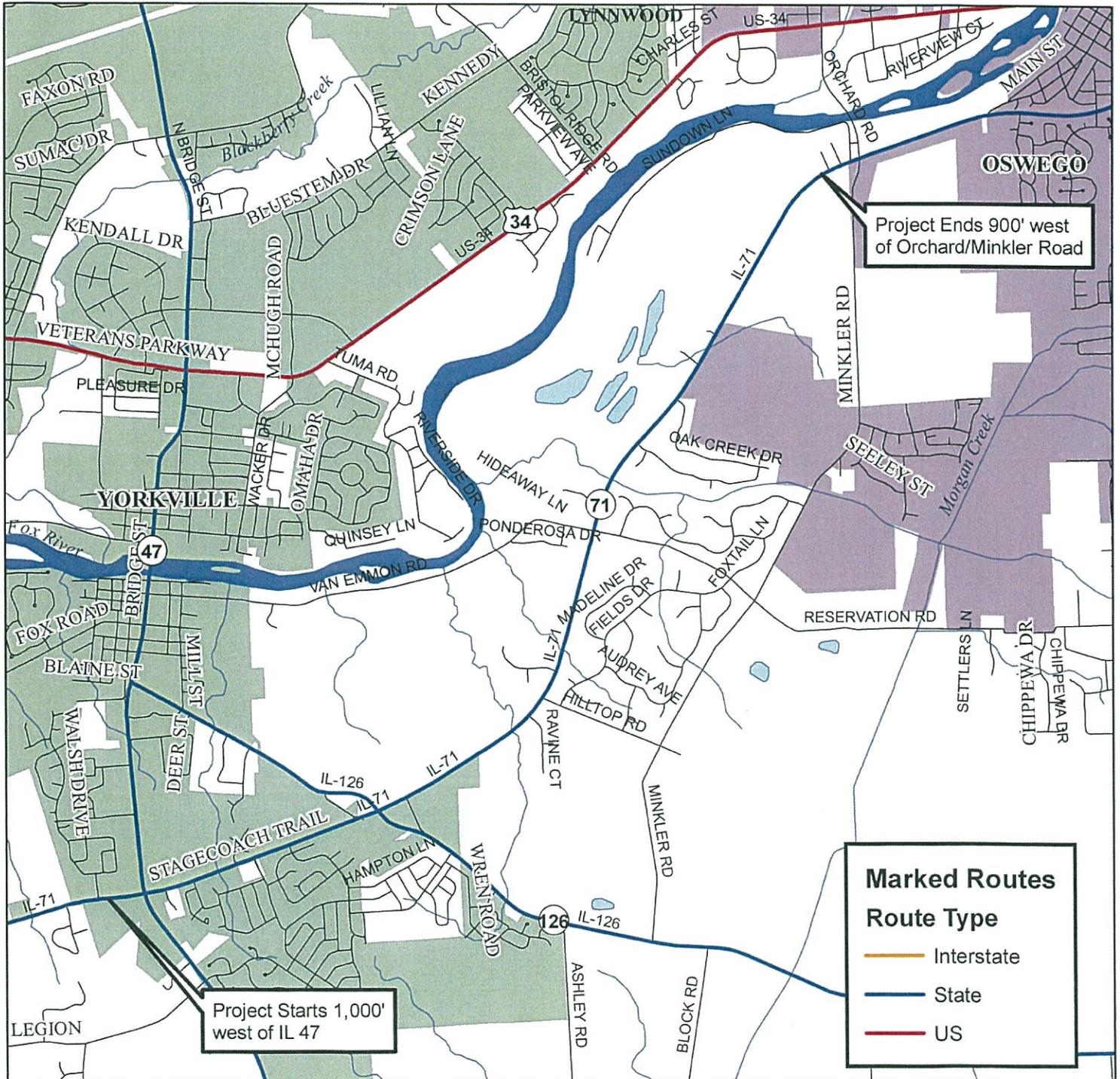
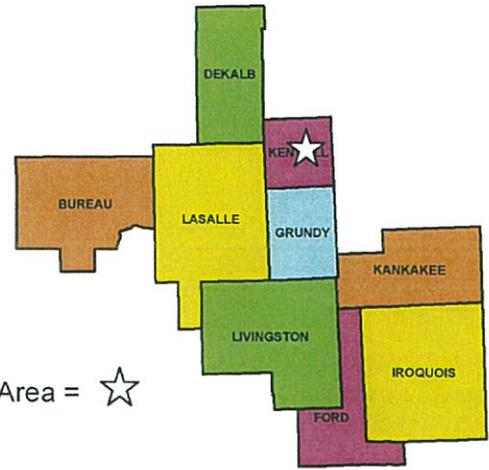
Project Location Map

FAP Route 311 (IL 71)
 Section (1, 1-1)R
 Kendall County
 5.55 miles of reconstruction and
 adding lanes
 Phase I Job No: P-93-016-04
 Contract No. 66883

D3# 1239



Project Area = ☆



Project Ends 900' west of Orchard/Minkler Road

Project Starts 1,000' west of IL 47

Marked Routes

Route Type

- Interstate
- State
- US

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: FAP Route 311 (IL 71)	Comments:			
Section: (1, 1-1)	Design Date: 9/20/2013 DPL	-- BY		
County: Kendall	Modify Date:	-- BY		
Location: IL 47 to Orchard / Minkler Road		ADT	Year	
		Current: 14,900	2009	
		Future: 19,750	2026	
Facility Type: Other Marked State Route	# of Lanes = 4	Structural Design Traffic		
Road Class: I		Minimum ADT	Actual ADT	Actual % of Total ADT
Subgrade Support Rating (SSR): Poor		PV = 0	17,578	89.0%
Construction Year: 2016		SU = 250	1,185	6.0%
Design Period (DP) = 20 years		MU = 750	988	5.0%
		Struct. Design ADT =	19,750	(2026)
				P = 32%
				S = 45%
				M = 45%

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = 0.15
 Csu = **132.5**
 Cmu = **482.53**
 TF flexible (Actual) = 5.72 (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) = 7.74 (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 = 5.72	PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)	Use TF rigid = 7.74	Edge Support = Tied Shoulder or C.&G.
Goto Map	HMA Mixture Temp. = 75.2 deg. F (Fig. 54-5.C)	Rigid Pavt Thick. = 9.50 in. (Fig. 54-4.E)	
Design HMA Mixture Modulus (E _{HMA}) = 690 ksi (Fig. 54-5.D)	Design HMA Strain (ε _{HMA}) = 73 (Fig. 54-5.E)	CRC Pavement	
Goto Map	Full Depth HMA Design Thickness = 11.00 in. (Fig. 54-5.F)	Use TF rigid = 7.74	IBR value = 3
Limiting Strain Criterion Thickness = 14.70 in. (Fig. 54-5.I)	Use Full-Depth HMA Thickness = 11.00 inches	CRCP Thickness = 8.50 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 = 5.72	HMA Overlay Design Thickness = 8.50 in. (Fig. 54-5.U)	Review 54-4.03 for limitations and special considerations.	
Goto Map	Limiting Strain Criterion Thickness = 11.80 in. (Fig. 54-5.V)	JPCP Thickness = NA inches	
Use HMA Overlay Thickness = 8.50 inches			

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads 4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	Class II Roads 2 lanes with ADT > 2000 One way Street with ADT <= 3500	Class III Roads 2 Lanes (ADT 750 -2000)	Class IV Roads 2 Lanes (ADT < 750)
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	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 Route 311 (IL 71)**
 SECTION **(1, 1-1)**
 COUNTY **Kendall**
 LOCATION **IL 47 to Orchard / Minkler Road**

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **29300 FT ==> 5.55 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) **11.00 IN** **14.70 IN MAX**
 SHOULDER THICKNESS **8.00 IN** **HMA SL: Standard Design**
 POLICY OVERLAY THICKNESS **2.25 IN**

FLEX PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		3.56	5.72	5.72

HMA COST PER TON	UNIT PRICE
HMA SURFACE	\$91.35 / TON
HMA TOP BINDER	\$86.36 / TON
HMA LOWER BINDER	\$67.76 / TON
HMA BINDER (LEVELING)	\$83.00 / TON
HMA SHOULDER	\$0.00 / TON

Read Me!

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(11.00")	179,500	197,500 SQ YD *	\$48.39 / SQ YD	\$9,556,885 ~
HMA SURFACE COURSE	(2.00")	1,209	24,900 TONS *	\$91.35 / TON	\$0
HMA TOP BINDER COURSE	(2.25")	1,227	24,900 TONS *	\$86.36 / TON	\$0
HMA LOWER BINDER COURSE	(6.75")	1,235	71,900 TONS *	\$67.76 / TON	\$0
HMA SHOULDER	(8.00")	0	0 TONS *	\$0.00 / TON	\$0 ~
CURB & GUTTER		0	0 LIN FT	\$0.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C (TONS)		0	0 TONS *	\$0.00 / TON	\$0
IMPROVED SUBGRADE: Modified Soil	179,500 = 0.00	0	0 SQ YD *	\$0.00 / SQ YD	\$0
Reserved For User Supplied Item		0	0 UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item		0	0 UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL		0	0 SQ YD *	\$0.00 / SQ YD	\$0
SHOULDER REMOVAL		0	0 SQ YD *	\$0.00 / SQ YD	\$0

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST \$9,556,885
 FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE \$70,240

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			\$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix	\$10.30 / SQ YD
HMA OVERLAY PVMT	(2.25")	Surface Mix	\$11.24 / SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	\$7.71 / SQ YD
HMA BINDER MIX	(0.75")	Leveling Binder Mix	\$3.53 / 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	\$80.23 / SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill Surf)		Shoulder Mix	\$70.00 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill +2.00")		Leveling Binder Mix	\$79.30 / SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill +2.00")		Shoulder Mix	\$70.00 / 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 \$14,183,063
 FLEXIBLE TOTAL ANNUAL COST PER MILE \$104,241

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%	117,200	LIN FT	\$1.60	\$187,520	
	CNTR LINE JOINT R&S	100.00%	58,600	LIN FT	\$1.85	\$108,410	
	RNDM / THRM CRACK R&S	50.00%	64,460	LIN FT	\$2.00	\$128,920	
	PD PVMT PATCH M&F SURF	0.10%	198	SQ YD	\$80.23	\$15,886	
	PWF _n =	0.8626		PW =	0.8626 X	\$440,736	\$380,183
YEAR 10							
	LONG SHLD JT R&S	100.00%	117,200	LIN FT	\$1.60	\$187,520	
	CNTR LINE JOINT R&S	100.00%	58,600	LIN FT	\$1.85	\$108,410	
	RNDM / THRM CRACK R&S	50.00%	64,460	LIN FT	\$2.00	\$128,920	
	PD PVMT PATCH M&F SURF	0.50%	988	SQ YD	\$80.23	\$79,268	
	PWF _n =	0.7441		PW =	0.7441 X	\$504,118	\$375,111
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	197,500	SQ YD	\$3.00	\$592,500	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	1,975	SQ YD	\$79.30	\$156,610	
	HMA OVERLAY PVMT 2.00"	100.00%	197,500	SQ YD	\$10.30	\$2,034,694	
	HMA OVERLAY SHLD 2.00 "	100.00%	0	SQ YD	\$0.00	\$0	
	PWF _n =	0.6419		PW =	0.6419 X	\$2,783,804	\$1,786,818
YEAR 20							
	LONG SHLD JT R&S	100.00%	117,200	LIN FT	\$1.60	\$187,520	
	CNTR LINE JOINT R&S	100.00%	58,600	LIN FT	\$1.85	\$108,410	
	RNDM / THRM CRACK R&S	50.00%	64,460	LIN FT	\$2.00	\$128,920	
	PD PVMT PATCH M&F SURF	0.10%	198	SQ YD	\$80.23	\$15,886	
	PWF _n =	0.5537		PW =	0.5537 X	\$440,736	\$244,025
YEAR 25							
	LONG SHLD JT R&S	100.00%	117,200	LIN FT	\$1.60	\$187,520	
	CNTR LINE JOINT R&S	100.00%	58,600	LIN FT	\$1.85	\$108,410	
	RNDM / THRM CRACK R&S	50.00%	64,460	LIN FT	\$2.00	\$128,920	
	PD PVMT PATCH M&F SURF	0.50%	988	SQ YD	\$80.23	\$79,268	
	PWF _n =	0.4776		PW =	0.4776 X	\$504,118	\$240,770
HMA_SD							
YEAR 30							
	NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	197,500	SQ YD	\$3.00	\$592,500	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	3,950	SQ YD	\$79.30	\$313,219	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	0	SQ YD	\$70.00	\$0	
	HMA OVERLAY PVMT 2.25 "	100.00%	197,500	SQ YD	\$11.24	\$2,220,839	
	HMA OVERLAY SHLD 2.25 "	100.00%	0	SQ YD	\$0.00	\$0	
	PWF _n =	0.4120		PW =	0.4120 X	\$3,126,558	\$1,288,100
YEAR 35							
	LONG SHLD JT R&S	100.00%	117,200	LIN FT	\$1.60	\$187,520	
	CNTR LINE JOINT R&S	100.00%	58,600	LIN FT	\$1.85	\$108,410	
	RNDM / THRM CRACK R&S	50.00%	64,460	LIN FT	\$2.00	\$128,920	
	PD PVMT PATCH M&F SURF	0.10%	198	SQ YD	\$80.23	\$15,886	
	PWF _n =	0.3554		PW =	0.3554 X	\$440,736	\$156,630
YEAR 40							
	LONG SHLD JT R&S	100.00%	117,200	LIN FT	\$1.60	\$187,520	
	CNTR LINE JOINT R&S	100.00%	58,600	LIN FT	\$1.85	\$108,410	
	RNDM / THRM CRACK R&S	50.00%	64,460	LIN FT	\$2.00	\$128,920	
	PD PVMT PATCH M&F SURF	0.50%	988	SQ YD	\$80.23	\$79,268	
	PWF _n =	0.3066		PW =	0.3066 X	\$504,118	\$154,541
							\$4,626,178
ROUTINE MAINTENANCE ACTIVITY			22.20 Lane Miles	0.00	\$0	\$0	
						MAINTENANCE LIFE-CYCLE COST	\$4,626,178
45	YEAR LIFE CYCLE	CRF _n = 0.0407852			MAINTENANCE ANNUAL COST PER MILE		\$34,001

PCC PAVEMENT

JPCP

ROUTE **FAP Route 311 (IL 71)**
 SECTION **(1, 1-1)**
 COUNTY **Kendall**
 LOCATION **IL 47 to Orchard / Minkler Road**

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **29300 FT ==> 5.55 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 9.50 IN TIED SHLD**
 SHOULDER THICKNESS **9.50 IN**

POLICY OVERLAY THICKNESS **2.50 IN**

RIGID PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
Worksheet Construction Type is	New Construction	5.02	7.74	7.74
The Pavement Type is				JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
JPC PAVEMENT	(9.50")	197,500	SQ YD	* \$40.33 / SQ YD	\$7,965,175
PAVEMENT REINFORCEMENT		0	SQ YD	\$0.00 / SQ YD	\$0
STABILIZED SUBBASE	(4.00")	0	SQ YD	* \$0.00 / SQ YD	\$0
PCC SHOULDERS	(9.50" to 9.50")	0	SQ YD	\$0.00 / SQ YD	\$0
CURB & GUTTER		0	LIN FT	\$0.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C	(~ 0.00")	0	TONS	\$0.00 / TON	\$0
IMPROVED SUBGRADE:	Modified Soil / Mod = 50.0'	162,778	SQ YD	\$0.00 / 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		156,267	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	\$7,965,175
RIGID CONSTRUCTION ANNUAL COST PER MILE	\$58,542

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")	1.0157	2.50 \$12.43 / SQ YD
HMA SURFACE MIX	(1.50")	1.0052	1.50 \$7.71 / SQ YD
HMA BINDER MIX	(1.00")	1.0135	1.00 \$4.71 / SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		2.50 \$0.00 / SQ YD
CLASS A PAVEMENT PATCHING			\$180.00 / SQ YD
CLASS B PAVEMENT PATCHING			\$125.00 / SQ YD
CLASS C SHOULDER PATCHING			\$130.00 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	1.50 \$77.67 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	2.50 \$82.79 / 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	\$10,634,626
RIGID TOTAL ANNUAL COST PER MILE	\$78,161

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%	198	SQ YD	\$125.00	\$24,750	
		PWFn = 0.7441			PW = 0.7441 X	\$24,750	\$18,416
YEAR 15	PAVEMENT PATCH CLASS B	0.20%	395	SQ YD	\$125.00	\$49,375	
		PWFn = 0.6419			PW = 0.6419 X	\$49,375	\$31,692
YEAR 20	PAVEMENT PATCH CLASS B	2.00%	3,950	SQ YD	\$125.00	\$493,750	
	SHOULDER PATCH CLASS C	0.50%	0	SQ YD	\$130.00	\$0	
	LONGITUDINAL SHLD JT R&S	100.00%	117,200	LIN FT	\$1.65	\$193,380	
	CENTERLINE JT R&S	100.00%	58,600	LIN FT	\$1.85	\$108,410	
		PWFn = 0.5537			PW = 0.5537 X	\$795,540	\$440,471
YEAR 25	PAVEMENT PATCH CLASS B	3.00%	5,925	SQ YD	\$125.00	\$740,625	
	SHOULDER PATCH CLASS C	1.00%	0	SQ YD	\$130.00	\$0	
		PWFn = 0.4776			PW = 0.4776 X	\$740,625	\$353,727
YEAR 30	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	4.00%	7,900	SQ YD	\$125.00	\$987,500	
	SHOULDER PATCH CLASS C	1.50%	0	SQ YD	\$130.00	\$0	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	197,500	SQ YD	\$12.43	\$2,454,119	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	0	SQ YD	\$0.00	\$0	
		PWFn = 0.4120			PW = 0.4120 X	\$3,441,619	\$1,417,901
YEAR 35	NON-INTERSTATE						
	LONGITUDINAL SHLD JT R&S	100.00%	117,200	LIN FT	\$1.65	\$193,380	
	CENTERLINE JT R&S	100.00%	58,600	LIN FT	\$1.85	\$108,410	
	RANDOM CRACK R&S	50.00%	58,600	LIN FT	\$2.00	\$117,200	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	37,498	LIN FT	\$2.00	\$74,996	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	198	SQ YD	\$82.79	\$16,392	
		PWFn = 0.3554			PW = 0.3554 X	\$510,378	\$181,380
YEAR 40	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	0.50%	988	SQ YD	\$125.00	\$123,500	
	LONGITUDINAL SHLD JT R&S	100.00%	117,200	LIN FT	\$1.65	\$193,380	
	CENTERLINE JT R&S	100.00%	58,600	LIN FT	\$1.85	\$108,410	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	56,246	LIN FT	\$2.00	\$112,492	
	RANDOM CRACK R&S	50.00%	58,600	LIN FT	\$2.00	\$117,200	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	988	SQ YD	\$82.79	\$81,796	
		PWFn = 0.3066			PW = 0.3066 X	\$736,778	\$225,864
							\$2,669,451
	ROUTINE MAINTENANCE ACTIVITY		22.20	Lane Miles	\$0.00	\$0	\$0
							MAINTENANCE LIFE-CYCLE COST \$2,669,451
45	YEAR LIFE CYCLE	CRFn = 0.0407852					MAINTENANCE ANNUAL COST PER MILE \$19,620

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 10/7/13 10:40 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$7,965,175	\$9,556,885
		ANNUAL COST PER MILE	\$58,542	\$70,240
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$2,669,451	\$4,626,178
		ANNUAL COST PER MILE	\$19,620	\$34,001
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$10,634,626	\$14,183,063
		ANNUAL COST PER MILE	\$78,161	\$104,241

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	=====>	JPCP	\$78,161	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	HMA	\$104,241	33.4%