Illinois Department of Transportation

To:	John Fortman	Attn: District One
From:	John D. Baranzelli	
Subject:	Pavement Design	
Date:	August 3, 2012	

FAP Route 351 (US 6/IL 7 – 159th Street & Wolf Road)
Section 536-R-1/2010-081-R
Will/Cook Counties
From Gougar Road to Ravinia Avenue

We have reviewed the pavement selection for the project, which was submitted to BDE by email dated July 11, 2012. The project will reconstruct US 6/IL 7 and the intersections with Cedar Road, Parker Road, Bell Road, Will-Cook Road, 115th Avenue, 114th Court, 114th Avenue, 113th Court, 113th Avenue, Parker Station Boulevard, 108th Avenue and 104th Avenue. Various intersections are subject to local jurisdictional approval.The life cycle cost analysis for Stuenkel Road favored the rigid design by12.8%. The approved pavement design for this project is as follows:

US 6/IL 7 [159th Street/Wolf Road] [Pavement Reconstruction]

Parker Station Blvd., 113th Ave., 113th Ct., 114th Ave., 114th Ct., and 115th Ave. at 159th Street] [Pavement Reconstruction][Local Jurisdiction]

9.5 inches of PCC Jointed Pavement with Tied PCC Shoulders
4.5 HMA Stabilized Subbase
12 inches of Aggregate Subgrade Improvement

Cedar Road [North] at 159th Street [Pavement Reconstruction]
Parker Road at 159th Street [Pavement Reconstruction]

Cedar Rd. [South], Bell Rd. [North], Bell Rd. [South], Will-Cook Rd. [South], 108th Ave. and 104th Ave. at 159th Street [Pavement Reconstruction][Local Jurisdiction]

8 inches of PCC Jointed Pavement with Tied PCC Shoulders
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, PE

Attn: Paul Niedernhofer

From: John Fortmann

By: Jose A. Dominguez

Subject: Pavement Analysis*

Date: July 11, 2012

*Location: US 6 / IL 7 (159th St.)
Route: FAP 351
Section: 536-R-1 / 2010-081-R
County: Will / Cook
Contract No.: 60L71 & 60L72
Job No: D-91-010-11

Current target: 06CY13

We are submitting the pavement analysis for the above captioned locations for your review and approval. Please note that the pavement area for reconstruction exceeds 4,750 square yards for 159th Street, therefore review by the Central Office is required. The improvement involves the following scope of work.

A. Pavement reconstruction of existing US-6 / IL 7 (159th St.) for a length of 40,314 feet consisting of four 12-foot lane cross-sections.

B. Pavement reconstruction of existing US-6 / IL-7 (Wolf Road) for a length of 2,635 feet consisting of two to four 12-foot lane cross-sections.

C. Pavement reconstruction of arterial roads Cedar Road, Parker Road, Bell Road, Will-Cook Road, 115th Ave, 114th Court, 114th Ave., 113th Court,113th Ave., Parker Station Blvd, 108th Ave., 104th Ave. to accommodate the new geometry of 159th Street.

A 30 year pavement analysis was performed on US-6 / IL 7 (159th Street). We recommend a mechanistic-rigid pavement design based on the life cycle cost analysis which favors PCC pavement by 12.8%.

a. US 6 / IL 7 (159th St.) (IDOT Jurisdiction)

b. US 6 / IL 7 (Wolf Road) (IDOT Jurisdiction)[5, 6]

c. Parker Station Blvd. at 159th Street[1,6]

d. 113th Ave. at 159th Street[1,6]

e. 113th Court at 159th Street[1,6]

f. 114th Ave. at 159th Street[1,6]

g. 114th Court at 159th Street[1,6]

h. 115th Ave. at 159th Street[1,6]

Pavement Reconstruction
- Tied PCC Shoulders
- 9 ½" PCC Pavement (Jointed)[2]
- 4 ½" HMA Stabilized Subbase[3]
- 12" Aggregate Subgrade Improvement

i. Cedar Road (North) at 159th Street (IDOT Jurisdiction)

j. Cedar Road (South) at 159th Street (Will County Jurisdiction)[6]

k. Parker Road at 159th Street (IDOT Jurisdiction)

l. Bell Road (North) at 159th Street (Will County Jurisdiction)[6]

m. Bell Road (South) at 159th Street (Will County Jurisdiction)[5, 6]

n. Will-Cook Road (South) at 159th Street (Homer Glen Jurisdiction)[6]

o. 108th Ave. at 159th Street (Cook County Jurisdiction)[5, 6]

p. 104th Ave. at 159th Street (Cook County Jurisdiction)[6]

Pavement Reconstruction
- Tied PCC Shoulders
- 8" PCC Pavement (Jointed)[4]
- 4 ½" HMA Stabilized Subbase[3]
- 12" Aggregate Subgrade Improvement

[1]Designer Note 1: We recommend that these arterial roads match the mainline pavement design for construction continuity and short length of construction.

[2]Designer Note 2: Use pay item "**42000411 – PORTLAND CEMENT CONCRETE PAVEMENT 9 ½" (JOINTED)**".

[3]Designer Note 3: Use pay item "**31200502 - STABILIZED SUBBASE - HOT-MIX ASPHALT, 4 ½"** ". The 4 ½" Stabilized Subbase should be included where pavement does not have an enclosed drainage system. See figure 54-4.D in Chapter 54 of the BDE manual. **159th Street must include the 4 ½" Stabilized Subbase** due to the fact that it is a 30 year pavement design.

[4]Designer Note 4: Use pay item "**42000301 – PORTLAND CEMENT CONCRETE PAVEMENT 8" (JOINTED)**".

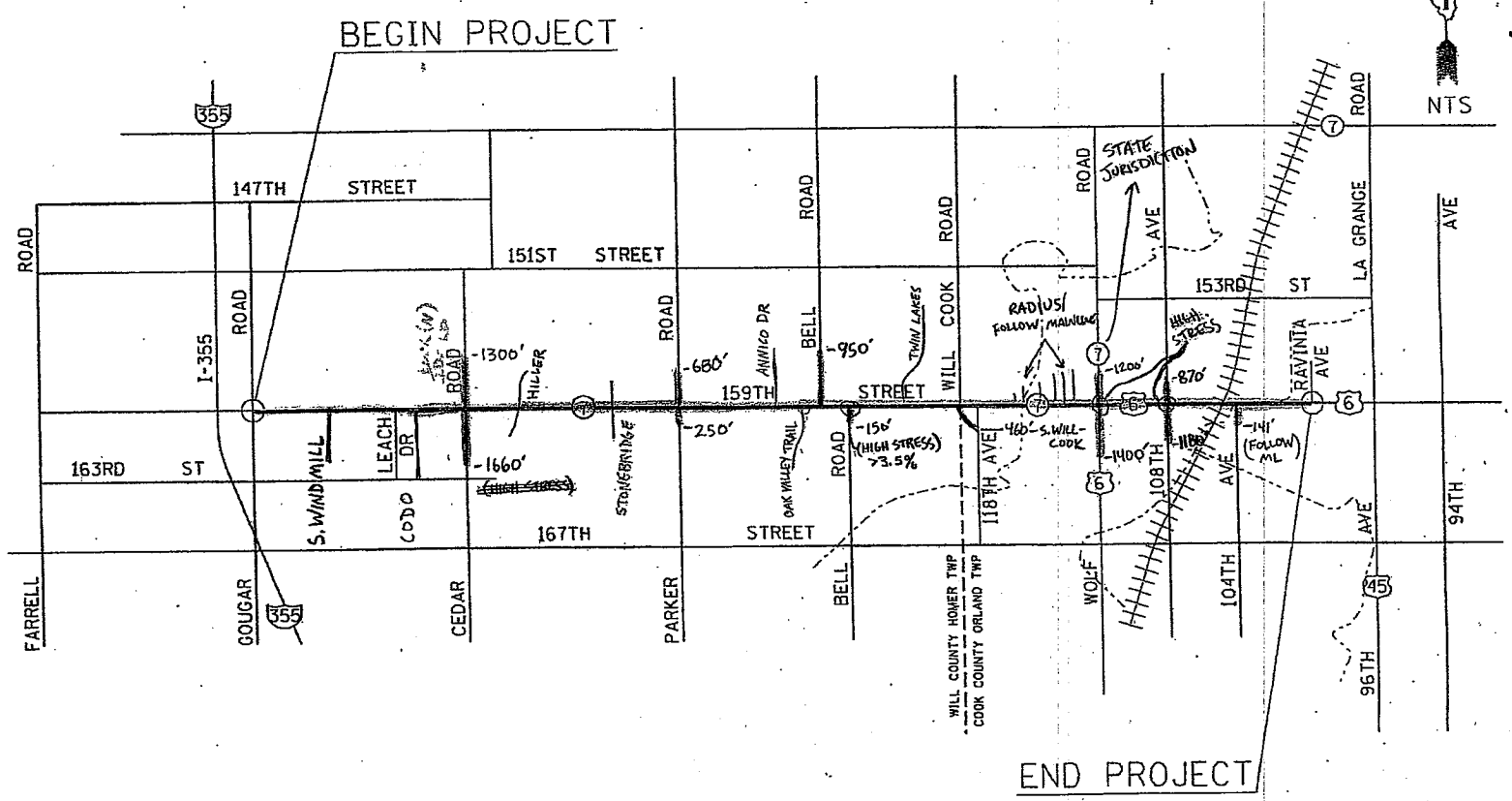
[5]Designer Note 5: Bell Road (South), Wolf Road, and 108th Ave are "High Stress" intersections since their approach grades are greater than 3.5%. District 1 recommends rigid pavement. However, if the municipality elects to use HMA, we recommend using Mix "F" N90 at "High Stress" intersections. Either selection is preferred to be built at a minimum 150 ft back from the location of the stop bar.

[6]Designer Note 6: These roads are subject to local jurisdictional approval and concurrence.

If you have any questions or need additional information, please contact Melchor Mangoba at 847-705-4255.

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

Illinois Department of Transportation



LOCATION MAP

US ROUTE 6/ILLINOIS ROUTE 7 (159TH STREET)
FROM EAST OF GOUGAR ROAD TO RAVINIA AVENUE
WILL AND COOK COUNTIES
IDOT PROJECT NO. P-91-284-93

HAMPTON, LENZINI AND RENWICK, INC.
CIVIL ENGINEERS • STRUCTURAL ENGINEERS • LAND SURVEYORS

APPENDIX A

Summary of Pavement Selection

We did not feel a need to perform life cycle costs on all the state roads due to the fact that 159th Street's area covers more than 92% of IDOT jurisdiction on this project. Its lifecycle favored concrete by 12.8%, so we felt it was enough reason to make the entire project concrete.

We decided that Wolf road should match the mainline road even though the design calls it to be only a half inch thinner. This allows us to have only 2 different pavement design thicknesses which will aid in constructability.

BDE 5401 Template (05/29/2012)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 08/30/2012

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: FAP 351 (US 67) L-7 (159th St.)
Section: 586-R-1 / 2010-031-R
County: Will / Cook
Location: Cottage Rd. to Ravinia Ave

Comments: The pavement design analysis was completed as part of the Engineering Analysis and Report (06-74 / 09-72)

Design Date: 08/01/2012 AK / MF
Modified Date:

<-- BY	ADT	Year
<-- BY		
Current:	[illegible]	2010
Future:	[illegible]	2030

READ ME

Facility Type: Other Marked State Route

# of Lanes = 4

RESET

Road Class: I

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane	
PV =	0	30,634	96.0%	P =	32%
SU =	250	862	2.7%	S =	45%
MU =	750	415	1.3%	M =	45%

Subgrade Support Rating (SSR): Poor
Construction Year: 2013
Design Period (DP) = 30 years

Struct. Design ADT = 31,910 (2028)

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv =	0.15	
Csu =	132.5	
Cmu =	482.53	
TF flexible (Actual) =	4.29	(Actual ADT)
TF flexible (Min) =	5.33	(Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv =	0.15	
Csu =	143.81	
Cmu =	696.42	
TF rigid (Actual) =	5.62	(Actual ADT)
TF rigid (Min) =	7.54	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible =	5.33	
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)
HMA Mixture Temp. =	75.0	deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) =	690	ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) =	75	(Fig. 54-5.E)
Full Depth HMA Design Thickness =	11.00	in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness =	14.50	in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness =	**11.00**	**inches**

JPC Pavement

Use TF rigid =	7.54	
Edge Support =	Tied	Shoulder or C.&G.
Rigid Pavt Thick. =	**9.50**	**in. (Fig. 54-4.E)**

CRC Pavement

Use TF rigid =	7.54	
IBR value =	3	
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

Use TF flexible =	5.33	
District =	District 1	
HMA Overlay Design Thickness =	**9.00**	**in. (Fig. 54-5.U)**

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

JPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

Facility Type	Min. Str. Design Traffic (Fig 54-2.C) PV	SU	MU
Interstate or Supplemental Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

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

Class	Traffic Factor ESAL Coefficients: Rigid (Fig. 54-4.C) Csu	Rigid Cmu	Flexible (Fig. 54-5.B) Csu	Flexible Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B): Rural 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	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

PLAIN JOINTED PCC PAVEMENT

FILENAME-	US 6/IL 7 (159th)	30-Aug-12	
ROUTE-	US 6/IL 7 (159th)	9:15 AM	
SECTION-	536-R-1/2010-081-R		
COUNTY-	Will/ Cook		
LOCATION-	Gougar Rd.to Ravinia Ave		
DATE-	30-Aug-12		
PROJECT LENGTH (FT)	40314 =	7.64	MILES
AVERAGE LANE WIDTH (FT)	12		
NUMBER OF LANES	4		
# OF EDGES	4		
INSIDE SHLDER WIDTH (FT)	0		
OUTSIDE SHLDER WIDTH (FT)	0		
# OF CENTERLINES	2		
RIGID THICKNESS-	9.5		
TRAFFIC FACTORS	MINIMUM	ACTUAL	
RIGID-	7.54	5.62	

TRAFFIC

		Percentages
PV-	30634	96.00%
SU-	862	2.70%
MU-	415	1.30%

INITIAL COSTS

ITEM	QUANTITY	UNIT PRICE	COST
PAVEMENT (SQ YDS)	215,008	$33.81	$7,269,420
STAB SUBBASE (SQ YDS)	241,884	$15.00	$3,628,260
SHOULDERS (SQ YDS)	0		$0
SHOULDER SEAL (LN FT)	161,256	$2.00	$322,512
SUBBASE GRAN MATL TY C (TONS)	0		$0

CONSTRUCTION INITIAL COST (PW)	$11,220,192
TOTAL REHABILITATION COST (PW)	$2,614,194
TOTAL LIFE CYCLE COST (PW)	$13,834,386
ANNUAL COST PER MILE	$73,862

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)		$10.18
POLICY HMA OVERLAY SHLDR (SQ YDS)		$10.18
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)	215	$130.00	$27,950	
				$27,950	$20,798
Activity 2					
YEAR 15					
	PAVEMENT PATCHING 0.2% (SQ YDS)	430	$130.00	$55,900	
				$55,900	$35,882
Activity 3					
YEAR 20					
	PAVEMENT PATCHING 2.0% (SQ YDS)	4,300	$130.00	$559,000	
	SHOULDER PATCHING 0.5% (SQ YDS)	0	$85.00	$0	
	SHLDR JT ROUT & SEAL 100% (LF)	161,256	$1.00	$161,256	
	CENTERLINE JT ROUT & SEAL 100% (LF)	80,628	$1.00	$80,628	
				$800,884	$443,449
Activity 4					
YEAR 25					
	PAVEMENT PATCHING 3.0% (SQ YDS)	6,450	$130.00	$838,500	
	SHOULDER PATCHING 1.0% (SQ YDS)	0	$85.00	$0	
				$838,500	$400,468
Activity 5					
YEAR 30					
	PAVEMENT PATCHING 4.0% (SQ YDS)	8,600	$130.00	$1,118,000	
	SHOULDER PATCHING 1.5% (SQ YDS)	0	$85.00	$0	
	POLICY HMS OVERLAY OVMT (SQ YDS)	215,008	$10.18	$2,188,781	
	POLICY HMA OVERLAY SHLDR (SQ YDS)	0	$10.18	$0	
				$3,306,781	$1,362,394
Activity 6					
YEARS 35					
	SHLDR JT ROUT & SEAL 100% (LF)	161,256	$1.00	$161,256	
	CENTERLINE JT ROUT & SEAL 100% (LF)	80,628	$1.00	$80,628	
	RANDOM CRACK ROUT & SEAL 50% (LF)	80,628	$1.00	$80,628	
	REFL TRANS CRACK ROUT & SEAL 40%	51,602	$1.00	$51,602	
	PARTIAL PVMT PATCH 0.1% (SQ YDS)	215	$130.00	$27,950	
				$402,064	$142,894
Activity 7					
YEAR 40					
	PAVEMENT PATCHING 0.5% (SQ YDS)	1,075	$130.00	$139,750	
	SHOULDER PATCHING 0.5% (SQ YDS)	1,075	$130.00	$139,750	
	REFL TRANS CRACK ROUT & SEAL 60%	77,403	$1.00	$77,403	
	RANDOM CRACK ROUT & SEAL 50% (LF)	80,628	$1.00	$80,628	
	SHLDR JT ROUT & SEAL 100% (LF)	161,256	$1.00	$161,256	
	CENTERLINE JT ROUT & SEAL 100% (LF)	80,628	$1.00	$80,628	
				$679,415	$208,309
			Total Rehabilitation Cost (Present Worth)		$2,614,194

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

ROUTE-	US 6/IL 7 (159th)	30-Aug-12
SECTION-	536-R-1/2010-081-R	9:15 AM
COUNTY-	Will/ Cook	
LOCATION-	Gougar Rd to Ravinia Ave	

PROJECT LENGTH (FT)	40314	
AVERAGE LANE WIDTH (FT)	12	
NUMBER OF LANES	4	
# OF EDGES	4	
INSIDE SHLDER WIDTH (FT)	0	
OUTSIDE SHLDER WIDTH (FT)	0	
# OF CENTERLINES	2	
PROJECT TYPE	2	1=RURAL, 2=URBAN
PAVING WIDTH	1	1=SINGLE LANE, 2=DUAL LANE
INTERSTATE / OTHER ROUTE	OTHER ROUTE	
FLEXIBLE THICKNESS-	11	

TRAFFIC FACTORS	MINIMUM	ACTUAL
FLEXIBLE	5.33	4.29

TRAFFIC

PV-	30634	96.00%
SU-	862	2.70%
MU-	415	1.30%

PAVEMENT OVERLAY THICKNESS	3.75
SHOULDER OVERLAY THICKNESS	1.75

INITIAL COSTS

ITEM	QUANTITY	UNIT PRICE	COST
SURFACE (SQ YDS)	215,008	$10.16	$2,188,781
POLY BINDER (SQ YDS)	215,008	$10.58	$2,274,785
BINDER (SQ YDS)	215,008	$29.33	$6,306,185
SHOULDERS (SQ YDS)	0	$0.00	$0
SUBBASE GRAN MATL TY C (TONS)	0	$0.00	$0

CONSTRUCTION INITIAL COST (PW)	$10,769,751
TOTAL REHABILITATION COST (PW)	$4,829,558
TOTAL LIFE CYCLE COST (PW)	$15,599,309
ANNUAL COST PER MILE	$83,285

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)		$90.89
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)		$90.89
POLICY HMA OVERLAY SHLDR (TONS)		$90.89

MATERIAL TYPE/PERCENTAGE PCC 12.8%

FULL DEPTH FLEXIBLE PAVEMENT
MAINTENANCE COSTS

	ITEM	QUANTITY	UNIT PRICE	COST	PW
Activity 1					
YEAR 5	RAND/THERM CRACK ROUT & SEAL 50% (LF)	22,173	$1.00	$22,173	
	SHLDR JT ROUT & SEAL 100% (LF)	161,256	$1.00	$161,256	
	CENTERLINE JT ROUT & SEAL 100% (LF)	80,628	$1.00	$80,628	
	PARTIAL PVMT PATCH 0.1% (SQ YDS)	215	$90.00	$19,350	
				$283,407	$244,467
Activity 2					
YEAR 10	PARTIAL PVMT PATCH 0.5% (SQ YDS)	1,075	$90.00	$96,750	
	RAND/THERM CRACK ROUT & SEAL 50% (LF)	22,173	$1.00	$22,173	
	SHLDR JT ROUT & SEAL 100% (LF)	161,256	$1.00	$161,256	
	CENTERLINE JT ROUT & SEAL 100% (LF)	80,628	$1.00	$80,628	
				$360,807	$268,476
Activity 3					
YEAR 15	2" MILL PVMT & SHLDR 100% (SQ YDS)	215,008	$1.75	$376,264	
	PARTIAL PVMT PATCH 1.0% (SQ YDS)	2,150	$90.00	$193,500	
	2" OVERLAY PVMT & SHLDR 100% (TONS)	24,081	$90.89	$2,188,791	
				$2,758,555	$1,770,716
Activity 4					
YEAR 20	SHLDR JT ROUT & SEAL 100% (LF)	161,256	$1.00	$161,256	
	CENTERLINE JT ROUT & SEAL 100% (LF)	80,628	$1.00	$80,628	
	RAND/THERM CRACK ROUT & SEAL 50% (LF)	22,173	$1.00	$22,173	
	PARTIAL PVMT PATCH 0.1% (SQ YDS)	215	$90.00	$19,350	
				$283,407	$156,922
Activity 5					
YEAR 25	SHLDR JT ROUT & SEAL 100% (LF)	161,256	$1.00	$161,256	
	CENTERLINE JT ROUT & SEAL 100% (LF)	80,628	$1.00	$80,628	
	RAND/THERM CRACK ROUT & SEAL 50% (LF)	22,173	$1.00	$22,173	
	PARTIAL PVMT PATCH 0.5% (SQ YDS)	1,075	$90.00	$96,750	
				$360,807	$172,321
Activity 6					
YEAR 30	2" MILL PVMT & SHLDR 100% (SQ YDS)	215,008	$1.75	$376,264	
	PARTIAL PVMT PATCH 2.0% (SQ YDS)	4,300	$90.00	$387,000	
	HMA SHLDR PATCHING 1.0% (SQ YDS)	0	$90.00	$0	
	POLICY HMA OVERLAY PVMT (TONS)	45,152	$90.89	$4,103,994	
	POLICY HMA OVERLAY SHLDR (TONS)	0	$90.89	$0	
				$4,867,258	$2,005,310
Activity 7					
YEAR 35	SHLDR JT ROUT & SEAL 100% (LF)	161,256	$1.00	$161,256	
	CENTERLINE JT ROUT & SEAL 100% (LF)	80,628	$1.00	$80,628	
	RAND/THERM CRACK ROUT & SEAL 50% (LF)	22,173	$1.00	$22,173	
	PARTIAL PVMT PATCH 0.1% (SQ YDS)	215	$90.00	$19,350	
				$283,407	$100,723
Activity 8					
YEAR 40	SHLDR JT ROUT & SEAL 100% (LF)	161,256	$1.00	$161,256	
	CENTERLINE JT ROUT & SEAL 100% (LF)	80,628	$1.00	$80,628	
	RAND/THERM CRACK ROUT & SEAL 50% (LF)	22,173	$1.00	$22,173	
	PARTIAL PVMT PATCH 0.5% (SQ YDS)	1,075	$90.00	$96,750	
				$360,807	$110,623

Total Rehabilitation Cost (Present Worth) $4,829,558

BDE 5401 Template (05/29/2012) **IDOT MECHANISTIC PAVEMENT DESIGN** Printed: 08/30/2012

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: Bell Rd. (North)
Section: 536-R-1
County: Will
Location: US-6 / IL-7 (159th St.)

Comments: Bell Rd. - North Leg Pavement HDG-1
Design Date: 08/04/2012
Modified Date:

	ADT	Year
<-- BY		
<-- BY		
Current:	2,800	2010
Future:	4,410	2030

READ ME

Facility Type: Unmarked State Route

RESET

# of Lanes = 2 or 3
Part of future 4 lanes or more ? No
One Way Street ? No
Road Class: II

Subgrade Support Rating (SSR): Poor
Construction Year: 2013
Design Period (DP) = 20 years

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	No Min	14,582	98.0%	P = 50%
SU =	No Min	193	1.3%	S = 50%
MU =	No Min	104	0.7%	M = 50%
Struct. Design ADT =		14,880	(2023)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv =	0.15	
Csu =	112.06	
Cmu =	385.44	
TF flexible (Actual) =	0.64	(Actual ADT)
TF flexible (Min) =	No Min	(Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv =	0.15	
Csu =	135.78	
Cmu =	567.21	
TF rigid (Actual) =	0.88	(Actual ADT)
TF rigid (Min) =	No Min	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible =	0.64	
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)
HMA Mixture Temp. =	75.0	deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) =	690	ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) =	137	(Fig. 54-5.E)
Full Depth HMA Design Thickness =	7.50	in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness =	13.50	in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness =	**7.50**	**inches**

JPC Pavement

Use TF rigid =	0.88	
Edge Support =	Tied	Shoulder or C.&G.
Rigid Pavt Thick. =	7.75	in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid =	0.88	
IBR value =	5	
CRCP Thickness =	6.00	in. (Fig. 54-4.N)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible =	0.64	
District =	3 (Ill. 16)	
HMA Overlay Design Thickness =	5.50	in. (Fig. 54-5.U)

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

UPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

Facility Type	Min. Str. Design Traffic (Fig 54-2.C) PV	SU	MU
Interstate or Supplemental Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

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

Class	Traffic Factor ESAL Coefficients: Rigid (Fig. 54-4.C) Csu	Rigid Cmu	Flexible (Fig. 54-5.B) Csu	Flexible Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street) ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B) Rural 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	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

BDE 5401 Template (05/29/2012)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 08/30/2012

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: Bell Rd (South)
Section: 53C-R-1
County: Will
Location: US 6 / IL 7 (159th St.)

Comments: Bell Rd. South Leg Pavement Design

Design Date: 06/04/2012 AK
Modified Date:

	ADT	Year
<-- BY		
<-- BY		
Current:	[illegible]	2012
Future:	2011	2030

READ ME

Facility Type: Unmarked State Route

RESET

# of Lanes = 2or3
Part of future 4 lanes or more ? No
One Way Street ? No
Road Class: II

Subgrade Support Rating (SSR): Poor
Construction Year: 2016
Design Period (DP) = 20 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	No Min	9,940	99.0%	P = 50%
SU =	No Min	70	[illegible]	S = 50%
MU =	No Min	30	0.3%	M = 50%
Struct. Design ADT =		10,040	(2023)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv =	0.15	
Csu =	112.06	
Cmu =	385.44	
TF flexible (Actual) =	0.21	(Actual ADT)
TF flexible (Min) =	No Min	(Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv =	0.15	
Csu =	135.78	
Cmu =	567.21	
TF rigid (Actual) =	0.28	(Actual ADT)
TF rigid (Min) =	No Min	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible =	0.50	Per BDE 54-5.01(i)-1g
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)
HMA Mixture Temp. =	750	deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) =	690	ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) =	147	(Fig. 54-5.E)
Full Depth HMA Design Thickness =	7.25	in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness =	14.50	in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness =	**7.25**	**inches**

JPC Pavement

Use TF rigid =	0.28	
Edge Support =	Tied	Shoulder or C.&G.
Rigid Pavt Thick. =	7.50	in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid =	0.28	
IBR value =	[illegible]	
CRCP Thickness =	5.00	in. (Fig. 54-4.N)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible =	0.50	
District =	[illegible]	
HMA Overlay Design Thickness =	5.25	in. (Fig. 54-5.U)

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

JPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

Facility Type	Min. Str. Design Traffic (Fig 54-2.C) PV	SU	MU
Interstate or Supplemental Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

Class Table for One-Way Streets

ADT	Class
0 - 3500	II
>3501	I

Class	Traffic Factor ESAL Coefficients: Rigid (Fig. 54-4.C) Csu	Rigid Cmu	Flexible (Fig. 54-5.B) Csu	Flexible Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)

ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B): Rural 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	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

BDE 5401 Template (05/29/2012)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 08/30/2012

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: Cedar Rd (North)
Section: 336-R-1
County: Will
Location: US-6 / IL-7 (159th St)

Comments: Cedar Rd - North Leg Pavement Design

Design Date: 06/04/2012 AK
Modified Date:

<-- BY	ADT	Year
<-- BY		
Current:	4,950	2010
Future:	7,000	2030

READ ME

Facility Type: Unmarked State Route

# of Lanes = 4

RESET

Road Class: I

Subgrade Support Rating (SSR): 1 Poor
Construction Year: 2013
Design Period (DP) = 20 years

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	No Min	5,908	99.0%	P = 32%
SU =	No Min	42	0.7%	S = 45%
MU =	No Min	18	0.3%	M = 45%

Struct. Design ADT = 5,968 (2023)

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv =	0.15	
Csu =	132.5	
Cmu =	482.53	
TF flexible (Actual) =	0.13	(Actual ADT)
TF flexible (Min) =	No Min	(Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv =	0.15	
Csu =	143.81	
Cmu =	696.42	
TF rigid (Actual) =	0.17	(Actual ADT)
TF rigid (Min) =	No Min	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible =	0.50	Per BDE 54-5.01(i)-1g
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)
HMA Mixture Temp. =	75.0	deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) =	690	ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) =	147	(Fig. 54-5.E)
Full Depth HMA Design Thickness =	7.25	in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness =	14.60	in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness =	**7.25**	**Inches**

JPC Pavement

Use TF rigid =	0.17	
Edge Support =	Tied	Shoulder or C.&G.
Rigid Pavt Thick. =	**7.50**	**in. (Fig. 54-4.E)**

CRC Pavement

Use TF rigid =	0.17	
IBR value =	3	
CRCP Thickness =	**4.75**	**in. (Fig. 54-4.M)**

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible =	0.50	
District =	3	
HMA Overlay Design Thickness =	**5.25**	**in. (Fig. 54-5.U)**

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

JPCP Thickness = NA Inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

	Min. Str. Design Traffic (Fig 54-2.C)		
Facility Type	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

	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%

BDE 5401 Template (05/29/2012)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 08/30/2012

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: Cedar Rd (South)
Section: 596-R
County: Will
Location: US-6 / IL-7 (159th St)

Comments: Cedar Rd South Lgo Pavement Design

Design Date: 06/04/2012 AK
Modified Date:

<-- BY	ADT	Year
<-- BY		
Current:	15,931	2012
Future:	21,161	2050

READ ME

Facility Type: Unmarked State Route

# of Lanes = 4

RESET

Road Class: I

Subgrade Support Rating (SSR): Poor
Construction Year: 2013
Design Period (DP) = 20 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane	
PV =	No Min	15,937	97.0%	P =	32%
SU =	No Min	329	2.0%	S =	45%
MU =	No Min	164	1.0%	M =	45%
Struct. Design ADT =		16,430	(2023)		

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv =	0.15	
Csu =	132.5	
Cmu =	482.53	
TF flexible (Actual) =	1.12	(Actual ADT)
TF flexible (Min) =	No Min	(Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv =	0.15	
Csu =	143.81	
Cmu =	696.42	
TF rigid (Actual) =	1.47	(Actual ADT)
TF rigid (Min) =	No Min	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible =	1.12	
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)
HMA Mixture Temp. =	75.0	deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) =	690	ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) =	116	(Fig. 54-5.E)
Full Depth HMA Design Thickness =	8.25	in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness =	12.90	in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness =	**8.25**	**inches**

JPC Pavement

Use TF rigid =	1.47	
Edge Support =	Tied	Shoulder or C.&G.
Rigid Pavt Thick. =	8.00	in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid =	1.47	
IBR value =		
CRCP Thickness =	6.75	in. (Fig. 54-4.M)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible =	1.12	
District =	District 6	
HMA Overlay Design Thickness =	6.25	in. (Fig. 54-5.U)

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

JPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

Facility Type	Min. Str. Design Traffic (Fig 54-2.C) PV	SU	MU
Interstate or Supplemental Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

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

Class	Traffic Factor ESAL Coefficients: Rigid (Fig. 54-4.C) Csu	Rigid Cmu	Flexible (Fig. 54-5.B) Csu	Flexible Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street) ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B): Rural 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	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

BDE 5401 Template (05/29/2012) **IDOT MECHANISTIC PAVEMENT DESIGN** Printed: 08/30/2012

PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells)

Route: Parker Rd
Section: 536-R-1
County: Will
Location: US-6 / IL-7 (159th St.)

Comments: Parker Rd - North & South Leg Pavement Design

Design Date: 06/04/2012 AK
Modified Date:

<-- BY	ADT	Year
Current:	9,100	2010
Future:	11,600	2030

READ ME

Facility Type: Unmarked State Route

RESET

# of Lanes = 2 or 3
Part of future 4 lanes or more ? No
One Way Street ? No
Road Class: II

Subgrade Support Rating (SSR): Poor
Construction Year: 2013
Design Period (DP) = 20 years

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	No Min	11,368	98.0%	P = 50%
SU =	No Min	151	1.3%	S = 50%
MU =	No Min	81	0.7%	M = 50%
Struct. Design ADT =		11,600	(2023)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv =	0.15	
Csu =	112.06	
Cmu =	385.44	
TF flexible (Actual) =	0.50	(Actual ADT)
TF flexible (Min) =	No Min	(Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv =	0.15	
Csu =	135.78	
Cmu =	567.21	
TF rigid (Actual) =	0.68	(Actual ADT)
TF rigid (Min) =	No Min	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible =	0.50	Per BDE 54-5.01(i)-1g
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)
HMA Mixture Temp. =	750	deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) =	690	ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) =	147	(Fig. 54-5.E)
Full Depth HMA Design Thickness =	7.25	in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness =	14.50	in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness =	**7.25**	**Inches**

JPC Pavement

Use TF rigid =	0.68	
Edge Support =	Tied	Shoulder or C.&G.
Rigid Pavt Thick. =	**7.75**	**in. (Fig. 54-4.E)**

CRC Pavement

Use TF rigid =	0.68	
IBR value =		
CRCP Thickness =	**5.75**	**in. (Fig. 54-4.N)**

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible =	0.50	
District =	3 or 5	
HMA Overlay Design Thickness =	**5.25**	**in. (Fig. 54-5.U)**

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

JPCP Thickness = NA Inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

	Min. Str. Design Traffic (Fig 54-2.C)		
Facility Type	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

	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%

BDE 5401 Template (05/29/2012) **IDOT MECHANISTIC PAVEMENT DESIGN** Printed: 08/30/2012

PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells)

Route: Will Cook Rd (South)
Section: 336-5-1
County: Will
Location: US 6 to 1.75 mi S

Comments: Will Cook Rd - South Leg Pavement Design
Design Date: 06/04/2012
Modified Date:

	ADT	Year
<-- BY		
<-- BY		
Current:	13,100	2012
Future:	6,000	2030

READ ME

Facility Type: Unmarked State Route

RESET

# of Lanes = 2 or 3
Part of future 4 lanes or more ? No
One Way Street ? No
Road Class: II

Subgrade Support Rating (SSR): Poor
Construction Year: 2013
Design Period (DP) = 20 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane	
PV =	No Min	14,637	97.0%	P =	50%
SU =	No Min	302	2.0%	S =	50%
MU =	No Min	151	1.0%	M =	50%
Struct. Design ADT =		15,090	(2023)		

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv =	0.15	
Csu =	112.06	
Cmu =	385.44	
TF flexible (Actual) =	0.94	(Actual ADT)
TF flexible (Min) =	No Min	(Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv =	0.15	
Csu =	135.78	
Cmu =	567.21	
TF rigid (Actual) =	1.29	(Actual ADT)
TF rigid (Min) =	No Min	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible =	0.94	
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)
HMA Mixture Temp. =	75.0	deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) =	690	ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) =	122	(Fig. 54-5.E)
Full Depth HMA Design Thickness =	8.00	in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness =	14.50	in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness =	**8.00**	**inches**

JPC Pavement

Use TF rigid =	1.29	
Edge Support =	Tied	Shoulder or C.&G.
Rigid Pavt Thick. =	8.00	in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid =	1.29	
IBR value =	3.0	
CRCP Thickness =	6.25	in. (Fig. 54-4.N)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible =	0.94	
District =	3 or 5	
HMA Overlay Design Thickness =	6.00	in. (Fig. 54-5.U)

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

JPCP Thickness = NA Inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

Facility Type	Min. Str. Design Traffic (Fig 54-2.C): PV	SU	MU
Interstate or Supplemental Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

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

Class	Traffic Factor ESAL Coefficients: Rigid (Fig. 54-4.C) Csu	Rigid Cmu	Flexible (Fig. 54-5.B) Csu	Flexible Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street): ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B): Rural 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	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

BDE 5401 Template (05/29/2012) **IDOT MECHANISTIC PAVEMENT DESIGN** Printed: 08/30/2012

PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells)

Route: 104th Ave
Section:
County: Cook
Location: US-6 / IL-7 (159th St)

Comments: 104th Ave Pavement Design
Design Date: 06/04/2012 MB
Modified Date:

<-- BY	ADT	Year
Current:	3500	2012
Future:	100	2036

READ ME

Facility Type: Unmarked State Route

RESET

# of Lanes = 2 or 3
Part of future 4 lanes or more ? No
One Way Street ? No
Road Class: II

Subgrade Support Rating (SSR): Poor
Construction Year: 2013
Design Period (DP) = 20 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane	
PV =	No Min	9,365	99.0%	P =	50%
SU =	No Min	85	0.9%	S =	50%
MU =	No Min	9	0.1%	M =	50%
Struct. Design ADT =		9,460	(2023)		

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv =	0.15	
Csu =	112.06	
Cmu =	385.44	
TF flexible (Actual) =	0.15	(Actual ADT)
TF flexible (Min) =	No Min	(Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv =	0.15	
Csu =	135.78	
Cmu =	567.21	
TF rigid (Actual) =	0.18	(Actual ADT)
TF rigid (Min) =	No Min	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible =	0.50	Per BDE 54-5.01(i)-1g
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)
HMA Mixture Temp. =	750	deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) =	690	ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) =	147	(Fig. 54-5.E)
Full Depth HMA Design Thickness =	7.25	in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness =	14.50	in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness =	**7.25**	**inches**

JPC Pavement

Use TF rigid =	0.18	
Edge Support =	Tied	Shoulder or C.&G.
Rigid Pavt Thick. =	**7.50**	**in. (Fig. 54-4.E)**

CRC Pavement

Use TF rigid =	0.18	
IBR value =	3	
CRCP Thickness =	**4.75**	**in. (Fig. 54-4.N)**

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible =	0.50	
District =	District 1	
HMA Overlay Design Thickness =	**5.25**	**in. (Fig. 54-5.U)**

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

JPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

Facility Type	Min. Str. Design Traffic (Fig 54-2.C) PV	SU	MU
Interstate or Supplemental Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

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

Class	Traffic Factor ESAL Coefficients: Rigid (Fig. 54-4.C) Csu	Rigid Cmu	Flexible (Fig. 54-5.B) Csu	Flexible Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B) Rural 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	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

BDE 5401 Template (05/29/2012) **IDOT MECHANISTIC PAVEMENT DESIGN** Printed: 08/30/2012

PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells)

Route: 108th Ave
Section:
County: Cook
Location: US 6 / L 115th St

Comments: 108th Ave Pavement Design
Design Date: 08/30/2012 YR
Modified Date:

	ADT	Year
<-- BY		
<-- BY		
Current:	9,550	2010
Future:	10,10	2030

READ ME

Facility Type: Unmarked State Route

RESET

# of Lanes = 2 or 3
Part of future 4 lanes or more ? No
One Way Street ? No
Road Class: II

Subgrade Support Rating (SSR): Poor
Construction Year: 2013
Design Period (DP) = 20 years

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	No Min	9,550	97.9%	P = 50%
SU =	No Min	195	2.0%	S = 50%
MU =	No Min	10	0.1%	M = 50%
Struct. Design ADT =		9,755	(2023)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv =	0.15	
Csu =	112.06	
Cmu =	385.44	
TF flexible (Actual) =	0.27	(Actual ADT)
TF flexible (Min) =	No Min	(Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv =	0.15	
Csu =	135.78	
Cmu =	567.21	
TF rigid (Actual) =	0.33	(Actual ADT)
TF rigid (Min) =	No Min	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible =	0.50	Per BDE 54-5.01(i)-1g
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)
HMA Mixture Temp. =	75.0	deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) =	690	ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) =	147	(Fig. 54-5.E)
Full Depth HMA Design Thickness =	7.25	in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness =	14.50	in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness =	7.25	Inches

JPC Pavement

Use TF rigid =	0.33	
Edge Support =	Tied	Shoulder or C.&G.
Rigid Pavt Thick. =	7.50	in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid =	0.33	
IBR value =	3	
CRCP Thickness =	5.25	in. (Fig. 54-4.N)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible =	0.50	
District =	3 - Hig	
HMA Overlay Design Thickness =	5.25	in. (Fig. 54-5.U)

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

JPCP Thickness = NA Inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

Facility Type	Min. Str. Design Traffic (Fig 54-2.C) PV	SU	MU
Interstate or Supplemental Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

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

Class	Traffic Factor ESAL Coefficients: Rigid (Fig. 54-4.C) Csu	Rigid Cmu	Flexible (Fig. 54-5.B) Csu	Flexible Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B): Rural 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	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

BDE 5401 Template (05/29/2012) **IDOT MECHANISTIC PAVEMENT DESIGN** Printed: 08/30/2012

PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells)

Route: Worksheet / I-74
Section: 2016-06-R
County: Cook
Location: US 6 / IL 59 (S.O.)

Comments: Worksheet Pavement Design, Illinois State Route 1 Irrigation
Design Date: Tue 8/14/2012 AK
Modified Date:

<-- BY	ADT	Year
<-- BY		
Current:	17,300	2016
Future:	23,100	2030

READ ME

Facility Type: Other Marked State Route

RESET

# of Lanes = 2 or 3
Part of future 4 lanes or more ? No
One Way Street ? No
Road Class: II

Subgrade Support Rating (SSR): Poor
Construction Year: 2016
Design Period (DP) = 20 years

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	16,885	95.1%	P = 50%
SU =	250	586	3.3%	S = 50%
MU =	750	284	1.6%	M = 50%
Struct. Design ADT =		17,755	(2023)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = 0.15
Csu = 112.06
Cmu = 385.44
TF flexible (Actual) = 1.78 (Actual ADT)
TF flexible (Min) = 3.17 (Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv = 0.15
Csu = 135.78
Cmu = 567.21
TF rigid (Actual) = 2.43 (Actual ADT)
TF rigid (Min) = 4.59 (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 3.17
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)
HMA Mixture Temp. = 75.0 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 690 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 86 (Fig. 54-5.E)
Full Depth HMA Design Thickness = 10.00 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 4.50 in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness = 10.00 Inches

JPC Pavement

Use TF rigid = 4.59
Edge Support = Tied Shoulder or C.&G.
Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 4.59
IBR value = 5
CRCP Thickness = 7.75 in. (Fig. 54-4.N)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible = 3.17
District = 3-4-5-6
HMA Overlay Design Thickness = 8.00 in. (Fig. 54-5.U)

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.
JPCP Thickness = NA Inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

Facility Type	Min. Str. Design Traffic (Fig 54-2.C) PV	SU	MU
Interstate or Supplemental Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

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

Class	Traffic Factor ESAL Coefficients: Rigid (Fig. 54-4.C) Csu	Rigid Cmu	Flexible (Fig. 54-5.B) Csu	Flexible Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B): Rural 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	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%