Illinois Department of Transportation

To:	Diane M. O'Keefe	Attn: District One
From:	John D. Baranzelli	John D Baranzelli
Subject:	Pavement Design	
Date:	April 2, 2012	

FAP Route 575 (US Route 30)
Will County
From IL Route 59 to I-55

We have reviewed the pavement selection for the project, which was submitted to BDE by memo dated March 22, 2012. The project will reconstruct and widen US 30 from Il 59 to I-55. The design meets the warrants for a "high stress" intersection with MU ADT exceeding 200 vehicles. Life cycle costs favor the PCC pavement option by 9.5%. This project meets the requirements for the alternate bidding process and the approved pavement design for this project is as follows:

US Route30 from IL 59 to I-55 (Pavement Reconstruction)

Option 1:

10.25 inches of Jointed PCC Pavement with tied PCC Curb & Gutter
4.5 inches of Stabilized Sub-Base
12 inches of Aggregate Subgrade

Option 2:

13.25 inches of HMA Pavement
- 2 inches of Polymerized HMA Surface Course, Stone Matrix Asphalt, N80
- 2 inches of Polymerized HMA Binder Course, Stone Matrix Asphalt, N80
- 9.25 inches of HMA binder course, IL-19, N90
- 12 inches of Aggregate Subgrade

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

Illinois Department of Transportation

Memorandum

To: John D. Baranzelli, PE

Attn: Paul R. Niedernhofer

From: Diane O'Keefe

By: Jose Dominguez

Subject: Pavement Analysis*

Date: March 22, 2012

*Route: FAP 575 (US 30)
Limits: From IL 59 to I-55
Contract No.: 60P95
Letting: 06OY13

Section: 14W-R
County: Will
Job No.: P-91-069-10

We are submitting the pavement analysis for the above captioned location for your review and approval. Please note that the pavement area for reconstruction exceeds 4,750 square yards. The improvement involves the following scope of work:

a) Widening of US-30 from I-55 (Sta. 3655+08) to Renwick Road (Sta. 3714+54) for a length of 5,947 feet to provide two through lanes in each direction with a median.

b) Widening of US-30 from Renwick Road (Sta. 3714+54) to IL-59 (Sta. 3769+17) for a length of 4946 feet to provide one through lane in each direction with a median, curb and gutter, multi-use paths and sidewalks, drainage improvements, and intersection improvements to improve capacity, operations and safety.

c) The improvement will match into the recently reconstructed (2011) US Route 30 and Illinois Route 59 intersection.

d) The reconstructed US Route 30 Bridge over Lily Cache Creek (2005) will be a project omission.

e) The roadway pavement from this bridge improvement has been assumed to be replaced as part of this project.

A 30 year mechanistic pavement design was performed on US 30 between IL 59 and I-55. This intersection is considered "high stress" as the design lane MU ADT exceeds 200 vehicles for the stop controlled intersection. We recommend using the same pavement design for the entire length of the project as follows:

US 30 from IL 59 to I-55*

Pavement Reconstruction

Option 1:
Tied PCC Curb & Gutter
10 ¼" PCC Pavement (Jointed)
4 ½" Hot-Mix Asphalt Stabilized Subbase
12" Aggregate Subgrade Improvement

Option 2:
PCC Curb & Gutter
13 ¼" HMA Pavement (Full-Depth)
2" Polymerized Hot-Mix Asphalt Surface, Stone Matrix Asphalt, N80
2" Polymerized Hot-Mix Asphalt Binder, Stone Matrix Asphalt, N80
9 ¼" Hot-Mix Asphalt Binder Course, IL-19.0, N90
12" Aggregate Subgrade Improvement

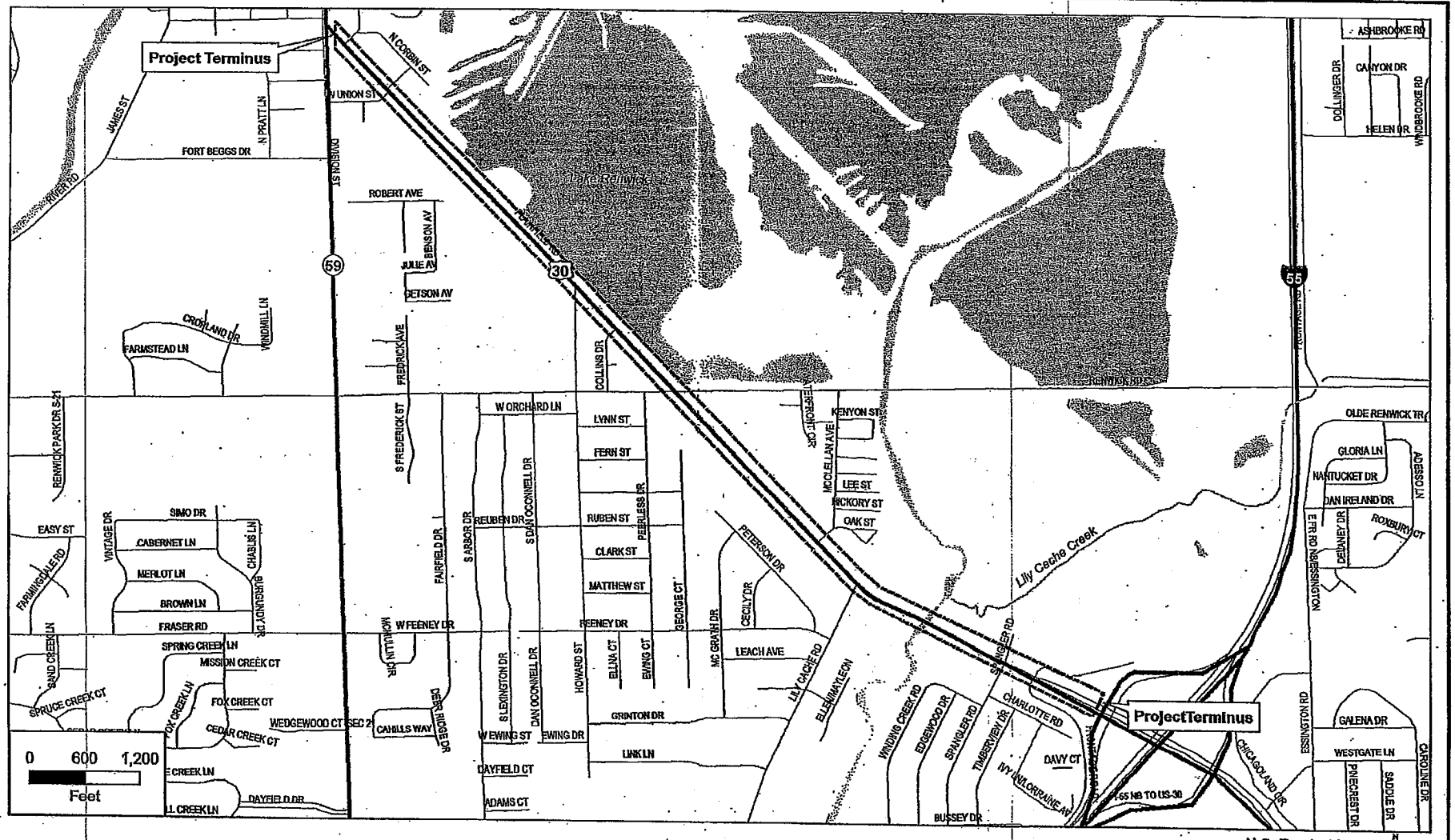
The life cycle cost analysis favored PCC pavement by 9.5%.

Since, the life cycle cost analysis for this location is less than 10%. An alternate bid consideration with review by the pavement selection committee will be required according to the flowchart in Figure 54-1.A of Chapter 54 of the BDE manual

*Designer Note 1: Use the same pavement design for all cross roads – Getson Ave, Howard St, Renwick Rd, Lily Cache Rd, Spangler Rd and West Frontage Rd. Cross roads are subject to local jurisdiction concurrence.

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

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



U.S. Route 30
FAP575
From West of I-55 to IL 59
Will County

Project Location Map

Figure 1

MECHANISTIC PAVEMENT DESIGN

Date 22-Mar-12
Calcs by: TCM, AM
Checked by:
Class 1 Roads and Streets
Urban X Rural

Route US 30
Section 14W-R
WILL County
Location IL 59 TO I-55

Limits of Analysis Station 0+28 to Station 103+65
Length 10900 Feet 2.06 Miles

Structural Design Traffic		Percent of S.D.T. in Design Lane	
PV =	27498	P =	89.00%
SU =	1545	S =	5.00%
MU =	1854	U =	6.00%

MINIMUM SUBGRADE SUPPORT RATING - "POOR"

Flexible Pavement Design Actual TF_F = 14.88 ✓ Minimum TF_F = 5.33 ✓

Selected Design AC Type

Design AC Mixture Temp 75.5 °F
Design AC Microstrain 56

Design E_{AC} 675 KSI
AC Thickness 13.25 Inch

Rigid Pavement Design Actual TF_F = 20.47 Minimum TF_F = 7.54

Extended Lane 10.25 Inch

15' Panel PCC Thickness for:

Tied Shoulder 10 Inch
Untied Shoulder 0 Inch

Figure 5.05

RIGID PAVEMENT

Date:	22-Mar-12			Route	US 30
Quantities by	TCM, AM	Checked by:		Section	14W-R
Unit Prices by	[redacted]	Checked by:		WILL	County
Net Length	10900	Lin. Ft. =	2.06	Miles	
Number Lanes	2 TO 4	Urban	X	Rural	

ITEMIZED CONSTRUCTION COST

Quantity	Units	Item		Unit Cost	Total Cost
41137	Sq. Yds.	10 Inch Jointed PCC	@	$40.36	$1,660,289
44768	Sq. Yds.	4-Inch (Stabilized/Granular Subbase)	@	$16.00	$716,288
0	Sq. Yds.	PCC Shoulder	@	$0.00	$0
	Lin. Ft.	Pipe Underdrains	@		
0		Subbase Gran. Mat., Type C	@	$0.00	$0
21,786	Lin. Ft.	100% Shoulder Joint Seal	@	$2.00	$43,572

Total Cost of Original Pavement Construction $2,420,149

ITEMIZED MAINTENANCE AND REHABILITATION ACTIVITY COST

REHABILITATION ACTIVITY 1 - YEAR 10

41	Sq. Yds.	0.1% Full Depth PCC Pavement Patching	@	$130.00	$5,330
		Total Cost of Rehabilitation Activity 1			$5,330

Figure 5.05a(1)

RIGID PAVEMENT (Cont.)

Route US 30

Section 14W-R

WILL County

REHABILITATION ACTIVITY 2 - YEAR 15

			Unit Cost	Total Cost
82 Sq. Yds.	0.2% Full Depth PCC Pavement Patching	@	$130.00	$10,660

Total Cost of Rehabilitation Activity 2 $10,660

REHABILITATION ACTIVITY 3 - YEAR 20

			Unit Cost	Total Cost
823 Sq. Yds.	2% Full Depth PCC Pavement Patching	@	$0.00	$106,990
0 Sq. Yds.	0.5% Full Depth PCC Pavement Patching	@	$85.00	$0
21786 Lin. Ft.	100% Longitudunal/ Shoulder Joint Routing & Sealing	@	$1.00	$21,786
21786 Lin. Ft.	100% Centerline Joint Routing & Sealing	@	$1.00	$21,786

Total Cost of Rehabilitation Activity 3 $150,562

FIGURE 5.05a(2)

RIGID PAVEMENT (Cont.)

Route US 30
Section 14W-R
WILL County

REHABILITATION ACTIVITY 4 - YEAR 25

			Unit Cost	Total Cost
1234 Sq. Yds.	3.0% Full Depth PCC Pavement Patching	@	$130.00	$160,420
0 Sq. Yds.	1.0% Full Depth PCC Pavement Patching	@	$85.00	$0

Total Cost of Rehabilitation Activity 4 $160,420

REHABILITATION ACTIVITY 5 - YEAR 30

			Unit Cost	Total Cost
1645 Sq. Yds.	3.0% Full Depth PCC Pavement Patching	@	$85.00	$0
0 Sq. Yds.	1.0% Full Depth PCC Pavement Patching	@	$12.75	$524,497
41,137 Sq. Yds.	Policy HMA Overlay - Pavement	@	$12.75	$524,497
0 Sq. Yds.	Policy HMA Overlay - Shoulder	@	$12.75	$0

Total Cost of Rehabilitation Activity 5 $738,347

REHABILITATION ACTIVITY 6 - YEAR 35

			Unit Cost	Total Cost
21,786 Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@	$1.00	$21,786
21786 Lin. Ft.	100% Centerline Joint Routing & Sealing	@	$1.00	$21,786
16,840 Lin. Ft.	50% Random Crack Routing & Sealing - Assume 100ft/station	@	$1.00	$16,840
9,879 Lin. Ft.	40% Reflective Transverse Crack Routing & Sealing	@	$1.00	$9,879
41 Sq. Yds.	0.1% Partial-Depth Pavement Patching (Mill & Fill Surface-Interstates; Mill & Fill 2.5in. Non-Interstates)		$130.00	$5,330

Total Cost of Rehabilitation Activity 6 $75,621

Figure 5.05a(3)

RIGID PAVEMENT (Cont.)

Route US 30

Section 14W-R

WILL County

REHABILITATION ACTIVITY 7 - YEAR 40

				Unit Cost	Total Cost
206	Sq. Yds.	0.5% Full Depth PCC Pavement Patching	@	$130.00	$26,780
206	Sq. Yds.	0.5% Partial Depth Pavement Patching	@	$130.00	$26,780
		(Mill & Fill Surface-Interstates; Mill & Fill 2.5in. Non-Interstates)			
14,819	Lin. Ft.	60% Reflective Transverse Crack Routing & Sealing	@	$1.00	$14,819
16,840	Lin. Ft.	50% Random Crack Routing & Sealing - Assume 100ft/station	@	$1.00	$16,840
21,786	Lin. Ft.	100% Longitudunal/ Shoulder Joint Routing & Sealing	@	$1.00	$21,786
21,786	Lin. Ft.	100% Centerline Joint Routing & Sealing	@	$1.00	$21,786
		Total Cost of Rehabilitation Activity 7			$128,791

RIGID PAVEMENT (Cont.)

Route US 30

Section 14W-R

WILL County

ANNUAL COST DETERMINATION

Present Worth Calculation:

Total Cost of Original Pavement Construction $2,420,149

Present Worth of Rehab Activity 1	$5,330	x 0.7441 =	$3,966
Present Worth of Rehab Activity 2	$10,660	x 0.6419 =	$6,843
Present Worth of Rehab Activity 3	$150,562	x 0.5537 =	$83,366
Present Worth of Rehab Activity 4	$160,420	x 0.4776 =	$76,617
Present Worth of Rehab Activity 5	$738,347	x 0.4120 =	$304,199
Present Worth of Rehab Activity 6	$75,621	x 0.3554 =	$26,876
Present Worth of Rehab Activity 7	$128,791	x 0.3066 =	$39,487

Total Life Cycle Cost (Present Worth) $541,354

Annual Cost Per Mile Calculation

Total PW	x CRF_n /	Length		= Annual Cost / Year-Mile
$541,354	x0.04079 /	2.06	Mi.	$58,641 per Yr.-Mi.

FLEXIBLE PAVEMENT

Date: 22-Mar-12 Route US 30
Quantities by TCM, AM Checked by: Section 14W-R
Unit Prices by TM Checked by: WILL County
Net Length 10900 Lin. Ft. = 2.06 Miles
Number Lanes 2 TO 4 Urban X Rural
Single Lane Paving X Dual Lane Paving

ITEMIZED CONSTRUCTION COST

Quantity	Units	Item		Unit Cost	Total Cost
41,137	Sq. Yds.	Class I Surface Course	@	$12.75	$524,497
41,137	Sq. Yds.	Class I Binder Course	@	$31.97	$1,315,150
0	Sq. Yds.	Stabilized Shoulders	@	$0.00	$0
	Lin. Ft.	Pipe Underdrains	@		
0		Subbase Gran. Matl., Type C	@	$0.00	$0
41,137	Sq. Yds.	Poly Binder	@	$11.57	$475,955

Total Cost of Original Pavement Construction $2,315,602

ITEMIZED MAINTENANCE AND REHABILITATION ACTIVITY COST

REHABILITATION ACTIVITY 1 - YEAR 5

				Unit Cost	Total Cost
5995	Lin. Ft.	50% Random/Thermal Cracking & Sealing (Assume 110ft/station)	@	$1.00	$5,995
0	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@	$1.00	$0
0	Lin. Ft.	100% Centerline Joint Rounting & Sealing	@	$1.00	$0
41	Sq. Yds.	0.1% Partial-Depth Pavement Patching Mill & Fill Surface	@	$90.00	$3,690

Total Cost of Rehabilitation Activity 1 $9,685

FIGURE 5.05b(1)

FLEXIBLE PAVEMENT (Cont.)

Route US 30

Section 14W-R

WILL County

REHABILITATION ACTIVITY 2 - YEAR 10

				Unit Cost	Total Cost
206	Sq. Yds.	0.5% Partial-depth HMA Pavement Patching - Mill & Fill Surface	@	$90.00	$18,540
5995	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/station)	@	$1.00	$5,995
0	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@	$1.00	$0
0	Lin. Ft.	100% Centerline Joint Rounting & Sealing	@	$1.00	$0

Total Cost of Rehabilitation Activity 2 $24,535

REHABILITATION ACTIVITY 3 - YEAR 15

				Unit Cost	Total Cost
41,137	Sq. Yds.	2.00in. Milling - Pavement & Shoulder	@	$1.75	$71,990
411	Sq. Yds.	1.0% Partial-depth Pavement Patching (Mill & Fill Addition 2.00in.)	@	$90.00	$36,990
4,607	Sq. Yds.	2.00in. HMA Overlay Pavement & Shoulder	@	$113.84	$524,458

Total Cost of Rehabilitation Activity 3 $633,438

FIGURE 5.05b(2)

FLEXIBLE PAVEMENT (Cont.)

Route US 30

Section 14W-R

WILL County

				Unit Cost	Total Cost
REHABILITATION ACTIVITY 4 - YEAR 20					
0	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@	$1.00	$0
0	Lin. Ft.	100% Centerline Joint Rounting & Sealing	@	$1.00	$0
5995	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/station)	@	$1.00	$5,995
41	Sq. Yds.	0.1% Partial-Depth HMA Pavement Patching (Mill & Fill Surface)	@	$90.00	$3,690
		Total Cost of Rehabilitation Activity 4			$9,685
REHABILITATION ACTIVITY 5 - YEAR 25				Unit Cost	Total Cost
0	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@	$1.00	$0
0	Lin. Ft.	100% Centerline Joint Rounting & Sealing	@	$1.00	$0
5995	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/station)	@	$1.00	$5,995
206	Sq. Yds.	0.5% Partial-Depth Pavement Patching (Mill & Fill Surface)	@	$90.00	$18,540
		Total Cost of Rehabilitation Activity 5			$24,535
REHABILITATION ACTIVITY 6 - YEAR 30				Unit Cost	Total Cost
41,137	Sq. Yds.	2.00in. Milling (Pavement only-Std Design Pavement & Shoulder-Limiting Strain Criteria Design)	@	$1.75	$71,990
823	Sq. Yds.	2.0% Partial-Depth HMA Pavement Patching (Mill & Fill Additional 2.00in. All Designs)	@	$90.00	$74,070
0	Sq. Yds.	1.0% Full-Depth HMA Shoulder Patching (Mill & Fill Surface-Standard Design Mill & Fill Additional 2.00in.-Limiting Strain Criteria Design)	@	$90.00	$0
8,639	Tons	HMA Overlay Pvmt (3.75in. - Std Design 2.00in.-Limiting Strain Criterion Design)	@	$113.84	$983,458
0	Tons	HMA Overlay Shoulder (1.75in. - Standard Design; 2.00in.-Limiting Strain Criterion Design)	@	$113.84	$0
		Total Cost of Rehabilitation Activity 6			$1,129,518

FIGURE 5.05b(3)

FLEXIBLE PAVEMENT (Cont.)
Route US 30
Section 14W-R
WILL County

REHABILITATION ACTIVITY 7 - YEAR 35

				Unit Cost	Total Cost
0	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@	$1.00	$0
0	Lin. Ft.	100% Centerline Joint Rounting & Sealing	@	$1.00	$0
5995	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/station)	@	$1.00	$5,995
41	Sq. Yds.	0.1% Partial-Depth HMA Pavement Patching (Mill & Fill Surface)	@	$90.00	$3,690
		Total Cost of Rehabilitation Activity 7			$9,685

REHABILITATION ACTIVITY 8 - YEAR 40

				Unit Cost	Total Cost
0	Lin. Ft.	100% Longitudinal Shoulder Joint Routing & Sealing	@	$1.00	$0
0	Lin. Ft.	100% Centerline Joint Rounting & Sealing (Single Lane and Dual Lane Paving)	@	$1.00	$0
5995	Lin. Ft.	50% Random/ Thermal Crack Routing & Sealing (Assume 110ft/station)	@	$1.00	$5,995
206	Sq. Yds.	0.5% Partial-Depth Pavement Patching (Mill & Fill Surface)	@	$90.00	$18,540
		Total Cost of Rehabilitation Activity 8			$24,535

FLEXIBLE PAVEMENT (Cont.)
Route US 30
Section 14W-R
WILL County

ANNUAL COST DETERMINATION

Present Worth Calculation:

Total Cost of Original Pavement Construction $2,315,602

Present Worth of Rehab Activity 1	$9,685	x 0.7441 =	$8,354
Present Worth of Rehab Activity 2	$24,535	x 0.6419 =	$18,256
Present Worth of Rehab Activity 3	$633,438	x 0.5537 =	$406,604
Present Worth of Rehab Activity 4	$9,685	x 0.4776 =	$5,363
Present Worth of Rehab Activity 5	$24,535	x 0.4120 =	$11,718
Present Worth of Rehab Activity 6	$1,129,518	x 0.3554 =	$465,361
Present Worth of Rehab Activity 7	$9,685	x 0.3066 =	$3,442
Present Worth of Rehab Activity 8	$24,535	x 0.3066 =	$7,522

Total Life Cycle Cost (Present Worth) $926,620

Annual Cost Per Mile Calculation

Total PW	x CRF_n /	Length		= Annual Cost / Year-Mile
$926,620	x0.04079 /	2.06	Mi.	$64,199 per Yr.-Mi.

MATERIAL TYPE/PERCENTAGE	PCC	9.48%

PLAIN JOINTED PCC PAVEMENT

FILENAME-	US 30	23-Mar-12	
ROUTE-	FAP 578	8:24 AM	
SECTION-	14W-R		
COUNTY-	WILL		
LOCATION-	IL 59 TO I-55		
DATE-	23-Mar-12		
PROJECT LENGTH (FT)	10900	2.06	MILES
AVERAGE LANE WIDTH (FT)	12		
NUMBER OF LANES	2 TO 4		
# OF EDGES	2		
INSIDE SHLDER WIDTH (FT)	0		
OUTSIDE SHLDER WIDTH (FT)	0		
# OF CENTERLINES	0		
RIGID THICKNESS-	10.75		
TRAFFIC FACTORS	MINIMUM	ACTUAL	
RIGID-	7.51	20.47	

TRAFFIC

		Percentages
PV-	27,498	89.00%
SU-	1,545	5.00%
MU-	1,854	6.00%

INITIAL COSTS

ITEM	QUANTITY	UNIT PRICE	COST
PAVEMENT (SQ YDS)	41,137	$40.36	$1,660,269
STAB SUBBASE (SQ YDS)	44,788	$16.00	$716,288
SHOULDERS (SQ YDS)	0	$0.00	$0
SHOULDER SEAL (LN FT)	21,766	$2.00	$43,572
SUBBASE GRAN MATL TY C (TONS)	0	$0.00	$0

CONSTRUCTION INITIAL COST (PW)	$2,420,149
TOTAL REHABILITATION COST (PW)	$541,354
TOTAL LIFE CYCLE COST (PW)	$2,961,503
ANNUAL COST PER MILE	$58,641

MAINTENANCE COSTS:

ITEM		UNIT COST
PAVEMENT PATCHING (SQ YDS)	(Use Class A pricing for CRC)	$130.00
SHOULDER PATCHING (SQ YDS)		$85.00
SHLDR JT ROUT & SEAL (LF)		$1.00
CENTERLINE JT ROUT & SEAL (LF)		$1.00
POLICY HMA OVERLAY PVMT (SQ YDS)		$12.75
POLICY HMA OVERLAY SHLDR (SQ YDS)		$12.75
RANDOM CRACK ROUT & SEAL (LF)		$1.00
REFL TRANS CRACK ROUT & SEAL (LF)		$1.00
PARTIAL PVMT PATCH (SQ YDS)		$130.00

MAINTENANCE COSTS:

	ITEM	QUANTITY	UNIT PRICE	COST	PW
Activity 1 YEAR 10					
	PAVEMENT PATCHING 0.1% (SQ YDS)	41	$130.00	$5,330	
				$5,330	$3,988
Activity 2 YEAR 15					
	PAVEMENT PATCHING 0.2% (SQ YDS)	82	$130.00	$10,660	
				$10,660	$6,843
Activity 3 YEAR 20					
	PAVEMENT PATCHING 2.0% (SQ YDS)	823	$130.00	$106,990	
	SHOULDER PATCHING 0.5% (SQ YDS)	0	$85.00	$0	
	SHLDR JT ROUT & SEAL 100% (LF)	21,766	$1.00	$21,766	
	CENTERLINE JT ROUT & SEAL 100% (LF)	21,766	$1.00	$21,766	
				$150,562	$83,366
Activity 4 YEAR 25					
	PAVEMENT PATCHING 3.0% (SQ YDS)	1,234	$130.00	$160,420	
	SHOULDER PATCHING 1.0% (SQ YDS)	0	$85.00	$0	
				$160,420	$76,617
Activity 5 YEAR 30					
	PAVEMENT PATCHING 4.0% (SQ YDS)	1,645	$130.00	$213,850	
	SHOULDER PATCHING 1.5% (SQ YDS)	0	$85.00	$0	
	POLICY HMA OVERLAY-OVMT (SQ YDS)	41,137	$12.75	$524,497	
	POLICY HMA OVERLAY SHLDR (SQ YDS)	0	$12.75	$0	
				$738,347	$304,199
Activity 6 YEARS 35					
	SHLDR JT ROUT & SEAL 100% (LF)	21,766	$1.00	$21,766	
	CENTERLINE JT ROUT & SEAL 100% (LF)	21,766	$1.00	$21,766	
	RANDOM CRACK ROUT & SEAL 50% (LF)	16,840	$1.00	$16,840	
	REFL TRANS CRACK ROUT & SEAL 40%	9,879	$1.00	$9,879	
	PARTIAL PVMT PATCH 0.1% (SQ YDS)	41	$130.00	$5,330	
				$75,621	$26,876
Activity 7 YEAR 40					
	PAVEMENT PATCHING 0.5% (SQ YDS)	206	$130.00	$26,780	
	SHOULDER PATCHING 0.5% (SQ YDS)	206	$130.00	$26,780	
	REFL TRANS CRACK ROUT & SEAL 60%	14,819	$1.00	$14,819	
	RANDOM CRACK ROUT & SEAL 50% (LF)	16,840	$1.00	$16,840	
	SHLDR JT ROUT & SEAL 100% (LF)	21,766	$1.00	$21,766	
	CENTERLINE JT ROUT & SEAL 100% (LF)	21,766	$1.00	$21,766	
				$128,791	$39,467
	Total Rehabilitation Cost (Present Worth)				$541,354

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

ROUTE-	FAP 575	23-Mar-12
SECTION-	14W-R	8:24 AM
COUNTY-	WILL	
LOCATION-	IL 59 TO I-55	

PROJECT LENGTH (FT)	10800	
AVERAGE LANE WIDTH (FT)	12	
NUMBER OF LANES	2 TO 4	
# OF EDGES	0	
INSIDE SHLDER WIDTH (FT)	0	
OUTSIDE SHLDER WIDTH (FT)	0	
# OF CENTERLINES	0	
PROJECT TYPE	2	1=RURAL, 2=URBAN
PAVING WIDTH	1	1=SINGLE LANE, 2=DUAL LANE
INTERSTATE / OTHER ROUTE	OTHER ROUTE	
FLEXIBLE THICKNESS-	0	

TRAFFIC FACTORS	MINIMUM	ACTUAL
FLEXIBLE	8.33	8.66

TRAFFIC

PV-	27493	0.89
SU-	1545	0.05
MU-	1854	0.06

PAVEMENT OVERLAY THICKNESS	3.70
SHOULDER OVERLAY THICKNESS	1.75

INITIAL COSTS

ITEM	QUANTITY	UNIT PRICE	COST
SURFACE (SQ YDS)	41,137	$12.75	$524,497
POLY BINDER (SQ YDS)	41,137	$11.57	$475,855
BINDER (SQ YDS)	41,137	$31.97	$1,315,150
SHOULDERS (SQ YDS)	0	$0.00	$0
SUBBASE GRAN MATL TY C (TONS)	0	$0.00	$0

CONSTRUCTION INITIAL COST (PW)	$2,315,602
TOTAL REHABILITATION COST (PW)	$926,620
TOTAL LIFE CYCLE COST (PW)	$3,242,222
ANNUAL COST PER MILE	$64,199

MAINTENANCE COSTS:

ITEM		UNIT COST
RAND/THERM CRACK ROUT & SEAL (LF)		$1.00
SHLDR JT ROUT & SEAL (LF)		$1.00
CENTERLINE JT ROUT & SEAL (LF)		$1.00
PARTIAL PVMT PATCH (SQ YDS)		$90.00
2" MILL PVMT & SHLDR (SQ YDS)	(Use $3.00 for small quantity)	$1.75
2" OVERLAY PVMT & SHLDR (TONS)		$113.84
2" MILL PVMT ONLY (SQ YDS)	(Use $3.00 for small quantity)	$1.75
HMA SHOULDER PATCHING (SQ YDS)		$90.00
POLICY HMA OVERLAY PVMT (TONS)		$113.84
POLICY HMA OVERLAY SHLDR (TONS)		$113.84

MATERIAL TYPE/PERCENTAGE PCC 9.5%

FULL DEOTH FLEXIBLE PAVEMENT
MAINTENANCE COSTS

ITEM	QUANTITY	UNIT PRICE	COST	PW
Activity 1				
YEAR 5 RAND/THERM CRACK ROUT & SEAL 50% (LF)	5,995	$1.00	$5,995	
SHLDR JT ROUT & SEAL 100% (LF)	0	$1.00	$0	
CENTERLINE JT ROUT & SEAL 100% (LF)	0	$1.00	$0	
PARTIAL PVMT PATCH 0.1% (SQ YDS)	41	$90.00	$3,690	
			$9,685	$8,354
Activity 2				
YEAR 10 PARTIAL PVMT PATCH 0.5% (SQ YDS)	206	$90.00	$18,540	
RAND/THERM CRACK ROUT & SEAL 50% (LF)	5,995	$1.00	$5,995	
SHLDR JT ROUT & SEAL 100% (LF)	0	$1.00	$0	
CENTERLINE JT ROUT & SEAL 100% (LF)	0	$1.00	$0	
			$24,535	$18,258
Activity 3				
YEAR 15 2" MILL PVMT & SHLDR 100% (SQ YDS)	41,137	$1.75	$71,990	
PARTIAL PVMT PATCH 1.0% (SQ YDS)	411	$90.00	$36,990	
2" OVERLAY PVMT & SHLDR 100% (TONS)	4,607	$113.84	$524,456	
			$633,436	$408,604
Activity 4				
YEAR 20 SHLDR JT ROUT & SEAL 100% (LF)	0	$1.00	$0	
CENTERLINE JT ROUT & SEAL 100% (LF)	0	$1.00	$0	
RAND/THERM CRACK ROUT & SEAL 50% (LF)	5,995	$1.00	$5,995	
PARTIAL PVMT PATCH 0.1% (SQ YDS)	41	$90.00	$3,690	
			$9,685	$5,353
Activity 5				
YEAR 25 SHLDR JT ROUT & SEAL 100% (LF)	0	$1.00	$0	
CENTERLINE JT ROUT & SEAL 100% (LF)	0	$1.00	$0	
RAND/THERM CRACK ROUT & SEAL 50% (LF)	5,995	$1.00	$5,995	
PARTIAL PVMT PATCH 0.5% (SQ YDS)	206	$90.00	$18,540	
			$24,535	$11,718
Activity 6				
YEAR 30 2" MILL PVMT & SHLDR 100% (SQ YDS)	41,137	$1.75	$71,990	
PARTIAL PVMT PATCH 2.0% (SQ YDS)	823	$90.00	$74,070	
HMA SHLDR PATCHING 1.0% (SQ YDS)	0	$90.00	$0	
POLICY HMA OVERLAY PVMT (TONS)	8,639	$113.84	$983,458	
POLICY HMA OVERLAY SHLDR (TONS)	0	$113.84	$0	
			$1,129,518	$485,361
Activity 7				
YEAR 35 SHLDR JT ROUT & SEAL 100% (LF)	0	$1.00	$0	
CENTERLINE JT ROUT & SEAL 100% (LF)	0	$1.00	$0	
RAND/THERM CRACK ROUT & SEAL 50% (LF)	5,995	$1.00	$5,995	
PARTIAL PVMT PATCH 0.1% (SQ YDS)	41	$90.00	$3,690	
			$9,685	$3,442
Activity 8				
YEAR 40 SHLDR JT ROUT & SEAL 100% (LF)	0	$1.00	$0	
CENTERLINE JT ROUT & SEAL 100% (LF)	0	$1.00	$0	
RAND/THERM CRACK ROUT & SEAL 50% (LF)	5,995	$1.00	$5,995	
PARTIAL PVMT PATCH 0.5% (SQ YDS)	206	$90.00	$18,540	
			$24,535	$7,822

Total Rehabilitation Cost (Present Worth) $926,620

USE FOR TRAFFIC FACTOR ONLY

Spreadsheet by Uehle - Rev. 11/02

MECHANISTIC PAVEMENT DESIGN

Date: 1/6/12

INPUT (Enter Data in Gray Shaded Cells)

Route: US 30
Section: 2400 R
County: Will
Location: [illegible]

Comments: Pavement design for US 30 (on IL 59 to I-55)

Designer: TMG

	ADT	Year
Current:	24400	2010
Future:	30900	2040

Facility Type: Other Marked State Route

# of Lanes = 4

Road Class: I

Subgrade Support Rating (SSR): Fair

Construction Year: 2013

Design Period (DP) = 30 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	27,498	89.0%	P = 32%
SU =	250	1,545	5.0%	S = 45%
MU =	750	1,854	6.0%	M = 45%
Struct. Design ADT =		30897	(2028)	

FLEXIBLE & RIGID PAVEMENT CALCULATIONS AND ADDITIONAL INPUT

Flexible Pavement

Cpv = 0.15
Csu = 133
Cmu = 483
TF flexible (Actual)= 14.88 (Actual ADT)
TF flexible (Min)= 5.33 (Min ADT Fig 54-2C)
Use TF flexible = 14.88
AC Type = 20
AC Mixture Tempurature = 80.0 deg. F (Figure 54-5C)
Design AC Mixture Modulus (Eac)= 550 ksi (Figure 54-5D)
Design Asphalt Concrete Microstrain = 43.9 (Figure 54-5E)
Asphalt Concrete Thickness = 17.25 in. (Figure 54-5F)

Rigid Pavement

Cpv = 0.15
Csu = 144
Cmu = 696
TF rigid (Actual)= 20.47 (Actual ADT)
TF rigid (Min)= 7.54 (Min ADT Fig 54-2C)
Use TF rigid = 20.47
1.00 Shoulder or C. &G.
Rigid Pavt Thick = 10.25 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	250	750
Unmarked State Route	No Min	No Min	No Min

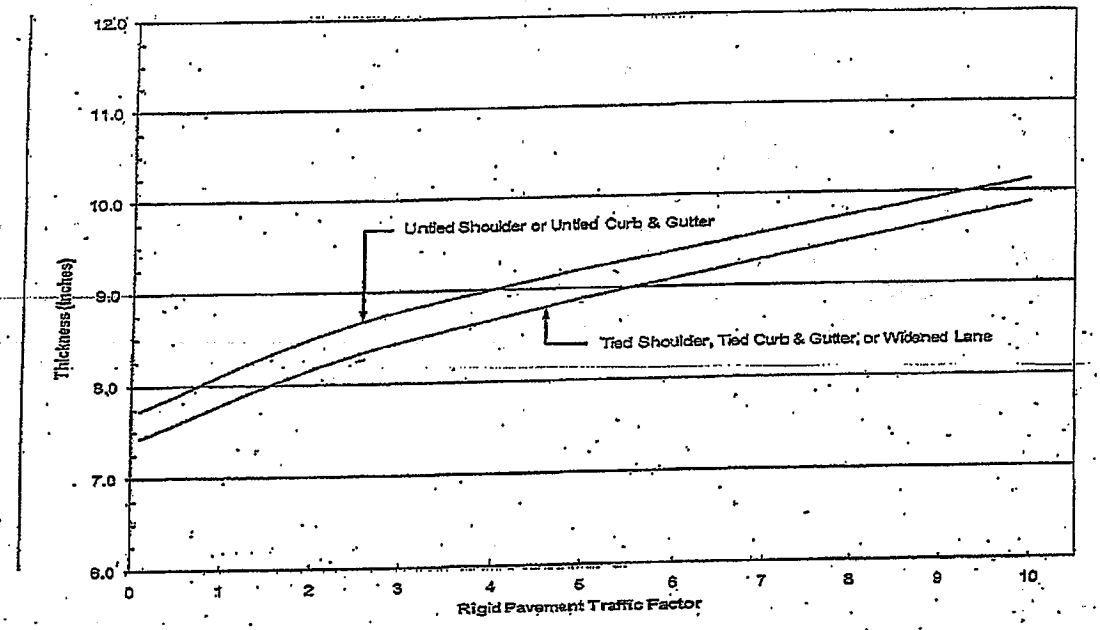
Class Table for One-Way Streets: ADT	Class
0 - 3500	II
>3501	I

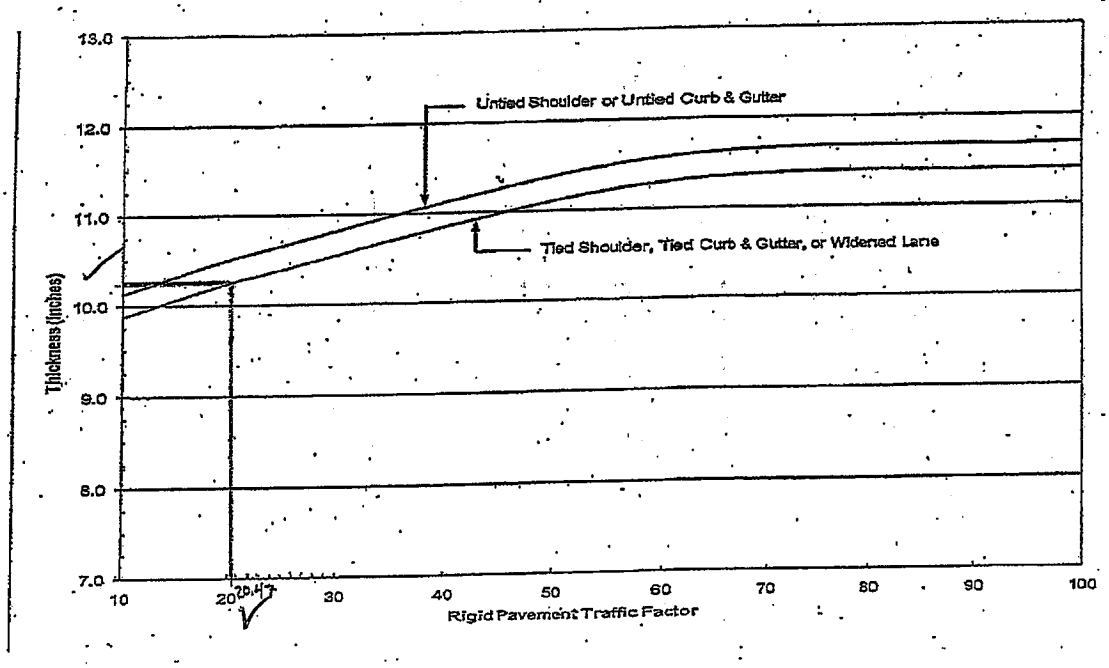
Class	Traffic Factor ESAL Coefficients: Rigid (Fig. 54-4C) Csu	Rigid Cmu	Flexible (Fig. 54-5B) Csu	Flexible Cmu
I	143.97	567.21	112.06	385.44
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV(ADT>400)	127.75	555.90	109.14	384.35
IV(ADT<=400)	127.75	555.90	9.86	78.84

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 P	Rural S	Rural M	Urban P	Urban S	Urban M
Number of Lanes						
1 Lane Ramp	100%	100%	100%	100%	100%	100%
2 or 3	50%	50%	50%	50%	50%	50%
4 or 5	32%	45%	45%	13%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

US 30





Note: Use of untied shoulder design requires BDE approval.

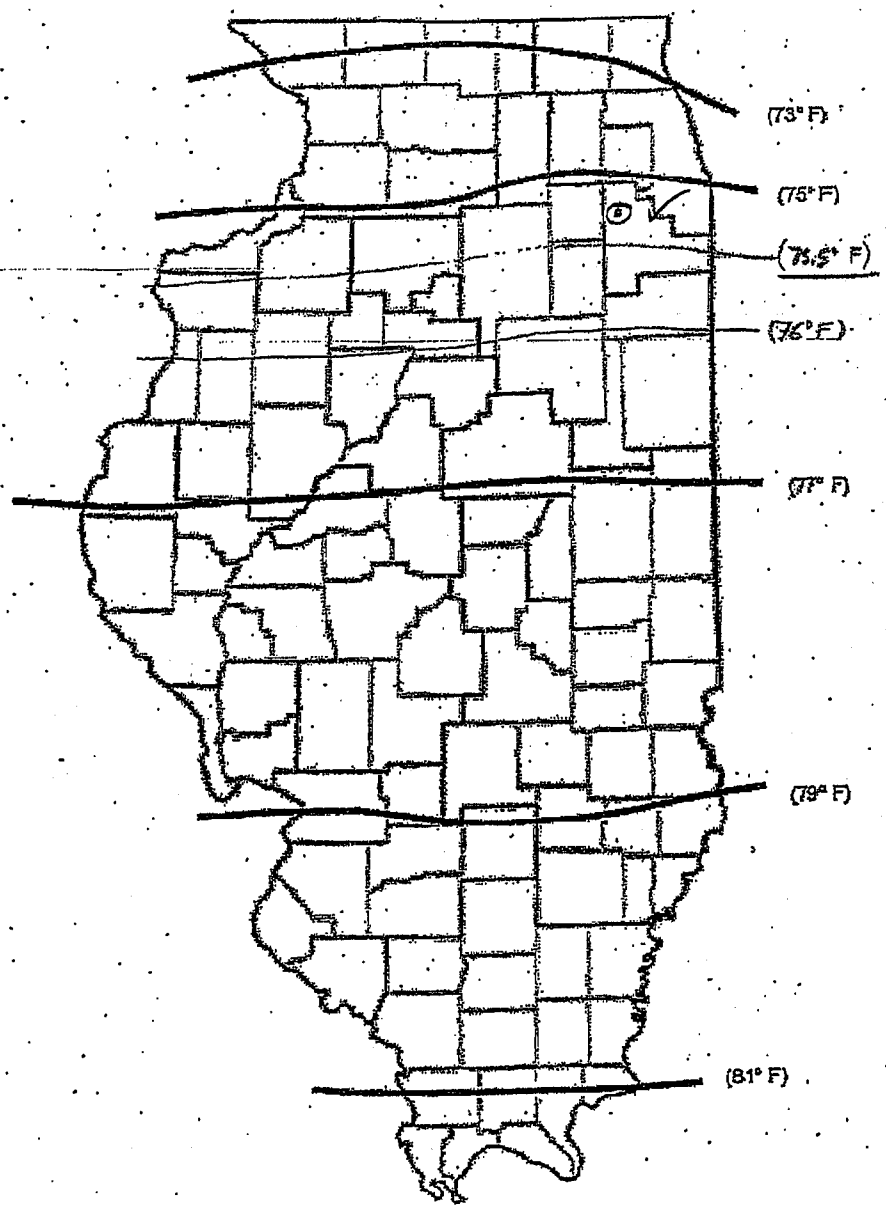
RIGID PAVEMENT DESIGN CHART
(Mechanistic Design: SSR = Poor)

10 1/4" PCC PAVEMENT (JOINTED)

Figure 54-4.E

HARD COPIES UNCONTROLLED

US 30

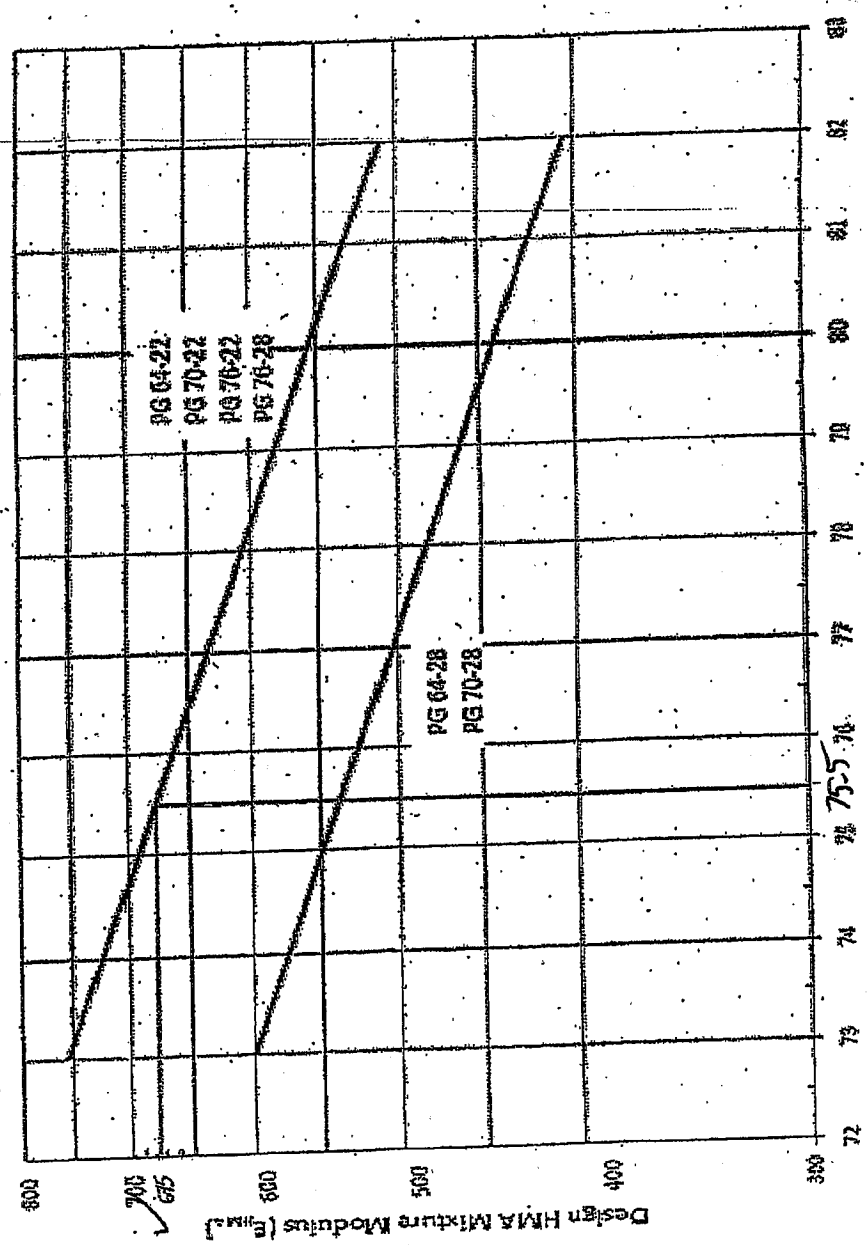


Note: The minimum design HMA mixture temperature will be 73 °F.

HMA MIXTURE TEMPERATURE
(Mechanistic Design: Flexible Pavement)

Figure 54-5.C

US 30



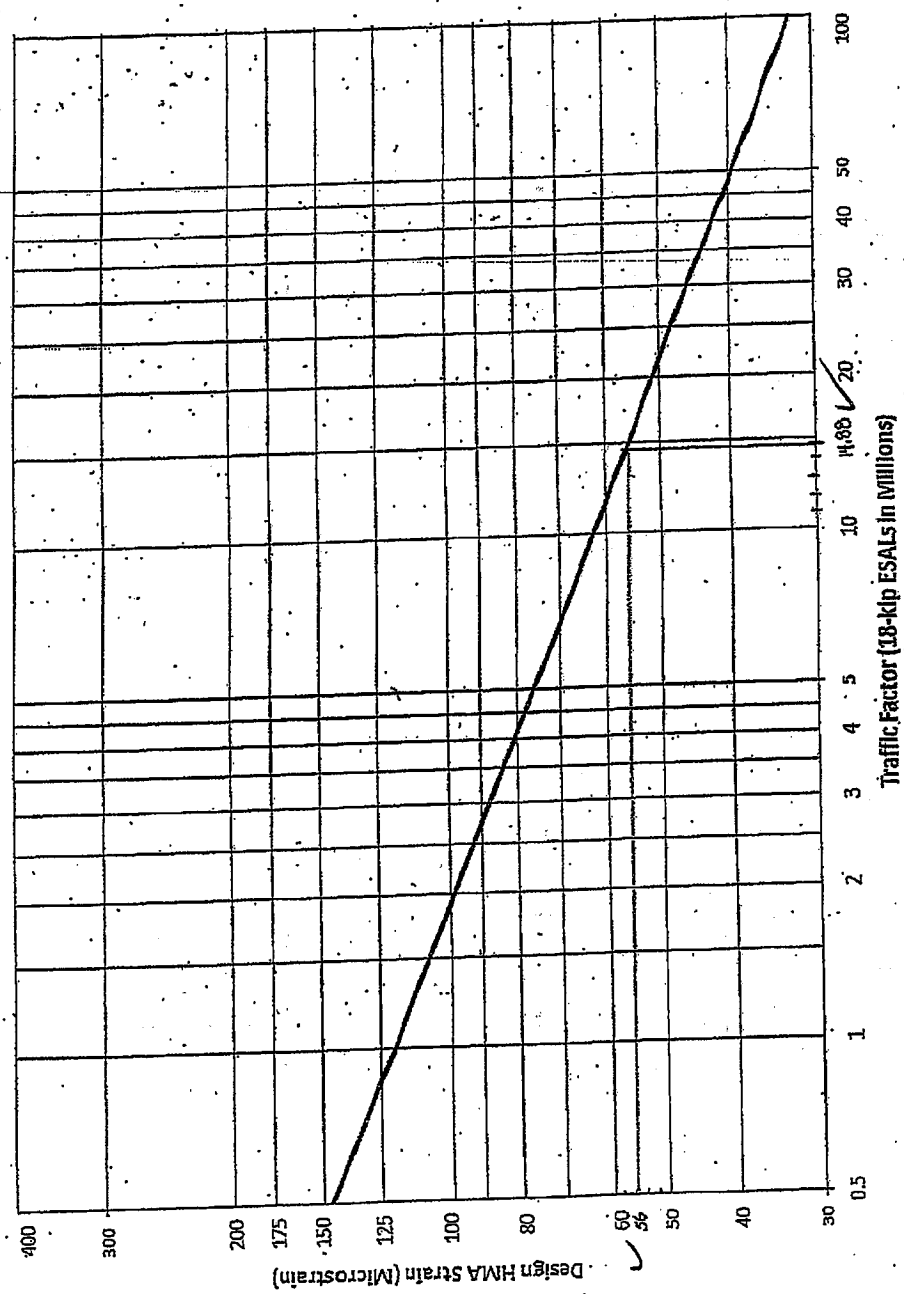
75-5

HMA MIXTURE MODULUS (E_{HMA})
(Mechanistic Design: Flexible Pavement)

Figure 54-5.D

HARD COPIES UNCONTROLLED

US 30



DESIGN HMA STRAIN
(Mechanistic Design: Flexible Pavement)

Figure 54-5.E

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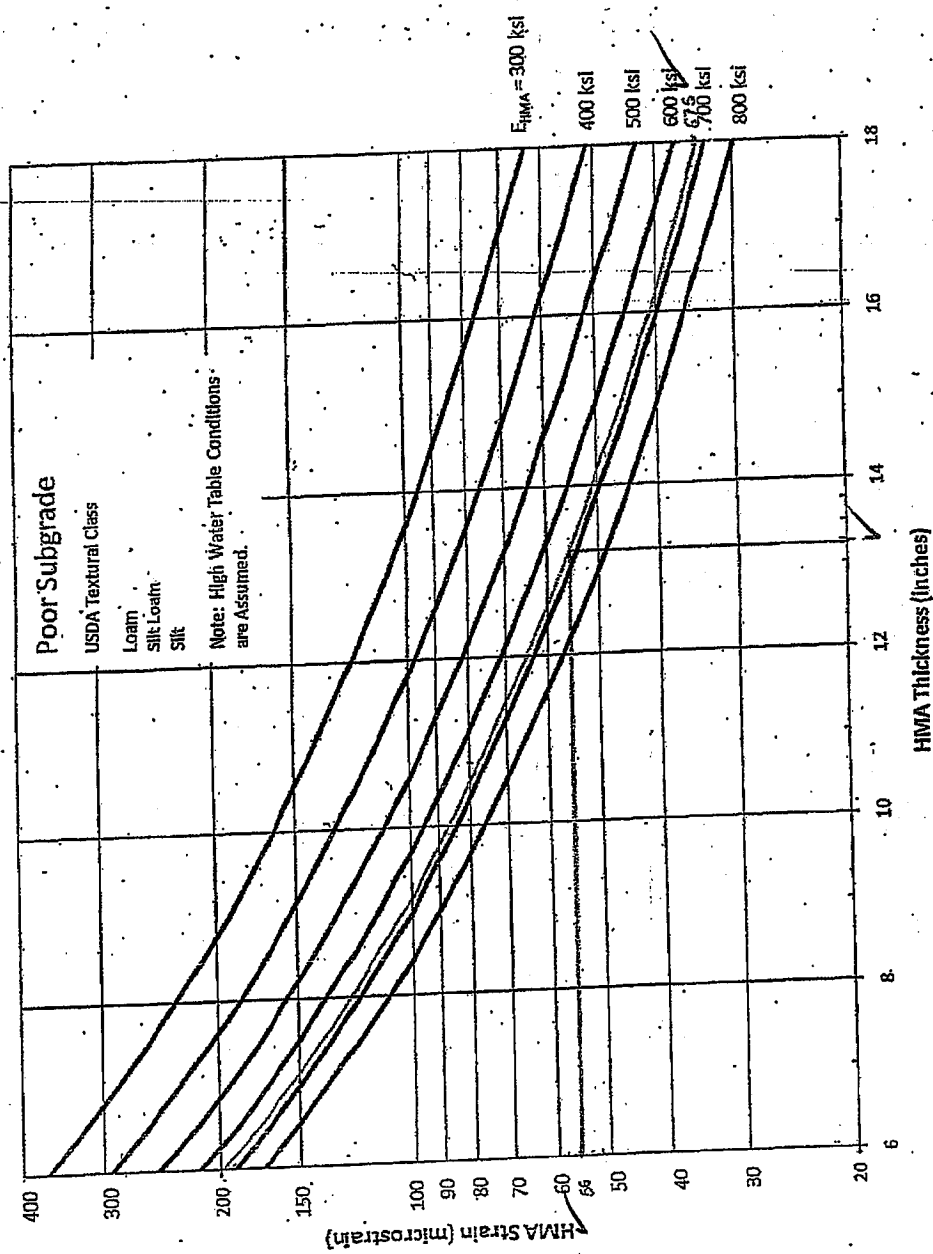

HMA THICKNESS DESIGN CHART
(Mechanistic-Design: Flexible Pavement: SSR = Poor)

Figure 54-5.F

13 1/4" FULL DEPTH HMA PAVEMENT

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