Illinois Department of Transportation

Memorandum

To: Scott Stitt

Attn: Paul R. Niedernhofer

From: Diane O'Keefe

By: Jose Dominguez

Subject: Pavement Analysis

Date: November 10, 2011

*Location: IL 31 at IL 176
Route: FAP 336
Contract No.: 62537
Letting: 03CY12

Section: 112R-N
County: McHenry
Job No.: D-91-351-02

We are submitting a revised pavement analysis for the above captioned location for your review and approval.

The following is the scope of work for this project:

a. Pavement reconstruction of IL 31 to provide 4 at 12ft through and variable turn lanes with barrier medians for an approximate length of 2295 ft at IL 176.

b. Pavement reconstruction of IL 176 to provide 4 at 12ft through and variable turn lanes with barrier medians for an approximate length of 2820 ft at IL 31.

c. Variable pavement widening and resurfacing from 0 to in excess of 6 ft on IL 31 and IL 176 to provide a tapered transition from the existing four-lane section to the newly reconstructed channelized intersection approaches.

A pavement analysis was previously performed on the above segments using a 20 year pavement design. As the reconstruction area exceeds 25,000 SQ YDS a 30 year pavement design is required. Our recommendation for the reconstruction segment is as follows:

a & b. IL 31 and IL 176

Tied PCC Curb and Gutter
10 ¼" Jointed PCC Pavement
4 ½" Stabilized Subbase, HMA
12" Aggregate Subgrade
Geotechnical Fabric

If you have any questions or need additional information, please contact Tom Matousek, Economic Analysis Coordinator, at (847)705-4255.

By: José A. Dominguez

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

USE FOR DFL Only

Spreadsheet by Uehle - Rev. 11/02

MECHANISTIC PAVEMENT DESIGN

Date: 11/10/11

INPUT (Enter Data in Gray Shaded Cells)

Route: IL 31
Section: 112R-n
County: McHenry
Location: at IL 176

Comments:

Designer: TMC

	ADT	Year
Current:	30000	2005
Future:	35000	2026

Facility Type: Other Marked State Route

# of Lanes = 4

Road Class: I

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT In Design Lane
PV =	0	34,427	91.4%	P = 32%
SU =	300	1,620	4.3%	S = 45%
MU =	900	1,620	4.3%	M = 45%
		Struct. Design ADT =	37667	(2028)

Subgrade Support Rating (SSR): Poor

Construction Year: 2013

Design Period (DP) = 30 years

FLEXIBLE & RIGID PAVEMENT CALCULATIONS AND ADDITIONAL INPUT

Flexible Pavement

Cpv = 0.15
Csu = 133
Cmu = 483
TF flexible (Actual)= 13.50 (Actual ADT)
TF flexible (Min)= 6.40 (Min ADT Fig 54-2C)
Use TF flexible = 13.50
AC Type = 20
AC Mixture Tempurature = deg. F (Figure 54-5C)
Design AC Mixture Modulus (Eac)= ksi (Figure 54-5D)
Design Asphalt Concrete Microstrain = ~~45.3~~ (Figure 54-5E)
Asphalt Concrete Thickness = in. (Figure 54-5F)

Rigid Pavement

Cpv = 0.15
Csu = 144
Cmu = 696
TF rigid (Actual)= 18.42 (Actual ADT)
TF rigid (Min)= 9.04 (Min ADT Fig 54-2C)
Use TF rigid = 18.42
1.00 Shoulder or C. &G.
Rigid Pavt Thick = 10.00 in. (Figure 54-4D)

DESIGN TABLES FROM BD&E PAVEMENT DESIGN CH. 54 AND PAVEMENT DESIGN MANUAL

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)

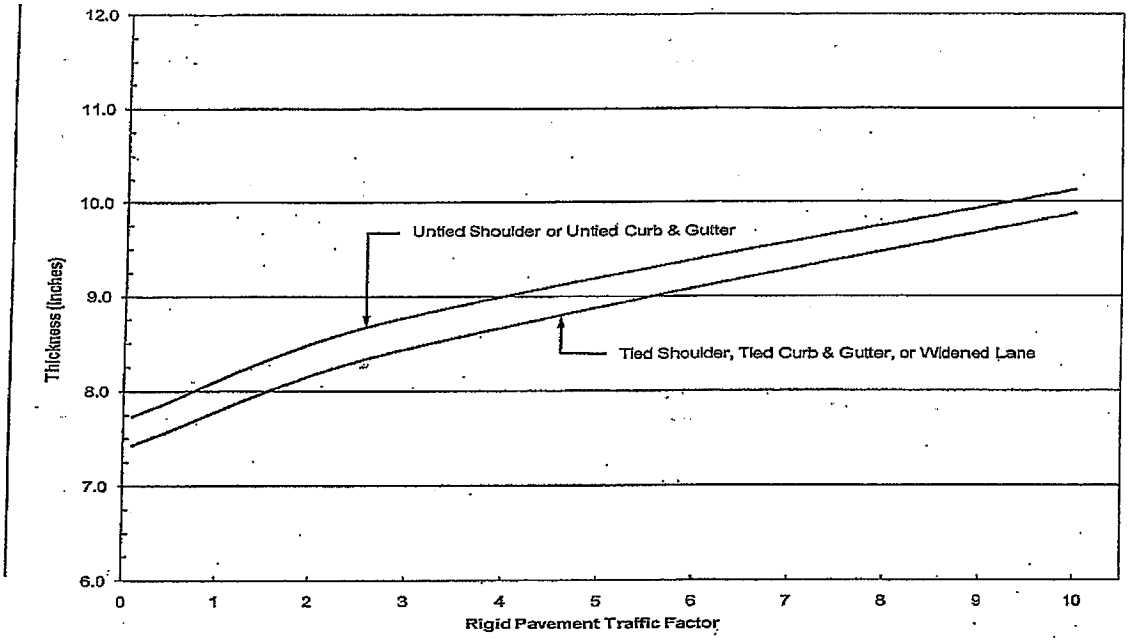
Facility Type	Min. Str. Design Traffic (Fig 54-2C) PV	SU	MU
Interstate or Supplemental Freeway	0	500	1500
Other Marked State Route	0	300	900
Unmarked State Route	No Min	No Min	No Min

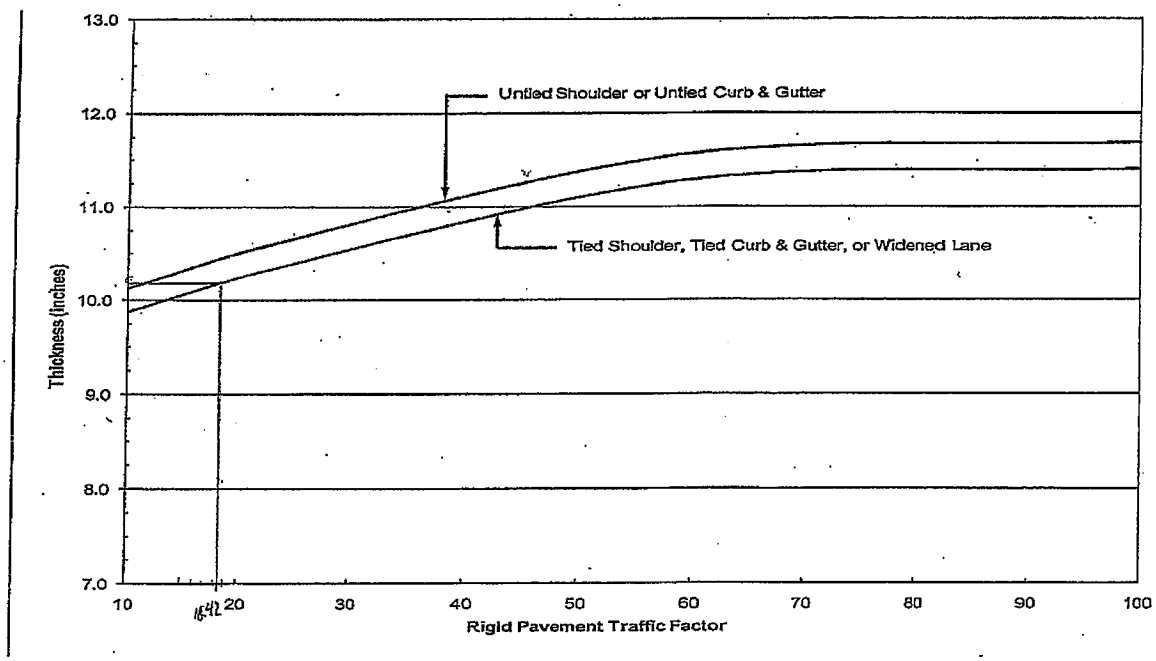
Class Table for One-Way Streets	
ADT	Class
0 - 3500	II
>3501	I

Class	Traffic Factor ESAL Coefficients: Rigid (Fig. 54-4C) Csu	Rigid Cmu	Flexible (Fig. 54-5B) Csu	Flexible Cmu
I	143.81	696.42	102.50	402.52
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV(ADT>400)	127.75	555.90	109.14	384.35
IV(ADT<=400)	127.75	555.90	9.86	78.84

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	Figure 54-2B Percentage of ADT in Design Lane: Rural P	Rural S	Rural M	Urban P	Urban S	Urban M
1 Lane Ramp	100%	100%	100%	100%	100%	100%
2 or 3	50%	50%	50%	50%	50%	50%
4	52%	46%	45%	52%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%





Note: Use of untied shoulder design requires BDE approval.

10¼" JOINTED PCC PAVEMENT

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

Figure 54-4.E

Niedernhofer, Paul R

From: Carrato, Thomas M.
Sent: Thursday, November 10, 2011 1:58 PM
To: Niedernhofer, Paul R
Cc: Dominguez, Jose A; Matousek, Thomas G; Khudeira, Mohamad
Subject: 62537 - IL 31 at IL 176 Revised Pavement Analysis
Attachments: IL-31 at IL-176 Memo and Design.pdf

Mr. Niedernhofer,

Per your discussion with Mohamad Khudeira from earlier today, I'm attaching the revised pavement analysis for Contract #62537 – IL 31 at IL 176. In summary, a pavement analysis was previously performed using a 20 year design however a 30 year design is warranted. The PCC thickness will increase from 9 ¾" to 10 ¼" and we've added 4 ½" Stabilized HMA Subbase.

Please let me know if you have any questions.

Thanks,

Tommy

Thomas M. Carrato, E.I.
Project Support Engineer
Illinois Department of Transportation
Tel.: (847) 705-4622
Fax: (847) 705-4246
E-Mail: Thomas.Carrato@illinois.gov

Illinois Department of Transportation

Memorandum

To:	Diane M. O'Keefe	Attn: District One
From:	Eric E. Harm	
Subject:	Pavement Design	
Date:	May 30, 2007	

FAP Route 336 (IL 31)
Section 112R-N
McHenry County
With IL 176 and with Terra Cotta

We have reviewed the pavement selection for the above captioned section, which was submitted with your memorandum dated April 11, 2007.

The approved pavement design is broken down into segments as follows:

IL 31 with the IL 31 and IL 176 intersection.

Due to the MU ADT > 800, this intersection qualifies as a "high stress" intersection, and will be reconstructed with rigid pavement. The life-cycle cost analysis, uniformity of design, and ease of construction favor the rigid design for IL 31.

9.75 inches of jointed PCC pavement [tied PCC C&G]
12 inches aggregate subgrade

Transitional Widening Segments for IL 31 and Il 176 will constructed to match the existing overlay.

1.75 inches of Bituminous Concrete Surface Course [Mix "F", N50]
0.75 inches of Bituminous Concrete leveling Binder (Machine Method) [IL-4.75, N50]
11.5 inches of Bituminous Concrete Binder Course [IL-19, N50]
12 inches Aggregate Subgrade

We have included our calculation spreadsheets.

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

Spreadsheet by Uehle - Rev. 11/02

MECHANISTIC PAVEMENT DESIGN

Date: 5/30/07

INPUT (Enter Data in Gray Shaded Cells)

Route: FAP 336
Section: 112R-N
County: McHenry
Location: with Rt. 176 & with Terra Cotta
Comments:
Designer: PRN

Facility Type: Other Marked State Route
# of Lanes = 4
Road Class: I
Subgrade Support Rating (SSR): Poor
Construction Year: 2009
Design Period (DP) = 20 years

	ADT	Year
Current:	30667	2007
Future:	37333	2027

Structural Design Traffic	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	31,665	91.4%	P = 32%
SU =	300	1,491	4.3%	S = 45%
MU =	900	1,491	4.3%	M = 45%
		Struct. Design ADT =	34667	(2019)

FLEXIBLE & RIGID PAVEMENT CALCULATIONS AND ADDITIONAL INPUT

Flexible Pavement

Cpv =	0.15	
Csu =	133	
Cmu =	483	
TF flexible (Actual)=	8.28	(Actual ADT)
TF flexible (Min)=	4.27	(Min ADT Fig 54-2C)
Use TF flexible =	8.28	
AC Type =	20	
AC Mixture Tempurature =	76.0	deg. F (Figure 54-5C)
Design AC Mixture Modulus (Eac)=	650	ksi (Figure 54-5D)
Design Asphalt Concrete Microstrain =	53.2	(Figure 54-5E)
Asphalt Concrete Thickness =	**14.25**	**in. (Figure 54-5F)**

Rigid Pavement

Cpv =	0.15	
Csu =	144	
Cmu =	696	
TF rigid (Actual)=	11.30	(Actual ADT)
TF rigid (Min)=	6.03	(Min ADT Fig 54-2C)
Use TF rigid =	11.30	
	Tied	Shoulder or C. &G.
Rigid Pavt Thick.=	**9.75**	**in. (Figure 54-4D)**

DESIGN TABLES FROM BD&E PAVEMENT DESIGN CH. 54 AND PAVEMENT DESIGN MANUAL

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 54-2C)		
Facility Type	PV	SU	MU
Interstate or Supplemental Freeway	0	500	1500
Other Marked State Route	0	300	900
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. 54-4C)		Flexible (Fig. 54-5B)	
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(ADT>400)	127.75	555.90	109.14	384.35
IV(ADT<=400)	127.75	555.90	9.86	78.84

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

	Figure 54-2B Percentage of ADT in Design Lane					
	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%

Illinois Department of Transportation

Memorandum

To:	Eric Harm	Attn:	Paul Niedernhofer
From:	Diane M. O'Keefe	By:	John Fortmann
Subject:	Pavement Analysis*		
Date:	April 11, 2007		

*Location:	IL 31 @ IL 176 &@ Terra Cotta	
Route:	FAP 336	
Section:	112R-N	
County:	McHenry	
Contract No.:	62537	
Job No.:	D-91-351-02	Current Target: 06CY08

We are submitting the pavement analysis for the above captioned location for your review and approval.

The following is the scope of work:

a. Pavement reconstruction of Illinois Route 31 to provide 4 at 12 ft through and variable turn lanes of pavement with barrier median for an approximate length of 1,583 ft south and 1,835 ft north of Illinois Route 176.

b. Pavement reconstruction of Illinois Route 176 to provide 4 at 12 ft through and variable turn lanes of pavement with barrier median for an approximate length of 1,499 ft west and 1,347 ft east of Illinois Route 31.

c. Variable pavement widening (with resurfacing) from 0 to in excess of 6 ft on Illinois Route 31 and Illinois Route 176 to provide tapered transition from the existing four-lane section to the newly reconstructed channelized intersection approaches.

A pavement analysis was performed on the above segments. Our recommendations for each segment are as follows:

a & b. Illinois Route 31 and Illinois Route 176 (Channelized Intersection)

We recommend rigid pavement for Segments **a** and **b** for the following reasons:

- The intersecting segments are legs of a signalized intersection which meets "high-stress" warrant due to high volume of heavy trucks (MU ADT exceeds 800). The "high-stress" intersection area extends from the stop bar to the end of turn lane tapers (37% of the paving area).

- The remainder (63%) of the improvement needs rigid pavement for uniformity of design and ease of construction.

- Life-cycle cost analysis for the non-"high-stress" pavement favors rigid pavement.

- Initial construction cost also favors rigid pavement.

District 1 recommends the following pavement structure and improved subgrade using our mechanistic pavement design for rigid pavement.

Tied PCC Curb and Gutter
Pavement Reconstruction:

9 ¾" Jointed PCC Pavement
12" Aggregate Subgrade

c. Illinois Route 31 and Illinois Route 176 (Transition Segments)

For transition pavement District 1 recommends segmental widening with resurfacing as follows:

1 ¾" Polymerized Hot-Mix Asphalt Surface Course, Mix "F"*
¾" Polymerized Leveling Binder (Machine Method) IL-4.75, N50*
11 ½" Hot-Mix Asphalt Binder Course, IL 19.0
12" Aggregate Subgrade

*Designer Note: The same overlay layers are used for resurfacing of existing pavement.

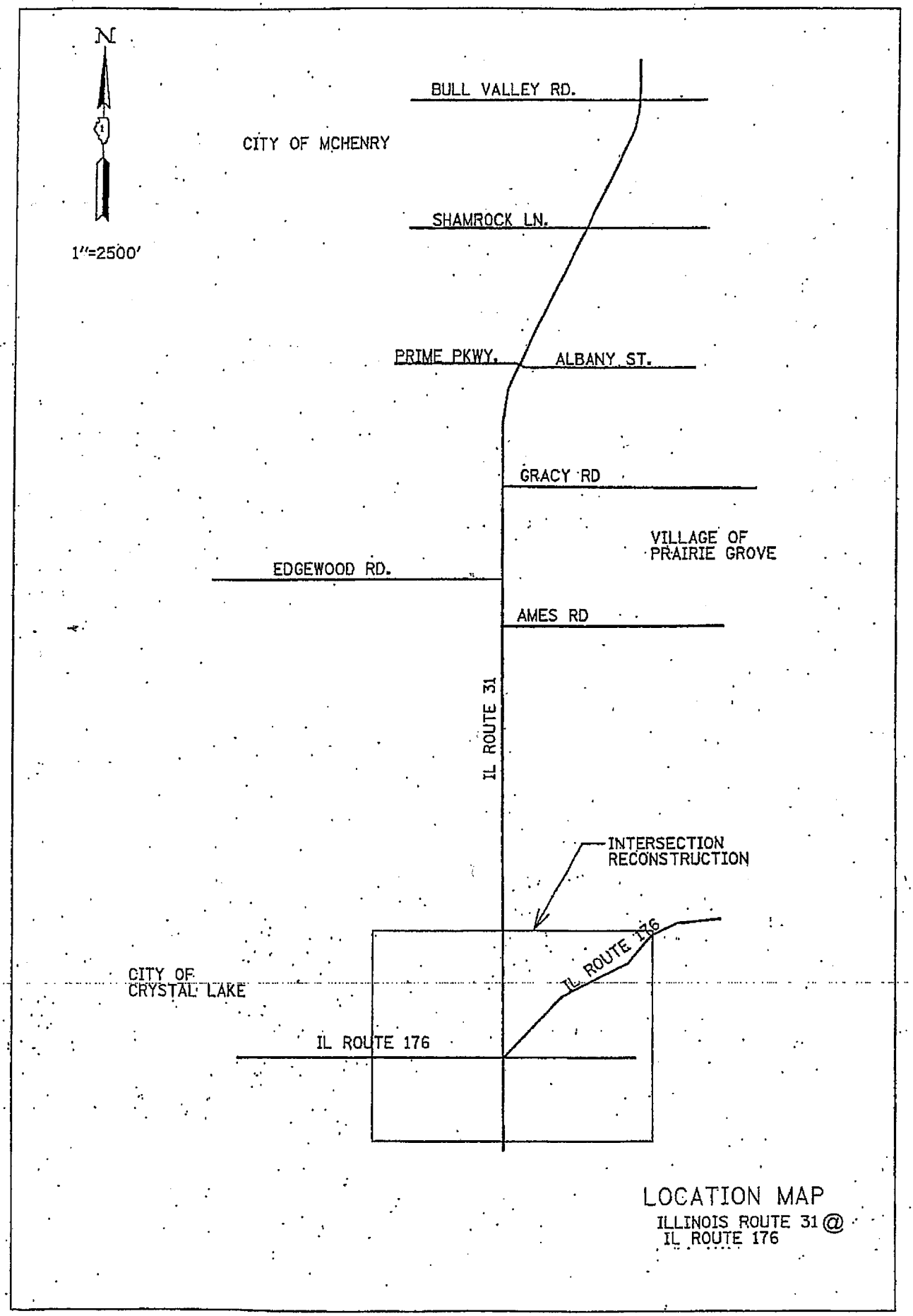
If you have any questions or need additional information, please contact Mr. Tom Matousek, Economic Coordinator, at (847) 705-4255.

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

S:\Gen\WP\PAVMTDESwp\MRM\Memos to C.O. drafts\IL 31 at IL 176.doc

ITEMS SUBMITTED TO CENTRAL OFFICE

- Location Map
- Requirements for Pavement Analysis
- Typical Sections
- Calculation of Thickness
- Life-Cycle Analysis
- Unit Cost Sheets



LOCATION MAP

ILLINOIS ROUTE 31 @
IL ROUTE 176

REVISED CONCRETE THICKNESS

04/11/07 08:58 AM

ROUTE: FAP 336
SECTION: 112R-N
COUNTY: McHenry
LOCATION: IL 31 @ IL 176 &@ Terra Cotta

	YEAR	A.D.T.
PRESENT	2005	30,000
FUTURE	2020	35,000
DESIGN	2019	34,688

MINIMUM TRAFFIC VALUES: YES
RAMP DESIGN (YES OR NO): NO
SOIL TYPE:POOR,FAIR,GRAN: POOR

DESIGN PERIOD:
DP = 20 YEARS

DESIGN TRAFFIC:
PV = 31,704
SU = 1,492
MU = 1,492

ROAD DESIG.	CLASS 1	2	3
INTER	11	21	31
OTHER	12	22	32

EXISTING
PV 91.4%
SU 4.3%
MU 4.3%

ROAD CLASS: 1
ROAD DESIG.: 12

% OF TRAFFIC IN DESIGN LANE
P = 32%
S = 45%
M = 45%

THESE ARE THE TRAFFIC FACTORS FOR THIS PROJECT

RIGID TRAFFIC FACTOR :	11.31	MINIMUM TRAFFIC FACTOR	6.03
FLEXIBLE TRAFFIC FACTOR :	8.29		4.27

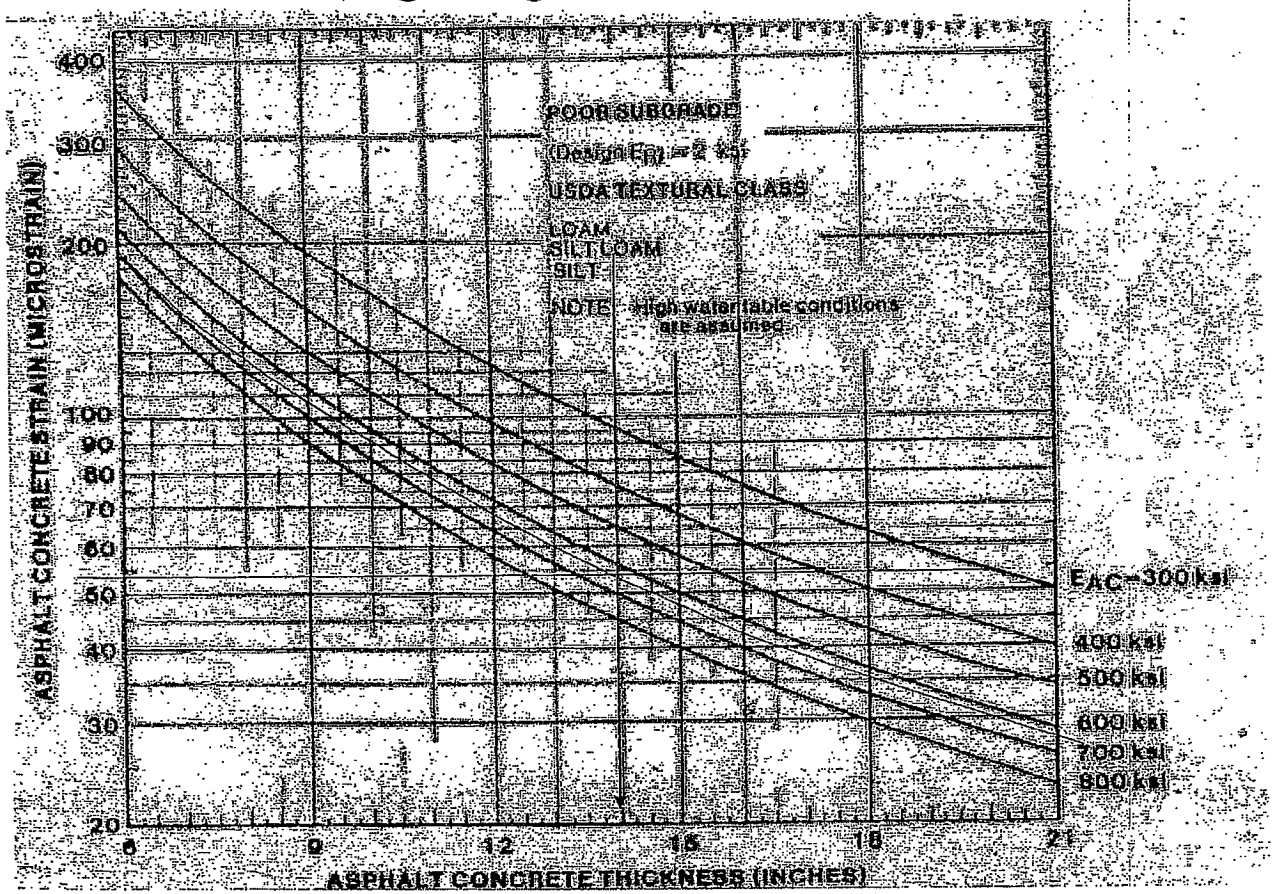
CALCULATED DESIGNS:RIGID

RIGID DESIGN:
EXTENDED LANE 9.75 INCHES
TIED SHLDER 9.75 INCHES
UNTIED SHLDER 10.25 INCHES

CALCULATED DESIGNS: FLEXIBLE

AC TYPE(10 OR 20)= 20
PAV'T AC MIX TEMP= 76
DESIGN EAC = 650
MICROSTRAIN = 53.20
THICKNESS = 14.00 INCHES

IL 31 @ IL 176 &@ Terra Cotta



EAC= 650.00 Microstrain= 53.20 Full-depth Thickness= 14.00 "

PLAIN JOINTED PCC PAVEMENT

FILENAME-	D-1	11-Apr-07
ROUTE-	FAP 336	08:58 AM
SECTION-	112R-N	
COUNTY-	McHenry	
LOCATION-	IL 31 @ IL 176 &@ Terra Cotta	
DATE-		

PROJECT LENGTH (FT)	4,200 =	0.80	MILES
AVERAGE LANE WIDTH (FT)	12.00		
NUMBER OF LANES	4		
# OF EDGES	2		
INSIDE SHLDER WIDTH (FT)	0		
OUTSIDE SHLDER WIDTH (FT)	0		
# OF CENTERLINES	1		
RIGID THICKNESS-	9.75		
TRAFFIC FACTORS	MINIMUM	ACTUAL	
RIGID-	6.03	11.31	

TRAFFIC		
PV-	0	31,704
SU-	300	1,492
MU-	900	1,492

INITIAL COSTS

ITEM	QUANTITY	UNIT PRICE	COST
PAVEMENT (SQ YDS)	22,400	$43.75	980,108
SUB BASE (SQ YDS)	23,800	$0.00	0
SHOULDERS (SQ YDS)	0	$0.00	0
SUBBASE GRAN MATL TY C (TONS)	0	$0.00	0
SHOULDER SEAL (LN FT)	8,400	$0.00	0
			0
			0
CONSTRUCTION INITIAL COST			$980,108
CONSTRUCTION ANNUAL COST			$53,302
TOTAL LIFE CYCLE COST-			$1,164,378
ANNUAL COST PER MILE-			$65,344

MAINTENANCE COSTS:

ITEM	UNIT COST
SHOULDER JOINT ROUTE AND SEAL (FT)	$0.85
CENTERLINE JOINT ROUTE AND SEAL (FT)	$0.85
PAVEMENT PATCHING (SQ YDS)	$60.00
SHOULDER PATCHING (SQ YDS)	$36.00
HOLES DRILLED (EACH)	$17.00
GROUT SOLIDS (CU FT)	$16.00
PAVEMENT GRINDING (SQ YDS)	$2.30

MAINTENANCE COSTS	ITEM	QUANTITY	UNIT PRICE	COST	PW
YEAR 7	PATCHING 0.5% (SQ YDS)	112	60.00	6,720	
				6,720	5,464
YEAR 10	PATCHING 1.0% (SQ YDS)	224	60.00	13,440	
	SHLDER JT 100.0% (LIN FT)	8,400	0.85	7,140	
	CENTERLINE JT 100.0% (LIN FT)	4,200	0.85	3,570	
	TRANSVERSE JOINT 100.0% (LIN F	13,440	0.00	0	
	SHOULDER PATCH 1.0% (SQ YD)	0	36.00	0	
				24,150	17,970
YEAR 15	PATCHING 1.5% (SQ YDS)	336	60.00	20,160	
				20,160	12,941
YEAR 20	HOLES DRILLED 70.0% (EACH)	1,568	17.00	26,656	
	GROUT SOLIDS (CU FT)	2,744	16.00	43,904	
	PATCHING 4.0% (SQ YDS)	896	60.00	53,760	
	SHOULDER PATCH 4.0% (SQ YDS)	0	36.00	0	
	GRINDING (SQ YD)	22,400	2.30	51,520	
	TRANSVERSE JOINT 100.0% (LIN F	13,440	0.00	0	
	SHLDER JT 100.0% (LIN FT)	8,400	0.85	7,140	
	CENTERLINE JT 100.0% (LIN FT)	4,200	0.85	3,570	
				186,550	103,293
YEAR 25	SHOULDER PATCH 1.0% (SQ YDS)	0	36.00	0	
	PATCHING 1.5% (SQ YDS)	336	60.00	20,160	
				20,160	9,628
YEAR 30	PATCHING 2.5% (SQ YDS)	560	60.00	33,600	
	SHLDER JT 100.0% (LIN FT)	8,400	0.85	7,140	
	CENTERLINE JT 100.0% (LIN FT)	4,200	0.85	3,570	
	TRANSVERSE JOINT 100.0% (LIN F	13,440	0.00	0	
	SHOULDER PATCH 1.5% (SQ YDS)	0	36.00	0	
				44,310	18,256
YEAR 35	SHOULDER PATCH 2.0% (SQ YDS)	0	36.00	0	
	PATCHING 3.5% (SQ YDS)	784	60.00	47,040	
				47,040	16,718
MAINTANENCE LIFE CYCLE COST					$184,270
MAINTANENCE ANNUAL COST					$10,021

FULL-DEPTH FLEXIBLE
TRAFFIC FACTOR LESS THAN 15.0 (RURAL)
TRAFFIC FACTOR LESS THAN 10.0 (URBAN)

ROUTE-	FAP 336	11-Apr-07
SECTION-	112R-N	08:58 AM
COUNTY-	McHenry	
LOCATION-	IL 31 @ IL 176 &@ Terra Cotta	

PROJECT LENGTH (FT)	4,200	
AVERAGE LANE WIDTH (FT)	12.00	
NUMBER OF LANES	4	
# OF EDGES	2	
INSIDE SHLDER WIDTH (FT)	0	
OUTSIDE SHLDER WIDTH (FT)	0	
# OF CENTERLINES	1	
PROJECT TYPE	2	1=RURAL, 2=URBAN
PAVING WIDTH	1	1=SINGLE LANE, 2=DUAL LANE

FLEXIBLE THICKNESS- 14.00

TRAFFIC FACTORS	MINIMUM	ACTUAL
FLEXIBLE	3.79	12.54

TRAFFIC

PV-	0	31,704
SU-	300	1,492
MU-	900	1,492

OVERLAY THICKNESS 2.25

INITIAL COSTS

ITEM	QUANTITY	UNIT PRICE	COST
SURFACE (SQ YDS)	22,400	$8.41	188,454
(TONS)		$71.30	
BINDER (SQ YDS)	22,400	$39.46	883,923
(TONS)		$58.72	
SHOULDERS	0	$0.00	0
SUBBASE GRAN MATL TY C (TONS)	0	$0.00	0
Additional PCC for B6;24 C&G	8,400	$5.08	42,697
		$0.00	0
			0
CONSTRUCTION INITIAL COST-			$1,115,074
CONSTRUCTION ANNUAL COST-			$60,642
TOTAL LIFE CYCLE COST-			$1,314,094
ANNUAL COST PER MILE -			$73,486

MAINTENANCE COSTS:

ITEM	UNIT COST
SHOULDER JOINT ROUTE AND SEAL (FT)	$0.40

FULL-DEPTH FLEXIBLE PAVEMENT
MAINTENANCE COSTS

ITEM	QUANTITY	UNIT PRICE	COST	PW
* FOR SINGLE LANE PAVING				
** FOR FULL WIDTH PAVING				
*** FOR BOTH SINGLE LANE & FULL WIDTH PAVING				
YEAR 3				
THERMAL CRACK 15.0% (LIN FT)	302	0.40	121	
SHLDER JT 100.0% (LIN FT)	8,400	0.40	3,360	
* CENTERLINE JT 100.0% (LIN FT)	4,200	0.40	1,680	
			5,161	4,723
YEAR 5				
PATCHING 0.5% (SQ YD)	112	45.00	5,040	
			5,040	4,348
YEAR 6				
THERMAL CRACK 50.0% (LIN FT)	1,008	0.40	403	
			403	338
YEAR 10				
PATCHING 3.0% (SQ YD)	672	45.00	30,240	
SHLDER PATCH 2.0% (SQ YD)	0	45.00	0	
			30,240	22,502
YEAR 12				
SHLDER JT 100.0 %(LIN FT)	8,400	0.40	3,360	
* CENTERLINE JT 100.0% (LIN FT)	4,200	0.40	1,680	
THERMAL CRACK 100.0% (LIN FT)	2,016	0.40	806	
RANDOM CRACK 50.0% (LIN FT)	4,200	0.40	1,680	
			7,526	5,279
YEAR 20				
MILLING (SQ YD)	22,400	0.75	16,800	
OVERLAY (TONS)	2,822	71.30	201,202	
PATCHING 4.0% (SQ YD)	896	45.00	40,320	
SHLDER PATCH 4.0% (SQ YD)	0	45.00	0	
			258,322	143,033
YEAR 21				
SHLDER JT 100.0 %(LIN FT)	8,400	0.40	3,360	
* CENTERLINE JT 100.0% (LIN FT)	4,200	0.40	1,680	
THERMAL CRACK 100.0% (LIN FT)	2,016	0.40	806	
RANDOM CRACK 50.0% (LIN FT)	4,200	0.40	1,680	
			7,526	4,045

CENTERLINE JOINT ROUTE AND SEAL (FT)	$0.40
THERMAL CRACKS ROUTE AND SEAL (FT)	$0.40
RANDOM CRACKS ROUTE AND SEAL (FT)	$0.40
PAVEMENT PATCHING (SQ YDS)	$45.00
SHOULDER PATCHING (SQ YDS)	$45.00
OVERLAY (TON)	$71.30
MILLING (SQ YDS)	$0.75

MATERIAL TYPE/PERCENTAGE	PCC	12.5%

YEAR 23					
	** CENTERLINE JT 100.0% (LIN FT)	0	0.40	0	0
YEAR 31					
	SHLDER JT 100.0 %(LIN FT)	8,400	0.40	3,360	
	*** CENTERLINE JT 100.0% (LIN FT)	4,200	0.40	1,680	
	THERMAL CRACK 100.0% (LIN FT)	2,016	0.40	806	
	RANDOM CRACK 50.0% (LIN FT)	4,200	0.40	1,680	
				7,526	3,010
YEAR 32					
	PATCHING 3.0% (SQ YD)	672	45.00	30,240	
	SHLDER PATCH 3.0% (SQ YD)	0	45.00	0	
				30,240	11,742
				MAINTANENC LIFE CYCLE COSTS	$199,020
				MAINTANENC ANNUAL COST PER MILE	$10,824