



Illinois Department of Transportation

To: John Fortman Attn: District One
From: John D. Baranzelli
Subject: Pavement Design
Date: September 4, 2012

A handwritten signature in black ink, appearing to be 'JDB', is written over the 'Subject' line of the header.

IL 53 (Rohlwing Road)
Section 03-96-0021
Du Page County
At Elgin-O'Hare Expressway

We have reviewed the pavement selection for the project, which was submitted to BDE by email dated August 20, 2012. The project will reconstruct IL 53 at the Elgin-O'Hare Expressway. The life cycle cost analysis IL 53 favored the rigid design by 19.7%. The approved pavement design for this project is as follows:

IL 53 [Rohlwing Road] [Pavement Reconstruction]

9.5 inches of PCC Jointed Pavement with Tied PCC Curb and Gutter
4.5 HMA Stabilized Subbase
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 D. Baranzelli Attn: Paul Niedernhofer
From: John Fortmann By: Jose Dominguez
Subject: Pavement Analysis*
Date: August 20, 2012

*Route: IL-53 (Rohlwing Road)
Limits: at Elgin-O'Hare Expressway
Contract No.: 11838
Letting: By ISTHA

Section: 03-96-0021
County: DuPage
Job No.: P-91-443-06

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

a.) Reconstruction of IL-53 (Rohlwing Road) at the Elgin-O'Hare Expressway to re-profile the roadway for the bridge replacement of IL-53 over the expressway. The total length of reconstruction is approximately 1,673 feet.

A 20 year pavement analysis was performed on the IL-53 (Rohlwing Road) segment since the pavement reconstruction is less than 25,000 square yards. We recommend a mechanistic-rigid pavement design based on the life cycle cost analysis which favors PCC pavement by over 19%.

a.) IL-53 (Rohlwing Road)**

**West and East Norwood Avenues are to be designed by the Consultant and/or local jurisdiction; they are connected to IL-53 via an omitted land bridge.

Pavement Reconstruction
Tied PCC Curb and Gutter
9 1/2" PCC Pavement Jointed ¹
12" Aggregate Subgrade Improvement ²

¹ Designer Note 1: Use pay item #42000411, "**PORTLAND CEMENT CONCRETE PAVEMENT, 9 1/2" (JOINTED)**", paid in square yards. Transverse contraction joints should be spaced every 15'.

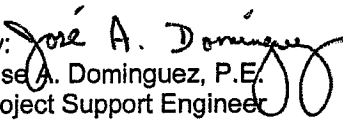
² Designer Note 2: Use pay item #30300112, "**AGGREGATE SUBGRADE IMPROVEMENT, 12" "**", paid in square yards.

Paul Niedernhofer
August 20, 2012
Page Two

We recommend that Hamilton Parkway follow the pavement design for IL-53 due to its short length and for construction continuity. Hamilton Parkway is subject to local jurisdictional approval and concurrence.

We recommend that the new construction of Driveway A, approximately 405 feet long, located east of IL-53 and south of Devon Avenue for access to the Infinity Broadcasting building be designed according to IDOT Standard Drawing BD01, "Driveway Details – Distance between ROW and face of curb and edge of shoulder greater than or equal to 15 feet".

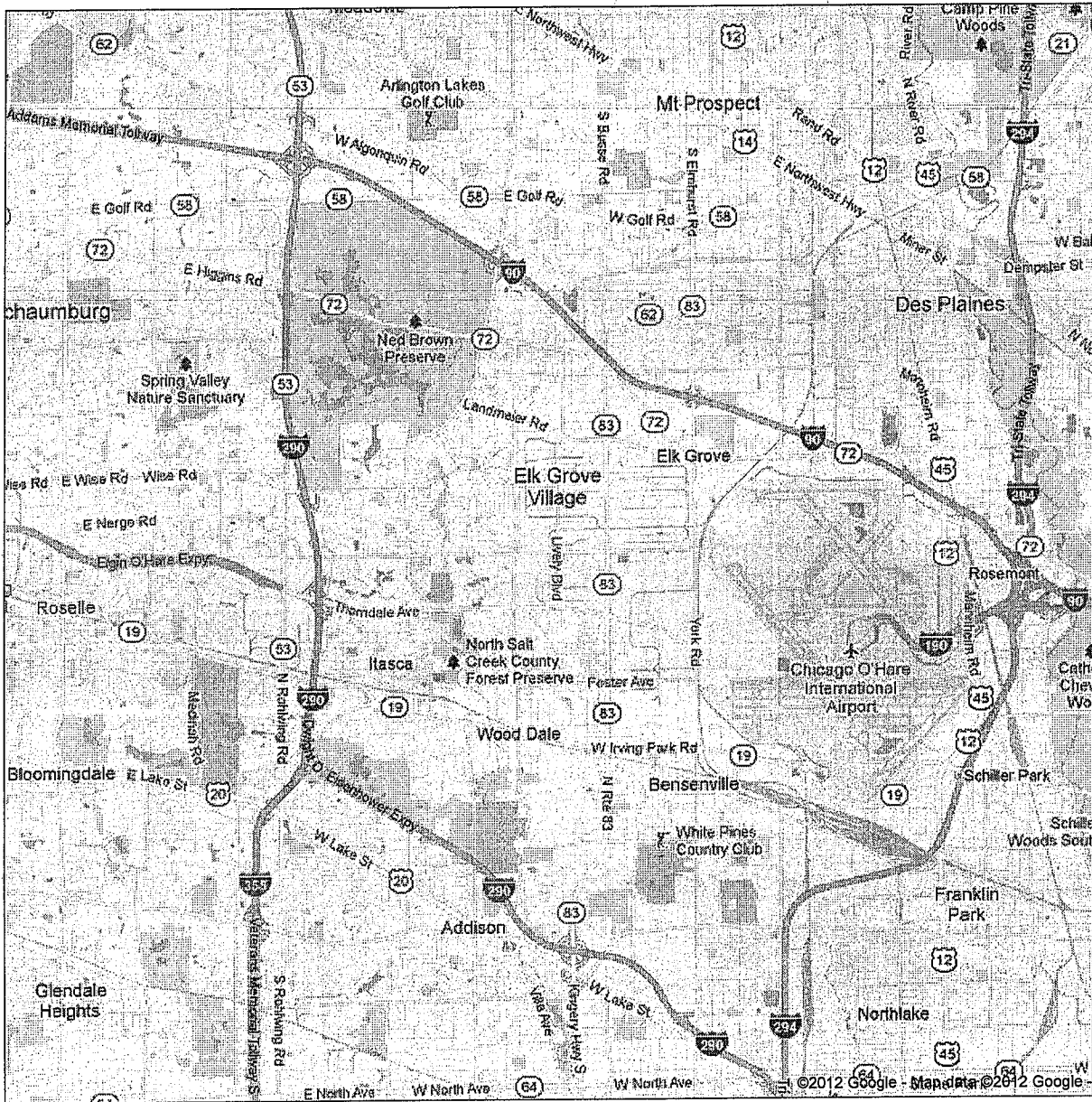
If you have any questions or need additional information, please contact Jenpai Chang, Acting Pavement Design Engineer, at (847)705-4432.


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

Get Google Maps on your phone



Text the word "GMAPS" to 466453



PROJECT AND TRAFFIC INPUTS				(Enter Data in Gray Shaded Cells)		
Route: Elgin O'Hare-West Bypass	Comments: New Construction					
Section:	Design Date: 07/24/2012 JK					
County: DuPage	Modified Date: 08/10/2012 AK					
Location: IL-53 (Rohlfing Rd)		<-- BY		ADT	Year	
		Current:	14,480	2010		
		Future:	24,700	2030		
Facility Type: Other Marked State Route	# of Lanes = 4	READ ME				
	Road Class: I	Structural Design Traffic				
	Subgrade Support Rating (SSR): Poor	Minimum ADT	Actual ADT	Actual % of Total ADT	% of ADT in Design Lane	
	Construction Year: 2013	PV = 0	19,137	90.6%	P = 32%	
	Design Period (DP) = 20 years	SU = 250	929	4.4%	S = 45%	
		MU = 750	1,056	5.0%	M = 45%	
		Struct. Design ADT = 21,123		(2023)		
TRAFFIC FACTOR CALCULATION						
FLEXIBLE PAVEMENT			RIGID PAVEMENT			
Cpv = 0.15	Csu = 132.5	Cmu = 482.53	Cpv = 0.15	Csu = 143.81	Cmu = 696.42	
TF flexible (Actual) = 5.71 (Actual ADT)	TF flexible (Min) = 3.56 (Min ADT Fig. 54-2.C)		TF rigid (Actual) = 7.84 (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 = 5.71	Use TF rigid = 7.84
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)	Edge Support = Tied Shoulder or C.&G.
HMA Mixture Temp. = 74.0 deg. F (Fig. 54-5.C)	Rigid Pavt Thick. = 9.50 in. (Fig. 54-4.E)
Design HMA Mixture Modulus (E _{HMA}) = 720 ksi (Fig. 54-5.D)	
Design HMA Strain (ε _{HMA}) = 73 (Fig. 54-5.E)	CRC Pavement
Full Depth HMA Design Thickness = 11.00 in. (Fig. 54-5.F)	Use TF rigid = 7.84
Limiting Strain Criterion Thickness = 14.50 in. (Fig. 54-5.I)	IBR value = 3
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 = 5.71	Review 54-4.03 for limitations and special considerations.
District = 3,4,5,6	JPCP Thickness = NA inches
HMA Overlay Design Thickness = 9.00 in. (Fig. 54-5.U)	
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)		
	Min. Str. Design Traffic (Fig 54-2.C)			Class Table for One-Way Streets		
Facility Type	PV	SU	MU	ADT	Class	
Interstate or Supplemental Freeway	0	500	1500	0 - 3500	II	
Other Marked State Route	0	250	750	>3501	I	
Unmarked State Route	No Min	No Min	No Min			
	Traffic Factor ESAL Coefficients				Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)		ADT	Class
Class	Csu	Cmu	Csu	Cmu	0 - 749	IV
I	143.81	696.42	132.50	482.53	750 - 2000	III
II	135.78	567.21	112.06	385.44	>2000	II
III	129.58	562.47	109.14	384.35		
IV	129.58	562.47	109.14	384.35		
	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%

PLAIN JOINED PCC PAVEMENT

FILENAME- 10-Aug-12
 ROUTE- 10:31 AM
 SECTION-
 COUNTY-
 LOCATION-
 DATE-
 PROJECT LENGTH (FT) 0.32 MILES
 AVERAGE LANE WIDTH (FT)
 NUMBER OF LANES
 # OF EDGES
 INSIDE SHOULDER WIDTH (FT)
 OUTSIDE SHOULDER WIDTH (FT)
 # OF CENTERLINES
 RIGID THICKNESS
 TRAFFIC FACTORS
 TRAFFIC
 PV 19137
 SU 128
 MU 1056
 Percentages
 90.89%
 4.00%
 5.00%

MAINTENANCE COSTS:	ITEM	QUANTITY	UNIT PRICE	COST	PW
Activity 1 YEAR 10	PAVEMENT PATCHING 0.1% (SQ YDS)	9	\$130.00	\$1,170	\$871
Activity 2 YEAR 15	PAVEMENT PATCHING 0.2% (SQ YDS)	19	\$130.00	\$2,470	\$1,585
Activity 3 YEAR 20	PAVEMENT PATCHING 2.0% (SQ YDS)	166	\$130.00	\$24,180	
	SHOULDER PATCHING 0.5% (SQ YDS)	0	\$85.00	\$0	
	SHLDR JT ROUT & SEAL 100% (LF)	6,692	\$1.00	\$6,692	
	CENTERLINE JT ROUT & SEAL 100% (LF)	6,692	\$1.00	\$6,692	
Activity 4 YEAR 25	PAVEMENT PATCHING 3.0% (SQ YDS)	279	\$130.00	\$36,270	\$20,799
	SHOULDER PATCHING 1.0% (SQ YDS)	0	\$85.00	\$0	
Activity 5 YEAR 30	PAVEMENT PATCHING 4.0% (SQ YDS)	372	\$130.00	\$48,360	\$17,323
	SHOULDER PATCHING 1.5% (SQ YDS)	0	\$85.00	\$0	
	POLICY HMA OVERLAY O/VMT (SQ YDS)	9,294	\$10.56	\$98,145	
	POLICY HMA OVERLAY SHLDR (SQ YDS)	0	\$10.56	\$0	
Activity 6 YEARS 35	SHLDR JT ROUT & SEAL 100% (LF)	6,692	\$1.00	\$6,692	\$60,360
	CENTERLINE JT ROUT & SEAL 100% (LF)	6,692	\$1.00	\$6,692	
	RANDOM CRACK ROUT & SEAL 50% (LF)	3,346	\$1.00	\$3,346	
	REFL TRANS CRACK ROUT & SEAL 40%	2,141	\$1.00	\$2,141	
	PARTIAL PMVT PATCH 0.7% (SQ YDS)	9	\$130.00	\$1,170	
Activity 7 YEAR 40	PAVEMENT PATCHING 0.5% (SQ YDS)	46	\$130.00	\$5,980	\$7,123
	SHOULDER PATCHING 0.5% (SQ YDS)	46	\$130.00	\$5,980	
	REFL TRANS CRACK ROUT & SEAL 60%	3,212	\$1.00	\$3,212	
	RANDOM CRACK ROUT & SEAL 50% (LF)	3,346	\$1.00	\$3,346	
	SHLDR JT ROUT & SEAL 100% (LF)	6,692	\$1.00	\$6,692	
	CENTERLINE JT ROUT & SEAL 100% (LF)	6,692	\$1.00	\$6,692	
	PARTIAL PMVT PATCH (SQ YDS)			\$31,902	\$9,781
				\$31,902	\$9,781
					\$117,842

Total Rehabilitation Cost (Present Worth)

INITIAL COSTS	ITEM	QUANTITY	UNIT PRICE	COST
	PAVEMENT (SQ YDS)	9,294	\$445,368	\$445,368
	STAB SUBBASE (SQ YDS)	10,410	\$0	\$0
	SHOULDER (SQ YDS)	0	\$0	\$0
	SHOULDER SEAL (LN FT)	6,692	\$0	\$0
	SUBBASE GRAN MATL TYP C (TONS)	0	\$0	\$0
				\$445,368
				\$117,842
				\$583,210
				\$71,792
				\$654,998
				\$130,000
				\$85,000
				\$1,000
				\$10,560
				\$10,560
				\$1,000
				\$1,000
				\$130,000

MAINTENANCE COSTS:

ITEM	UNIT PRICE	COST
PAVEMENT PATCHING (SQ YDS)	\$130.00	\$130,000
SHLDR JT ROUT & SEAL (LF)	\$85.00	\$85,000
CENTERLINE JT ROUT & SEAL (LF)	\$1.00	\$1,000
POLICY HMA OVERLAY PMVT (SQ YDS)	\$10.56	\$10,560
RANDOM CRACK ROUT & SEAL (LF)	\$1.00	\$1,000
REFL TRANS CRACK ROUT & SEAL (LF)	\$1.00	\$1,000
PARTIAL PMVT PATCH (SQ YDS)	\$130.00	\$130,000

(Use Class A pricing for CRC)

TOTAL REHABILITATION COST (PW)
 TOTAL LIFE CYCLE COST (PW)
 ANNUAL COST PER MILE

FULL-DEPTH FLEXIBLE
 TRAFFIC FACTOR LESS THAN 15.0 (RURAL)
 TRAFFIC FACTOR LESS THAN 10.0 (URBAN)
 ROUTE-
 SECTION-
 COUNTY-
 LOCATION-
 0
 DuPage
 at Thorndale (EO Exp)

10-Aug-12
 10:31 AM

FULL DEPTH FLEXIBLE PAVEMENT
 MAINTENANCE COSTS

PW

PROJECT LENGTH (FT) 1873
 AVERAGE LANE WIDTH (FT) 12.5
 NUMBER OF LANES 4
 # OF EDGES 4
 INSIDE SHOULDER WIDTH (FT) 0
 OUTSIDE SHOULDER WIDTH (FT) 0
 # OF CENTERLINES 4
 PROJECT TYPE 2
 PAVING WIDTH 1=URBAN, 2=URBAN
 INTERSTATE / OTHER ROUTE 1= SINGLE LANE, 2=DUAL LANE
 FLEXIBLE THICKNESS OTHER ROUTE
 TRAFFIC FACTORS MINIMUM ACTUAL
 FLEXIBLE 1.66 1.74

TRAFFIC
 PV- 19137 90.60%
 SU- 929 4.40%
 ML- 1058 5.00%

PAVEMENT OVERLAY THICKNESS 3.75
 SHOULDER OVERLAY THICKNESS 1.75

INITIAL COSTS	ITEM	QUANTITY	UNIT PRICE	COST
	SURFACE (SQ YDS)	9,294	\$10.66	\$98,145
	POLY BINDER (SQ YDS)	9,294	\$10.91	\$98,609
	BINDER (SQ YDS)	9,294	\$27.53	\$254,005
	SHOULDRS (SQ YDS)	0		\$0
	SUBBASE GRAN MAT'L Y C (TONS)	0		\$0

CONSTRUCTION INITIAL COST (PW) \$490,759
 TOTAL REHABILITATION COST (PW) \$223,207

TOTAL LIFE CYCLE COST (PW) \$973,968
 ANNUAL COST PER MILE \$85,910

MAINTENANCE COSTS:

ITEM	UNIT PRICE	UNIT COST
RANDTHERM CRACK ROUT & SEAL (LF)	\$1.00	\$1.00
SHLDR JT ROUT & SEAL (LF)	\$1.00	\$1.00
CENTERLINE JT ROUT & SEAL (LF)	\$90.00	\$90.00
PARTIAL PVMT PATCH (SQ YDS)	\$1.75	\$1.75
2" MILL PVMT & SHLDR (SQ YDS)	(Use \$3.00 for small quantity)	\$94.29
2" OVERLAY PVMT & SHLDR (TONS)	(Use \$3.00 for small quantity)	\$94.29
2" MILL PVMT ONLY (SQ YDS)		\$90.00
HMA SHOULDER PATCHING (SQ YDS)		\$94.29
POLICY HMA OVERLAY PVMT (TONS)		\$94.29
POLICY HMA OVERLAY SHLDR (TONS)		\$94.29

MATERIAL TYPE/PERCENTAGE PCC 19.7%

Activity 1	YEAR 5	RANDTHERM CRACK ROUT & SEAL 50% (LF)	SHLDR JT ROUT & SEAL 100% (LF)	CENTERLINE JT ROUT & SEAL 100% (LF)	PARTIAL PVMT PATCH 0.1% (SQ YDS)	QUANTITY	UNIT PRICE	COST	PW
						920	\$1.00	\$920	
						6,692	\$1.00	\$6,692	
						9	\$90.00	\$810	
								\$15,114	\$13,037
Activity 2	YEAR 10	PARTIAL PVMT PATCH 0.5% (SQ YDS)	RANDTHERM CRACK ROUT & SEAL 50% (LF)	SHLDR JT ROUT & SEAL 100% (LF)	CENTERLINE JT ROUT & SEAL 100% (LF)	46	\$90.00	\$4,140	
						920	\$1.00	\$920	
						6,692	\$1.00	\$6,692	
						6,692	\$1.00	\$6,692	
								\$18,444	\$13,724
Activity 3	YEAR 15	2" MILL PVMT & SHLDR 100% (SQ YDS)	PARTIAL PVMT PATCH 1.0% (SQ YDS)	2" OVERLAY PVMT & SHLDR 100% (TONS)		9,294	\$1.75	\$16,265	
						93	\$90.00	\$8,370	
						1,041	\$94.29	\$98,151	
								\$122,786	\$76,516
Activity 4	YEAR 20	SHLDR JT ROUT & SEAL 100% (LF)	CENTERLINE JT ROUT & SEAL 100% (LF)	RANDTHERM CRACK ROUT & SEAL 50% (LF)	PARTIAL PVMT PATCH 0.1% (SQ YDS)	6,692	\$1.00	\$6,692	
						6,692	\$1.00	\$6,692	
						920	\$1.00	\$920	
						9	\$90.00	\$810	
								\$15,114	\$8,369
Activity 5	YEAR 25	SHLDR JT ROUT & SEAL 100% (LF)	CENTERLINE JT ROUT & SEAL 100% (LF)	RANDTHERM CRACK ROUT & SEAL 50% (LF)	PARTIAL PVMT PATCH 0.5% (SQ YDS)	6,692	\$1.00	\$6,692	
						6,692	\$1.00	\$6,692	
						920	\$1.00	\$920	
						46	\$90.00	\$4,140	
								\$18,444	\$8,809
Activity 6	YEAR 30	2" MILL PVMT & SHLDR 100% (SQ YDS)	PARTIAL PVMT PATCH 2.0% (SQ YDS)	HMA SHLDR PATCHING 1.0% (SQ YDS)	POLICY HMA OVERLAY PVMT (TONS)	9,294	\$1.75	\$16,265	
						186	\$90.00	\$16,740	
						0	\$90.00	\$0	
						1,952	\$94.29	\$184,048	
						0	\$94.29	\$0	
								\$217,051	\$89,425
Activity 7	YEAR 35	SHLDR JT ROUT & SEAL 100% (LF)	CENTERLINE JT ROUT & SEAL 100% (LF)	RANDTHERM CRACK ROUT & SEAL 50% (LF)	PARTIAL PVMT PATCH 0.1% (SQ YDS)	6,692	\$1.00	\$6,692	
						6,692	\$1.00	\$6,692	
						920	\$1.00	\$920	
						9	\$90.00	\$810	
								\$15,114	\$5,372
Activity 8	YEAR 40	SHLDR JT ROUT & SEAL 100% (LF)	CENTERLINE JT ROUT & SEAL 100% (LF)	RANDTHERM CRACK ROUT & SEAL 50% (LF)	PARTIAL PVMT PATCH 0.5% (SQ YDS)	6,692	\$1.00	\$6,692	
						6,692	\$1.00	\$6,692	
						920	\$1.00	\$920	
						46	\$90.00	\$4,140	
								\$18,444	\$5,655

Total Rehabilitation Cost (Present Worth) \$223,207

MECHANISTIC PAVEMENT DESIGN

Date 10-Aug-12 Route IL-53 (Rohlwing Rd)
Calcs by: [REDACTED] Section 0
Checked by: [REDACTED] DuPage County
Class [REDACTED] Roads and Streets Location at Thorndale (EO Expy)
Urban Rural
Limits of Analysis Station [REDACTED] to Station [REDACTED]
Length 1673 Feet 0.32 Miles

Structural Design Traffic Percent of S.D.T. in Design Lane
PV = 19137 P = 90.60%
SU = 929 S = 4.40%
MU = 1056 U = 5.00%

MINIMUM SUBGRADE SUPPORT RATING - "POOR"

Flexible Pavement Design Actual $TF_F = 5.71$ Minimum $TF_F = 3.56$

Selected Design AC Type
Design AC Mixture Temp [REDACTED] °F Design E_{AC} [REDACTED] KSI
Design AC Microstrain [REDACTED] AC Thickness [REDACTED] Inch

Rigid Pavement Design Actual $TF_F = 7.84$ Minimum $TF_F = 5.02$
Extended Lane 10 Inch
15' Panel PCC Thickness for:
Tied Shoulder 0 Inch
Untied Shoulder 0 Inch

Figure 5.05

RIGID PAVEMENT

Date: 10-Aug-12 Route -53 (Rohlwing R
 Quantities by 0 Checked by: [REDACTED] Section 0
 Unit Prices by [REDACTED] Checked by: [REDACTED] DuPage County
 Net Length 1673 Lin. Ft. = 0.32 Miles
 Number Lanes 4 Urban X Rural

ITEMIZED CONSTRUCTION COST

<u>Quantity</u>	<u>Units</u>	<u>Item</u>		<u>Unit</u>	<u>Total</u>
				<u>Cost</u>	<u>Cost</u>
<u>9294</u>	Sq. Yds.	<u>10 Inch</u> Jointed PCC	@	<u>\$47.92</u>	<u>\$445,368</u>
<u>10410</u>	Sq. Yds.	4-Inch (Stabilized/Granular Subbase)	@	<u>\$0.00</u>	<u>\$0</u>
<u>0</u>	Sq. Yds.	PCC Shoulder	@	<u>\$0.00</u>	<u>\$0</u>
	Lin. Ft.	Pipe Underdrains	@		
<u>0</u>		Subbase Gran. Mat., Type C	@	<u>\$0.00</u>	<u>\$0</u>
<u>6,692</u>	Lin. Ft.	100% Shoulder Joint Seal	@	<u>\$0.00</u>	<u>\$0</u>

Total Cost of Original Pavement Construction \$445,368

ITEMIZED MAINTENANCE AND REHABILITATION ACTIVITY COST

REHABILITATION ACTIVITY 1 - YEAR 10

<u>9</u> Sq. Yds.	0.1% Full Depth PCC Pavement Patching	@	<u>\$130.00</u>	<u>\$1,170</u>
Total Cost of Rehabilitation Activity 1				<u>\$1,170</u>

Figure 5.05a(1)

REHABILITATION ACTIVITY 2 - YEAR 15

			Unit Cost	Total Cost
<u>19</u> Sq. Yds.	0.2% Full Depth PCC Pavement Patching @		<u>\$130.00</u>	<u>\$2,470</u>

Total Cost of Rehabilitation Activity 2 \$2,470

REHABILITATION ACTIVITY 3 - YEAR 20

			Unit Cost	Total Cost
<u>186</u> Sq. Yds.	2% Full Depth PCC Pavement Patching @		<u>\$0.00</u>	<u>\$24,180</u>
<u>0</u> Sq. Yds.	0.5% Full Depth PCC Pavement Patching @		<u>\$85.00</u>	<u>\$0</u>
<u>6692</u> Lin. Ft.	100% Longitudinal/ Shoulder Joint Routing & Sealing @		<u>\$1.00</u>	<u>\$6,692</u>
<u>6692</u> Lin. Ft.	100% Centerline Joint Routing & Sealing @		<u>\$1.00</u>	<u>\$6,692</u>

Total Cost of Rehabilitation Activity 3 \$37,564

FIGURE 5.05a(2)

REHABILITATION ACTIVITY 4 - YEAR 25

			Unit Cost	Total Cost
<u>279</u> Sq. Yds.	3.0% Full Depth PCC Pavement Patching	@	<u>\$130.00</u>	<u>\$36,270</u>
<u>0</u> Sq. Yds.	1.0% Full Depth PCC Pavement Patching	@	<u>\$85.00</u>	<u>\$0</u>

Total Cost of Rehabilitation Activity 4 \$36,270

REHABILITATION ACTIVITY 5 - YEAR 30

			Unit Cost	Total Cost
<u>372</u> Sq. Yds.	3.0% Full Depth PCC Pavement Patching	@	<u>\$85.00</u>	<u>\$0</u>
<u>0</u> Sq. Yds.	1.0% Full Depth PCC Pavement Patching	@	<u>\$10.56</u>	<u>\$98,145</u>
<u>9,294</u> Sq. Yds.	Policy HMA Overlay - Pavement	@	<u>\$10.56</u>	<u>\$98,145</u>
<u>0</u> Sq. Yds.	Policy HMA Overlay - Shoulder	@	<u>\$10.56</u>	<u>\$0</u>

Total Cost of Rehabilitation Activity 5 \$146,505

REHABILITATION ACTIVITY 6 - YEAR 35

			Unit Cost	Total Cost
<u>6,692</u> Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@	<u>\$1.00</u>	<u>\$6,692</u>
<u>6692</u> Lin. Ft.	100% Centerline Joint Routing & Sealing	@	<u>\$1.00</u>	<u>\$6,692</u>
<u>3,346</u> Lin. Ft.	50% Random Crack Routing & Sealing - Assume 100ft/station	@	<u>\$1.00</u>	<u>\$3,346</u>
<u>2,141</u> Lin. Ft.	40% Reflective Transverse Crack Routing & Sealing	@	<u>\$1.00</u>	<u>\$2,141</u>
<u>9</u> Sq. Yds.	0.1% Partial-Depth Pavement Patching (Mill & Fill Surface-Interstates; Mill & Fill 2.5in. Non-Interstates)		<u>\$130.00</u>	<u>\$1,170</u>

Total Cost of Rehabilitation Activity 6 \$20,041

Figure 5.05a(3)

RIGID PAVEMENT (Cont.)

Route IL-53 (Rohlwing Rd)

Section 0

DuPage County

REHABILITATION ACTIVITY 7 - YEAR 40

			Unit Cost	Total Cost
<u>46</u> Sq. Yds.	0.5% Full Depth PCC Pavement Patching	@	<u>\$130.00</u>	<u>\$5,980</u>
<u>46</u> Sq. Yds.	0.5% Partial Depth Pavement Patching	@	<u>\$130.00</u>	<u>\$5,980</u>
	(Mill & Fill Surface-Interstates; Mill & Fill 2.5in. Non-Interstates)			
<u>3,212</u> Lin. Ft.	60% Reflective Transverse Crack	@	<u>\$1.00</u>	<u>\$3,212</u>
	Routing & Sealing			
<u>3,346</u> Lin. Ft.	50% Random Crack	@	<u>\$1.00</u>	<u>\$3,346</u>
	Routing & Sealing - Assume 100ft/station			
<u>6,692</u> Lin. Ft.	100% Longitudinal/ Shoulder Joint	@	<u>\$1.00</u>	<u>\$6,692</u>
	Routing & Sealing			
<u>6,692</u> Lin. Ft.	100% Centerline Joint	@	<u>\$1.00</u>	<u>\$6,692</u>
	Routing & Sealing			
	Total Cost of Rehabilitation Activity 7			<u>\$31,902</u>

ANNUAL COST DETERMINATION

Present Worth Calculation:

	Total Cost of Original Pavement Construction	<u>\$445,368</u>
Present Worth of Rehab Activity 1	<u>\$1,170</u>	x 0.7441 = <u>\$871</u>
Present Worth of Rehab Activity 2	<u>\$2,470</u>	x 0.6419 = <u>\$1,585</u>
Present Worth of Rehab Activity 3	<u>\$37,564</u>	x 0.5537 = <u>\$20,799</u>
Present Worth of Rehab Activity 4	<u>\$36,270</u>	x 0.4776 = <u>\$17,323</u>
Present Worth of Rehab Activity 5	<u>\$146,505</u>	x 0.4120 = <u>\$60,360</u>
Present Worth of Rehab Activity 6	<u>\$20,041</u>	x 0.3554 = <u>\$7,123</u>
Present Worth of Rehab Activity 7	<u>\$31,902</u>	x 0.3066 = <u>\$9,781</u>
	Total Life Cycle Cost (Present Worth)	<u>\$117,842</u>

Annual Cost Per Mile Calculation

Total PW	x CRF _n /	Length		= Annual Cost / Year-Mile
<u>\$117,842</u>	x0.04079 /	<u>0.32</u>	Mi.	<u>\$71,792</u> per Yr.-Mi.

FLEXIBLE PAVEMENT

Date: 10-Aug-12 Route IL-53 (Rohwing Rd)
 Quantities by 0 Checked by: [REDACTED] Section 0
 Unit Prices by: 0 Checked by: [REDACTED] DuPage County
 Net Length 1673 Lin. Ft. = 0.32 Miles
 Number Lanes 4 Urban X Rural
 Single Lane Paving X Dual Lane Paving

ITEMIZED CONSTRUCTION COST

<u>Quantity</u>	<u>Units</u>	<u>Item</u>		<u>Unit Cost</u>	<u>Total Cost</u>
<u>9,294</u>	Sq. Yds.	Class I Surface Course	@	<u>\$10.56</u>	<u>\$98,145</u>
<u>9,294</u>	Sq. Yds.	Class I Binder Course	@	<u>\$27.33</u>	<u>\$254,005</u>
<u>0</u>	Sq. Yds.	Stabilized Shoulders	@	<u>\$0.00</u>	<u>\$0</u>
	Lin. Ft.	Pipe Underdrains	@		
<u>0</u>		Subbase Gran. Matl., Type C	@	<u>\$0.00</u>	<u>\$0</u>
<u>9,294</u>	Sq. Yds.	Poly Binder	@	<u>\$10.61</u>	<u>\$98,609</u>
Total Cost of Original Pavement Construction					<u>\$450,759</u>

ITEMIZED MAINTENANCE AND REHABILITATION ACTIVITY COST

REHABILITATION ACTIVITY 1 - YEAR 5

				<u>Unit Cost</u>	<u>Total Cost</u>
<u>920</u>	Lin. Ft.	50% Random/Thermal Cracking & Sealing (Assume 110ft/station)	@	<u>\$1.00</u>	<u>\$920</u>
<u>6692</u>	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@	<u>\$1.00</u>	<u>\$6,692</u>
<u>6692</u>	Lin. Ft.	100% Centerline Joint Rounting & Sealing	@	<u>\$1.00</u>	<u>\$6,692</u>
<u>9</u>	Sq. Yds.	0.1% Partial-Depth Pavement Patching Mill & Fill Surface	@	<u>\$90.00</u>	<u>\$810</u>

Total Cost of Rehabilitation Activity 1 \$15,114

FIGURE 5.05b(1)

REHABILITATION ACTIVITY 2 - YEAR 10

				<u>Unit</u> <u>Cost</u>	<u>Total</u> <u>Cost</u>
<u>46</u>	Sq. Yds.	0.5% Partial-depth HMA Pavement Patching - Mill & Fill Surface	@	<u>\$90.00</u>	<u>\$4,140</u>
<u>920</u>	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/station)	@	<u>\$1.00</u>	<u>\$920</u>
<u>6692</u>	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@	<u>\$1.00</u>	<u>\$6,692</u>
<u>6692</u>	Lin. Ft.	100% Centerline Joint Rounting & Sealing	@	<u>\$1.00</u>	<u>\$6,692</u>
Total Cost of Rehabilitation Activity 2					<u>\$18,444</u>

REHABILITATION ACTIVITY 3 - YEAR 15

				<u>Unit</u> <u>Cost</u>	<u>Total</u> <u>Cost</u>
<u>9,294</u>	Sq. Yds.	2.00in. Milling - Pavement & Shoulder	@	<u>\$1.75</u>	<u>\$16,265</u>
<u>93</u>	Sq. Yds.	1.0% Partial-depth Pavement Patching (Mill & Fill Addition 2.00in.)	@	<u>\$90.00</u>	<u>\$8,370</u>
<u>1,041</u>	Sq. Yds.	2.00in. HMA Overlay Pavement & Shoulder	@	<u>\$94.29</u>	<u>\$98,151</u>
Total Cost of Rehabilitation Activity 3					<u>\$122,786</u>

FLEXIBLE PAVEMENT (Cont.)

Route IL-53 (Rohlwing Rd)

Section 0

DuPage County

Unit Total

Cost Cost

REHABILITATION ACTIVITY 4 - YEAR 20

<u>6692</u>	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@	<u>\$1.00</u>	<u>\$6,692</u>
<u>6692</u>	Lin. Ft.	100% Centerline Joint Rounting & Sealing	@	<u>\$1.00</u>	<u>\$6,692</u>
<u>920</u>	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/station)	@	<u>\$1.00</u>	<u>\$920</u>
<u>9</u>	Sq. Yds.	0.1% Partial-Depth HMA Pavement Patching (Mill & Fill Surface)	@	<u>\$90.00</u>	<u>\$810</u>

Total Cost of Rehabilitation Activity 4 \$15,114

Unit Total

Cost Cost

REHABILITATION ACTIVITY 5 - YEAR 25

<u>6692</u>	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@	<u>\$1.00</u>	<u>\$6,692</u>
<u>6692</u>	Lin. Ft.	100% Centerline Joint Rounting & Sealing	@	<u>\$1.00</u>	<u>\$6,692</u>
<u>920</u>	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/station)	@	<u>\$1.00</u>	<u>\$920</u>
<u>46</u>	Sq. Yds.	0.5% Partial-Depth Pavement Patching (Mill & Fill Surface)	@	<u>\$90.00</u>	<u>\$4,140</u>

Total Cost of Rehabilitation Activity 5 \$18,444

Unit Total

Cost Cost

REHABILITATION ACTIVITY 6 - YEAR 30

<u>9,294</u>	Sq. Yds.	2.00in. Milling (Pavement only-Std Design @ Pavement & Shoulder-Limiting Strain Criteria Design)	@	<u>\$1.75</u>	<u>\$16,265</u>
<u>186</u>	Sq. Yds.	2.0% Partial-Depth HMA Pavement Patching (Mill & Fill Additional 2.00in. All Designs)	@	<u>\$90.00</u>	<u>\$16,740</u>
<u>0</u>	Sq. Yds.	1.0% Full-Depth HMA Shoulder Patching (Mill & Fill Surface-Standard Design Mill & Fill Additional 2.00in.-Limiting Strain Criteria Design)	@	<u>\$90.00</u>	<u>\$0</u>
<u>1,952</u>	Tons	HMA Overlay Pvmt (3.75in. - Std Design @ 2.00in.-Limiting Strain Criterion Design)	@	<u>\$94.29</u>	<u>\$184,046</u>
<u>0</u>	Tons	HMA Overlay Shoulder (1.75in. - Standard @ Design; 2.00in.-Limiting Strain Criterion Design)	@	<u>\$94.29</u>	<u>\$0</u>

Total Cost of Rehabilitation Activity 6 \$217,051

FIGURE 5.05b(3)

FLEXIBLE PAVEMENT (Cont.)

Route IL-53 (Rohlwing Rd)

Section 0

DuPage County

REHABILITATION ACTIVITY 7 - YEAR 35

				<u>Unit</u>	<u>Total</u>
				<u>Cost</u>	<u>Cost</u>
<u>6692</u>	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@	<u>\$1.00</u>	<u>\$6,692</u>
<u>6692</u>	Lin. Ft.	100% Centerline Joint Rounting & Sealing	@	<u>\$1.00</u>	<u>\$6,692</u>
<u>920</u>	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/station)	@	<u>\$1.00</u>	<u>\$920</u>
<u>9</u>	Sq. Yds.	0.1% Partial-Depth HMA Pavement Patching (Mill & Fill Surface)	@	<u>\$90.00</u>	<u>\$810</u>
Total Cost of Rehabilitation Activity 7					<u>\$15,114</u>

REHABILITATION ACTIVITY 8 - YEAR 40

				<u>Unit</u>	<u>Total</u>
				<u>Cost</u>	<u>Cost</u>
<u>6692</u>	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@	<u>\$1.00</u>	<u>\$6,692</u>
<u>6692</u>	Lin. Ft.	100% Centerline Joint Rounting & Sealing (Single Lane and Dual Lane Paving)	@	<u>\$1.00</u>	<u>\$6,692</u>
<u>920</u>	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/station)	@	<u>\$1.00</u>	<u>\$920</u>
<u>46</u>	Sq. Yds.	0.5% Partial-Depth Pavement Patching (Mill & Fill Surface)	@	<u>\$90.00</u>	<u>\$4,140</u>
Total Cost of Rehabilitation Activity 8					<u>\$18,444</u>

ANNUAL COST DETERMINATION

Present Worth Calculation:

	Total Cost of Original Pavement Construction	<u>\$450,759</u>
Present Worth of Rehab Activity 1	<u>\$15,114</u> x 0.7441 =	<u>\$13,037</u>
Present Worth of Rehab Activity 2	<u>\$18,444</u> x 0.6419 =	<u>\$13,724</u>
Present Worth of Rehab Activity 3	<u>\$122,786</u> x 0.5537 =	<u>\$78,816</u>
Present Worth of Rehab Activity 4	<u>\$15,114</u> x 0.4776 =	<u>\$8,369</u>
Present Worth of Rehab Activity 5	<u>\$18,444</u> x 0.4120 =	<u>\$8,809</u>
Present Worth of Rehab Activity 6	<u>\$217,051</u> x 0.3554 =	<u>\$89,425</u>
Present Worth of Rehab Activity 7	<u>\$15,114</u> x 0.3066 =	<u>\$5,372</u>
Present Worth of Rehab Activity 8	<u>\$18,444</u> x 0.3066 =	<u>\$5,655</u>
	Total Life Cycle Cost (Present Worth)	<u>\$223,207</u>

Annual Cost Per Mile Calculation

Total PW	x CRF _n /	Length		= Annual Cost / Year-Mile
<u>\$223,207</u>	x0.04079 /	<u>0.32</u>	Mi.	<u>\$85,910</u> per Yr.-Mi.

MATERIAL TYPE/PERCENTAGE	PCC	19.7%
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