Illinois Department of Transportation

To:	John Fortmann	Attn: District One
From:	John D. Baranzelli	
Subject:	Pavement Design	
Date:	August 21, 2015	

FAP Route 846 (IL 53)
D1HSRR2016-03
Will County
At Coal City Road

The project, submitted to BDE by email memo dated August 17, 2015, will replace the existing roadways due to the improvement of the at-grade railroad crossing. The project length does not qualify for alternate bid, as it is less than 2 lane-miles. The life cycle costs favor a flexible pavement design by more than 10%. The approved pavement design is as follows:

IL 53 (Pavement Reconstruction)

10.25 inches of Full Depth HMA Pavement with HMA Shoulder
- 2 inches of Polymerized HMA Surface Course, Mix "E", N70
- 2.25 inches of Polymerized HMA Binder Course IL-19.0, N90
- 6 inches of HMA Base Course, IL-19.0, N90

12 inches of Aggregate Subgrade Improvement

IL 53 (Temporary Pavement)

Option 1
10 inches of Full Depth Temporary HMA Pavement
- 2 inches of HMA Surface Course, Mix "D", N70
- 8 inches of HMA Binder Course, IL-19.0, N70

4 inches of Subgrade Granular Material Type B

Option 2
8 inches of Temporary PCC Pavement
4 inches of Subgrade Granular Material Type B

Coal City Road (Pavement Reconstruction)

8.25 inches of Full Depth HMA Pavement with HMA Shoulder
- 2 inches of HMA Surface Course, Mix "D", N70
- 6.25 inches of HMA Base Course, IL-19.0, N70

12 inches of Aggregate Subgrade Improvement

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

Illinois Department of Transportation

Memorandum

To: John D. Baranzelli — Attn: Paul Niedernhofer

From: Jose A. Dominguez — By: Melchor Mangoba / Ojas Patel

Subject: Pavement Analysis*

Date: August 14, 2015

*Route: IL 53 (High Speed Rail)
Limits: at Coal City Road
Section: D1HSRR2016-03

County: Will
Contract No.: 62B34
Job No.: D-91-013-14

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

Improvement of the at-grade railway crossing on Coal City Road in Will County to facilitate the High Speed Rail program. Improvements will include reconstruction of IL 53 and Coal City Road.

A 20-year pavement analysis was performed on the above segments. We recommend a mechanistic flexible pavement design based on the life cycle cost analysis which favors HMA pavement by 11%. Coal City Road is under local jurisdiction and the local agency is requesting flexible pavement.

<u>IL 53</u>
Reconstruction
HMA Shoulder[5]
10 ¼" Full Depth HMA[1, 4]
- 2" Polymerized HMA Surface Course, Mix "E", N70
- 2 ¼" Polymerized HMA Binder Course, IL-19.0, N90
- 6" HMA Base Course, IL-19.0, N90

12" Aggregate Subgrade Improvement[3]

IL 53 Temporary Pavement
Option 1[7]
Temporary Pavement
10" Full Depth Temporary HMA Pavement[8]
2" HMA Surface Course, Mix "D", N70
8" HMA Binder Course, IL-19.0, N70
4" Subbase Granular Material Type B (CA-6)[9]

Option 2[7]
Temporary Pavement
8" Temporary PCC Pavement[8]
4" Subbase Granular Material Type B (CA-6)[9]

Coal City Road[6]
Reconstruction
HMA Shoulder[5]
8 ¼" Full Depth HMA[2, 4]
2" HMA Surface Course, Mix "D", N70
6 ¼" HMA Base Course, IL-19.0, N70
12" Aggregate Subgrade Improvement[3]

[1]Designer Note 1: Use pay item **40701886, HOT-MIX ASPHALT PAVEMENT (FULL-DEPTH), 10 ¼"** paid for in square yards.

[2]Designer Note 2: Use pay item **40701846, HOT-MIX ASPHALT PAVEMENT (FULL-DEPTH), 8 ¼"** paid for in square yards.

[3]Designer Note 3: Use pay item **30300112, AGGREGATE SUBGRADE IMPROVEMENT, 12"**, paid in square yards.

[4]Designer Note 4: Refer to the District One, Bureau of Materials' "Hot-Mix Asphalt – Mix Selection" tables to determine the corresponding HMA mix table requirements for the plans.

[5] Designer Note 5: The designer shall utilize IDOT Highway Standards in conjunction with guidelines in BDE Manual 34-2.02 if necessary for shoulder thicknesses.

[6]Designer Note 6: Coal City Road is subject to local jurisdictional approval and concurrence.

[7]Designer Note 7: The contractor shall have the option of constructing either material type if both Portland cement concrete and HMA are shown in the plans. For quantity estimation purposes, excavation quantities should be estimated assuming the thicker design if both options are shown in the plans.

[8]Designer Note 8: Use pay item **Z0062456, TEMPORARY PAVEMENT**, paid in square yards.

The HMA temporary pavement shall consist of two items, HMA binder course and HMA surface course. Include both items in the HMA mix table requirements.

When PC Temp Pavement is used as an option, the following note shall appear on the plans adjacent to the HMA mix table: "PC Concrete temporary pavement shall consist of Class PV Concrete meeting the requirements of Art.1020 of the Standard Specifications. Temporary PCC pavement does not require dowel bars.

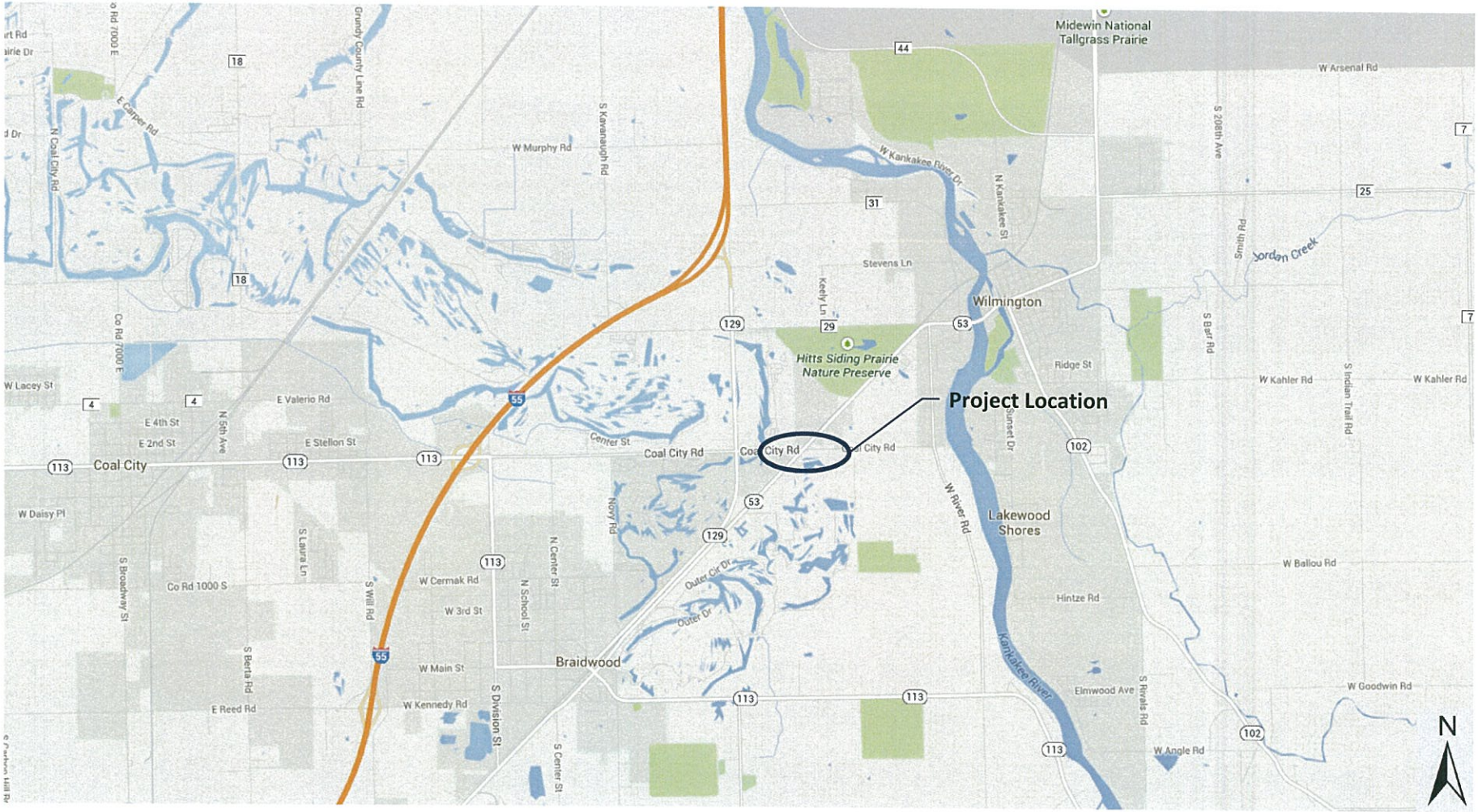
[9]Designer Note 9: Use pay item **31101200, SUBBASE GRANULAR MATERIAL, TYPE B 4"**, paid in square yards

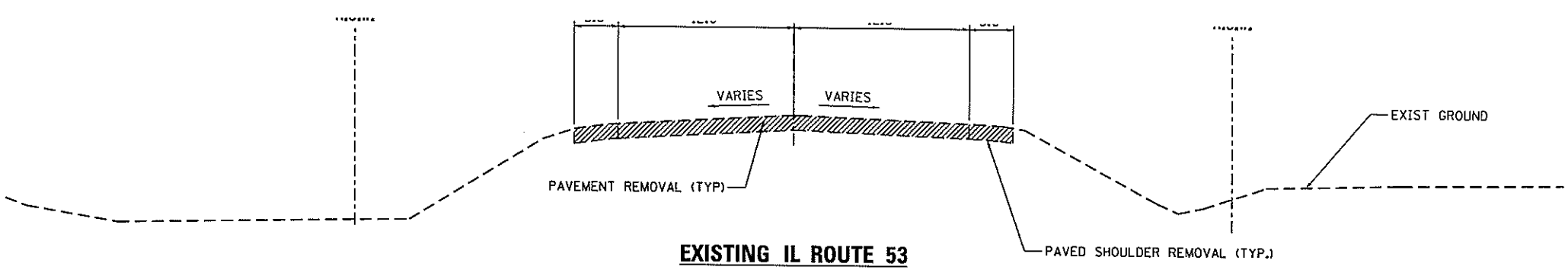
If you have any questions or need additional information, please contact Ojas Patel, Pavement Design Engineer, at (847)705-4550.

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

Location Map

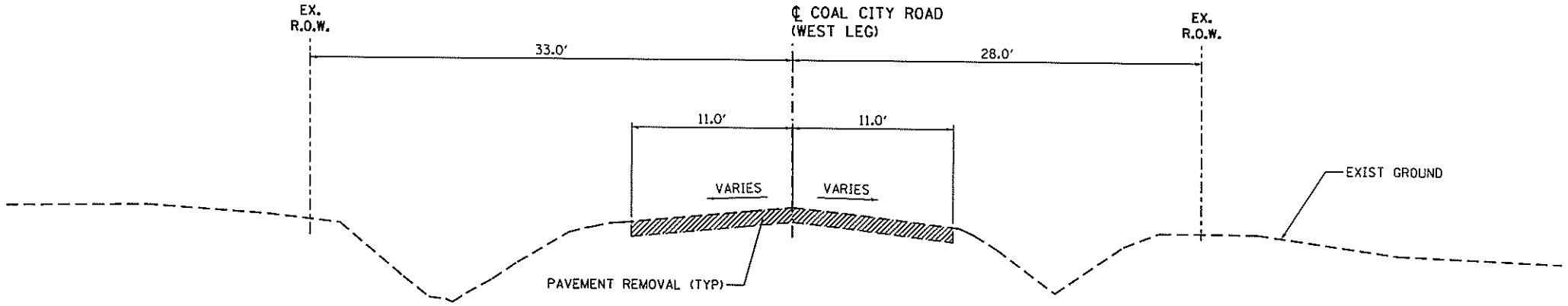
Coal City Road DOT#290505E





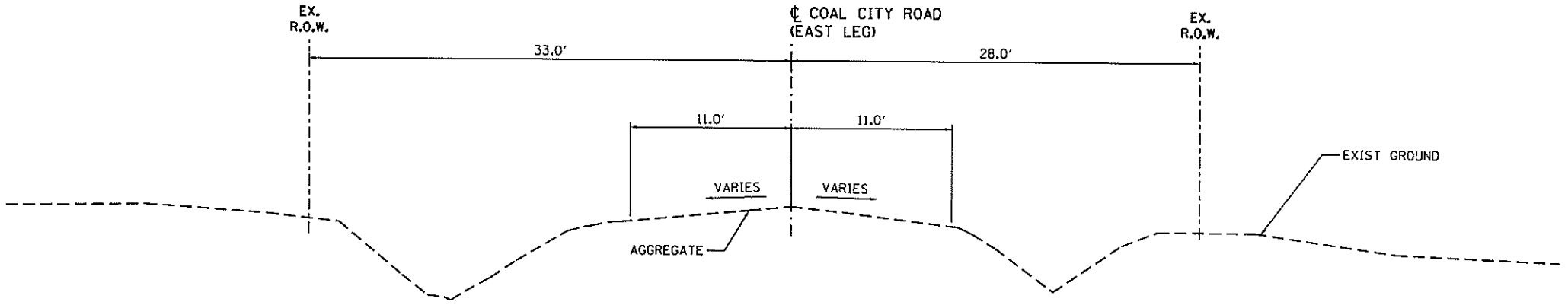
EXISTING IL ROUTE 53

STA. 11+12.18 TO STA. 40+83.62

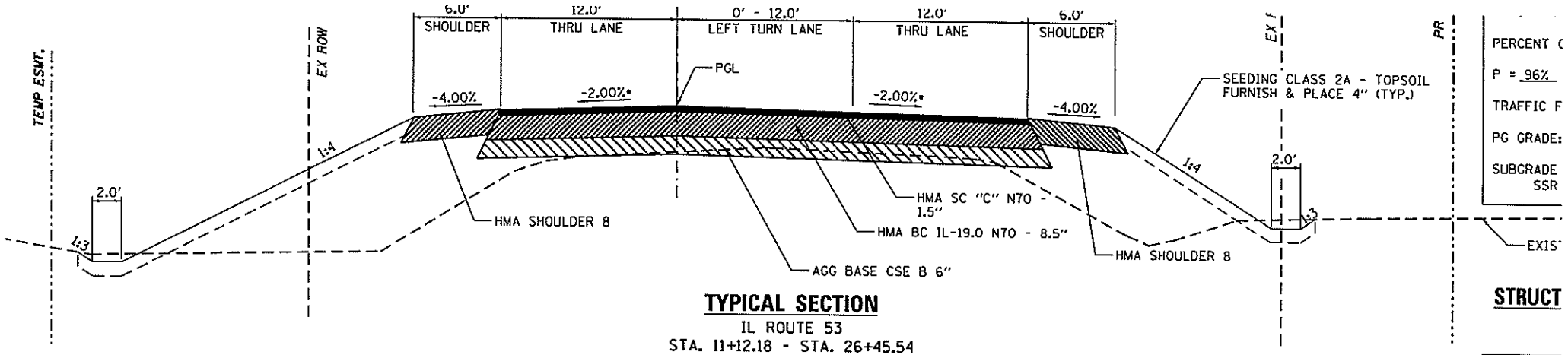


EXISTING COAL CITY ROAD (WEST LEG)

STA. 98+58.32 TO STA. 108+40.88



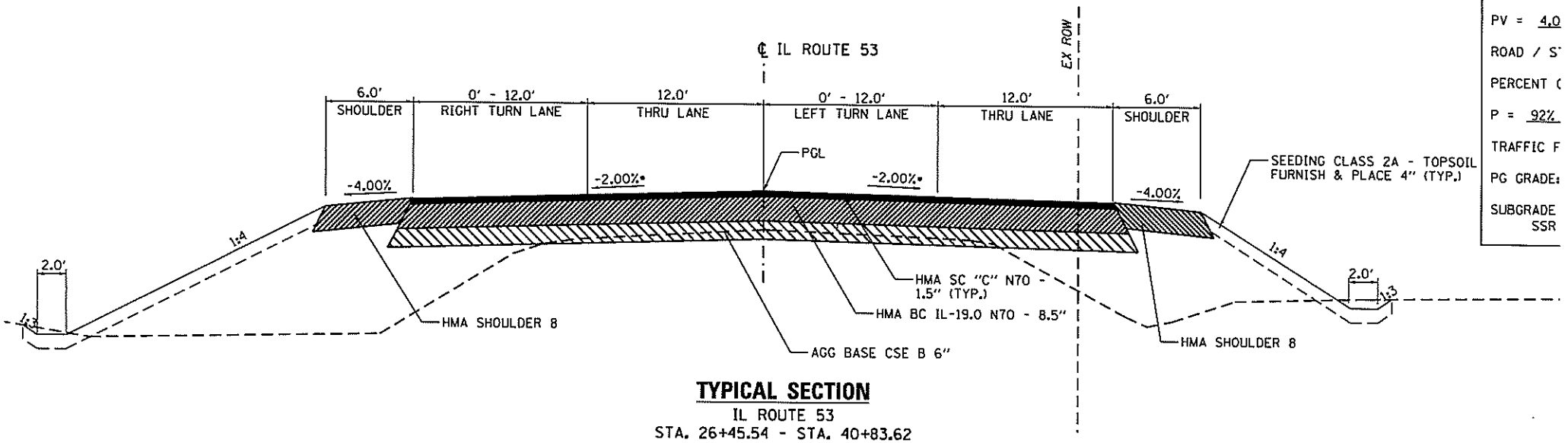
EXISTING COAL CITY ROAD (EAST LEG)



TYPICAL SECTION
IL ROUTE 53
STA. 11+12.18 - STA. 26+45.54

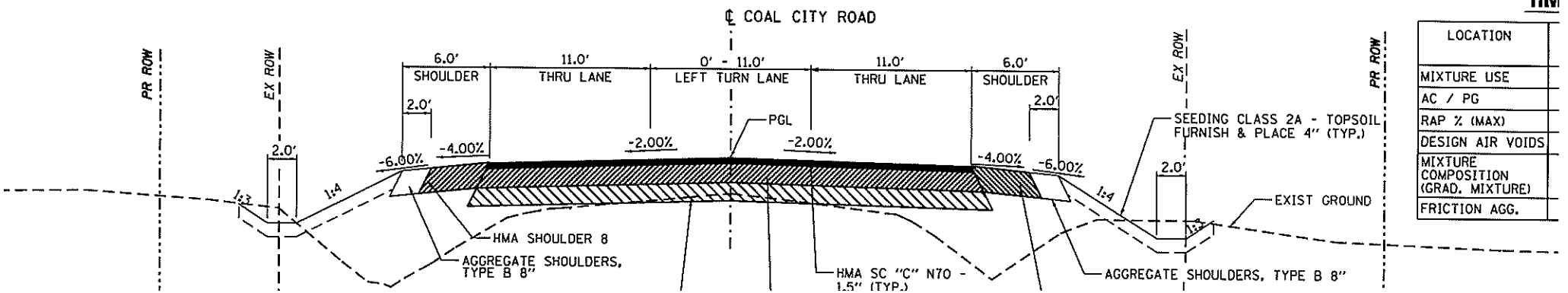
STRUCT

STRUCTUR/
PV = 4.0
ROAD / S
PERCENT (
P = 92%
TRAFFIC F
PG GRADE:
SUBGRADE SSR



TYPICAL SECTION
IL ROUTE 53
STA. 26+45.54 - STA. 40+83.62

HM



LOCATION	
MIXTURE USE	
AC / PG	
RAP % (MAX)	
DESIGN AIR VOIDS	
MIXTURE COMPOSITION (GRAD. MIXTURE)	
FRICTION AGG.	

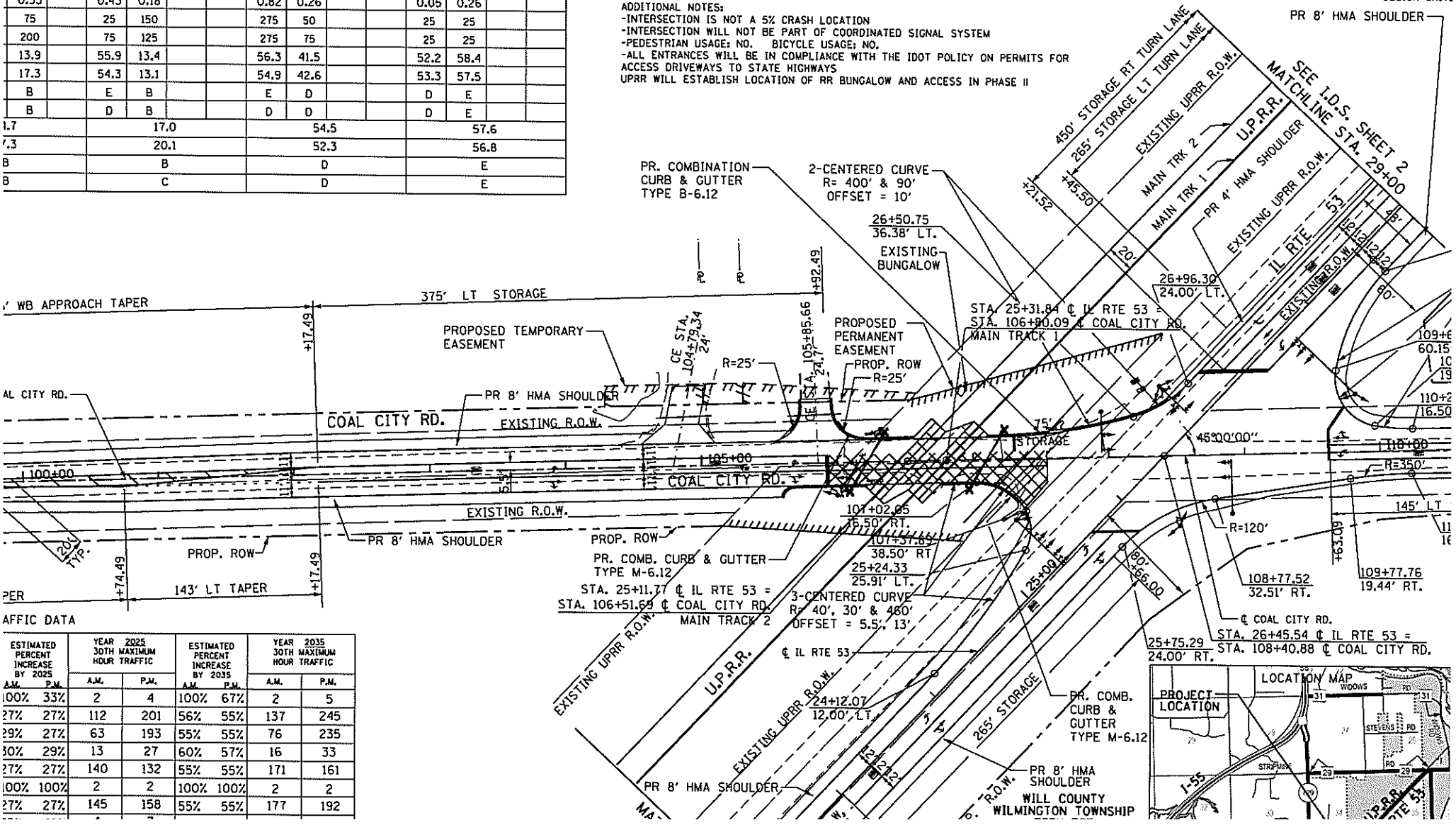
235		33	163			192	52			2	10			
1900		1900	1900			1900	1900			1900	1900			
12.0		12.0	12.0			11.0	11.0			11.0	11.0			
P.M.	0	A.M.	0	P.M.	0	A.M.	0	P.M.	0	A.M.	0	P.M.	0	
P.M.	0	A.M.	0	P.M.	0	A.M.	0	P.M.	0	A.M.	0	P.M.	0	
3		3				3				3				
1.00		1.00	1.00			1.00	1.00			1.00	1.00			
56.9		3.4	59.8			15.8	15.8			3.4	3.4			
55.6		5.3	59.7			16.0	16.0			2.6	2.6			
0.52		0.03	0.54			0.14	0.14			0.03	0.03			
0.51		0.05	0.54			0.15	0.15			0.02	0.02			
782		54	959			240	218			54	46			
771		83	985			251	219			40	41			
0.11		0.34	0.21			0.84	0.13			0.04	0.35			
0.33		0.43	0.18			0.82	0.26			0.05	0.26			
75		25	150			275	50			25	25			
200		75	125			275	75			25	25			
13.9		55.9	13.4			56.3	41.5			52.2	58.4			
17.3		54.3	13.1			54.9	42.6			53.3	57.5			
B		E	B			E	D			D	E			
B		D	B			D	D			D	E			
1.7		17.0				54.5				57.6				
7.3		20.1				52.3				56.8				
B		B				D				E				
B		C				D				E				

GENERAL NOTES

ARE PROFILES PROVIDED: YES. IF NOT, STATE REASON WHY: N/A.
TYPE B-6.12 CURB AND GUTTER ON THE OUTSIDE OF THE ROADWAY PAVEMENT.
TYPE N/A CURB AND GUTTER ON THE APPROACH MEDIAN.
TYPE N/A CURB AND GUTTER ON THE CORNER ISLANDS.
ALL DIMENSIONS ARE E-E OF PAVEMENT, UNLESS OTHERWISE NOTED
THE RIGHT-OF-WAY LIMITS ARE PRELIMINARY.
DESIGN VEHICLE TURNING MOVEMENTS ARE ACCOMMODATED PER AutoTURN PRO 3D SOFTWARE, VERSION 8.1.2
THE SCOPE OF WORK: PROPOSED ALIGNMENT SHIFT ELIMINATES NEED FOR ISLAND TO ACCOMMODATE 4-QUAD GATES AND GATE ARM LENGTH RESTRICTIONS, AND MINIMIZES CROSSING DETECTION AREA. PROPOSED TRAFFIC SIGNAL TO MITIGATE WARRANT 9.PROPOSED CHANNELIZATION TO IMPROVE TRAFFIC OPERATIONS. PROPOSED PROFILE MODIFICATIONS TO IMPROVE RAILROAD CROSSING. INCLUDES PAVEMENT, GRADING, DRAINAGE AND UTILITIES.
INTERSECTION DESIGN EXCEPTIONS: MINIMUM LENGTH OF VERTICAL CURVE, LOC C VS LOS D; WB L (AM, PM), EB L (PM), EB TR (AM,PM), NB L (PM), LOC C VS LOS E; WB TR (AM, PM), EB L (AM), NB L (AM), SB L(AM,PM), UNSHADOWED SB RIGHT TURN LANE
ADDITIONAL NOTES:
-INTERSECTION IS NOT A 5% CRASH LOCATION
-INTERSECTION WILL NOT BE PART OF COORDINATED SIGNAL SYSTEM
-PEDESTRIAN USAGE: NO. BICYCLE USAGE: NO.
-ALL ENTRANCES WILL BE IN COMPLIANCE WITH THE IDOT POLICY ON PERMITS FOR ACCESS DRIVEWAYS TO STATE HIGHWAYS
UPRR WILL ESTABLISH LOCATION OF RR BUNGALOW AND ACCESS IN PHASE II

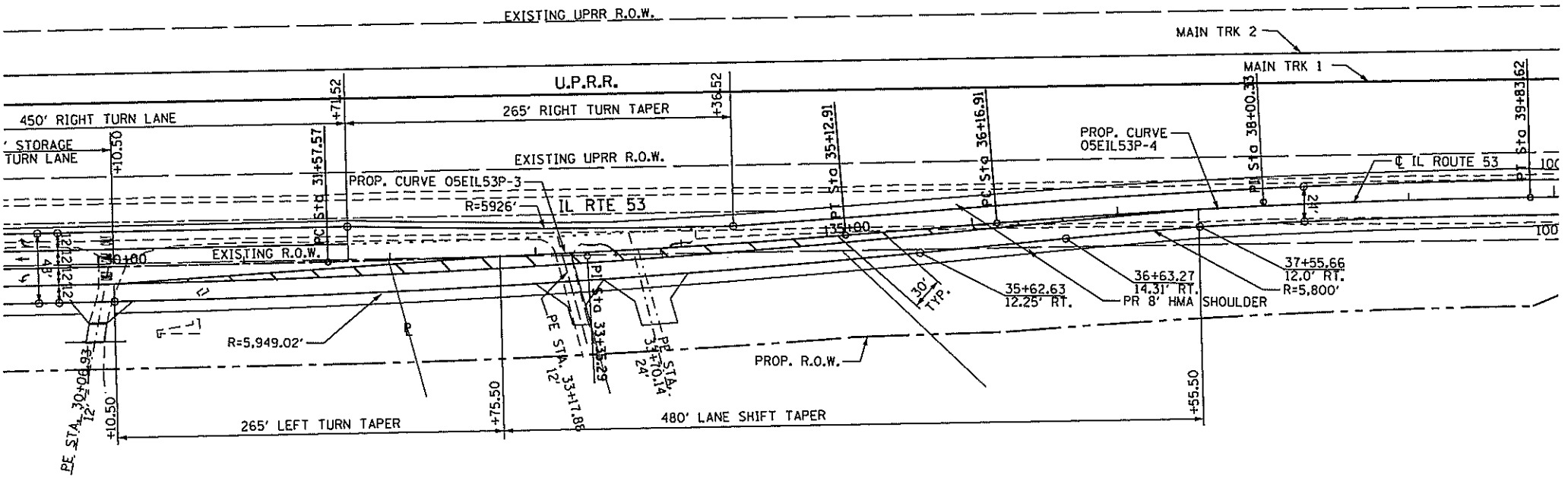
F.A. ROUTE N
STREET NAME
FUNCTIONAL
LOCAL ROAD
OSOW DESIGN
EXISTING AD
DESIGN YEAR
PROPOSED DE
PROPOSED PO

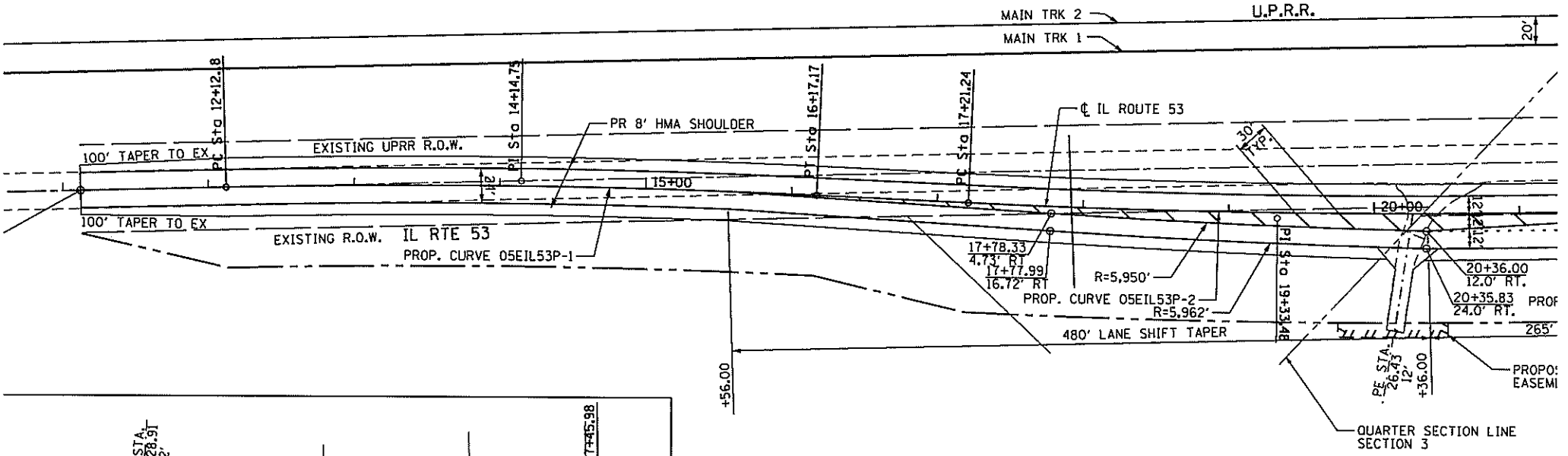
IMPROVEMENT
RAILROAD CR
ANTICIPATED
EXISTING ME
SIGNAL
SIGNAL WARR
DESIGN VEHIC
DESIGN YEAR
TRUCK ROUTE
DESIGN CRITE
DESIGN CRITE

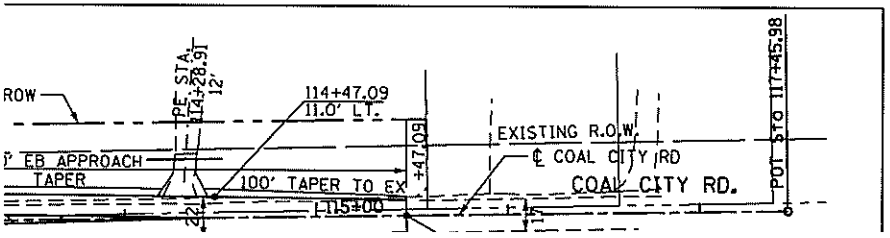


AFFIC DATA

ESTIMATED PERCENT INCREASE BY 2025		YEAR 2025 30TH MAXIMUM HOUR TRAFFIC		ESTIMATED PERCENT INCREASE BY 2035		YEAR 2035 30TH MAXIMUM HOUR TRAFFIC	
A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
100%	33%	2	4	100%	67%	2	5
27%	27%	112	201	56%	55%	137	245
29%	27%	63	193	55%	55%	76	235
30%	29%	13	27	60%	57%	16	33
27%	27%	140	132	55%	55%	171	161
100%	100%	2	2	100%	100%	2	2
27%	27%	145	158	55%	55%	177	192







PROP. CURVE 05EIL53P-1	PROP. CURVE 05EIL53P-2	PROP. CURVE 05EIL53P-3	PROP. CURVE 05EIL53P-4
PI STA. = 14+14.75	PI STA. = 19+33.48	PI STA. = 33+35.29	PI STA. = 38+00.33
Δ = 3° 54' 00" (RT)	Δ = 4° 05' 09" (LT)	Δ = 3° 25' 18" (LT)	Δ = 3° 31' 53" (RT)
D = 0° 57' 47"	D = 0° 57' 47"	D = 0° 57' 47"	D = 0° 57' 47"
R = 5,950.00'	R = 5,950.00'	R = 5,950.00'	R = 5,950.00'
T = 202.58'	T = 212.24'	T = 177.72'	T = 183.41'

BDE 5401 Template (Rev. 09/05/2013)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 08/21/2015

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: IL 53
Section:
County: Will
Location: at Coal City Road

Comments: High Speed Rail
Design Date: 07/30/2015 ONP
Modify Date:

<-- BY
<-- BY

	ADT	Year
Current:	7,150	2013
Future:	11,100	2035

Facility Type: Other Marked State Route

# 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	8,289	87.4%	P = 50%
SU =	250	730	7.7%	S = 50%
MU =	750	465	4.9%	M = 50%
Struct. Design ADT =		9,484	(2026)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT			RIGID PAVEMENT		
Cpv =	0.15		Cpv =	0.15	
Csu =	112.06		Csu =	135.78	
Cmu =	385.44		Cmu =	567.21	
TF flexible (Actual) =	2.62	(Actual ADT)	TF rigid (Actual) =	3.64	(Actual ADT)
TF flexible (Min) =	3.17	(Min ADT Fig. 54-2.C)	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)
Goto Map
HMA Mixture Temp. = 76.0 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 660 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 86 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 10.25 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 15.00 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 10.25 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 = 3

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
Goto Map
HMA Overlay Design Thickness = 7.50 in. (Fig. 54-5.U)
Limiting Strain Criterion Thickness = in. (Fig. 54-5.V)

Use HMA Overlay Thickness = 999.00 inches

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 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 (Rev. 09/05/2013) Printed: 08/21/2015

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE		IL 53
SECTION		
COUNTY		Will
LOCATION		at Coal City Road
FACILITY TYPE		NON-INTERSTATE
PROJECT LENGTH		2980 FT = = > 0.56 Miles
# OF CENTERLINES		2 CL
# OF LANES		3 LANES
# OF EDGES		2 EP
LANE WIDTH - AVERAGE		12 FT
SHOULDER WIDTH	HMA Left	6 FT
	HMA Right	6 FT
	Total Width of Paved Shoulders	12 FT
PAVEMENT THICKNESS (FLEXIBLE)		10.25 IN (15.00 IN MAX)
SHOULDER THICKNESS		8.00 IN Standard Design
POLICY OVERLAY THICKNESS		2.25 IN

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	3.17	2.62	3.17

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$102.53 / TON
HMA TOP BINDER	$100.51 / TON
HMA LOWER BINDER	$69.84 / TON
HMA BINDER (LEVELING)	$101.50 / TON
HMA SHOULDER	$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(10.25")	11,920	SQ YD	*	$48.12 / SQ YD	$573,590 ~
HMA SURFACE COURSE	(2.00")	1,341	TONS		$102.53 / TON	$0
HMA TOP BINDER COURSE	(2.25")	1,524	TONS		$100.51 / TON	$0
HMA LOWER BINDER COURSE	(6.00")	4,140	TONS		$69.84 / TON	$0
HMA SHOULDER	(8.00")	1,780	TONS		$72.00 / TON	$128,164 ~
CURB & GUTTER		0	LIN FT		$30.00 / LIN FT	$0
SUBBASE GRAN MATL TY C (TONS)		243	TONS		$25.00 / TON	$6,075
IMPROVED SUBGRADE:	Modified Soil	16,790	SQ YD		$7.00 / SQ YD	$117,530
Reserved For User Supplied Item		0	UNITS		$0.00 / UNITS	$0
Reserved For User Supplied Item		0	UNITS		$0.00 / UNITS	$0
PAVEMENT REMOVAL		11,920	SQ YD		$15.00 / SQ YD	$178,800
SHOULDER REMOVAL		3,973	SQ YD		$10.00 / SQ YD	$39,730

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$1,043,889
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$75,435

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY				$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix	$11.54 / SQ YD
HMA OVERLAY PVMT		(2.25")		$12.94 / SQ YD
HMA SURFACE MIX		(1.50")	Surface Mix	$8.64 / SQ YD
HMA BINDER MIX		(0.75")	eling Binder Mix	$4.30 / SQ YD
HMA OVERLAY SHLD	(Year 30)	(2.25")	Shoulder Mix	$9.07 / SQ YD
HMA OVERLAY SHLD		(2.00")	Shoulder Mix	$8.06 / SQ YD
MILLING (2.00 IN)				$3.00 / SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)	Surface Mix	$81.48 / SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill Surf)	Shoulder Mix	$78.06 / SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill +2.00 ")	Leveling Binder Mix	$81.37 / SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill +2.00 ")	Shoulder Mix	$78.06 / SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				$2.00 / LIN FT
CENTERLINE JOINT ROUT & SEAL				$2.00 / LIN FT
RANDOM / THERMAL CRACK ROUT & SEAL		(100% Rehab = 110.00' / Station / Lane)		$2.00 / LIN FT

FLEXIBLE TOTAL LIFE-CYCLE COST	$1,417,183
FLEXIBLE TOTAL ANNUAL COST PER MILE	$102,411

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 08/21/15

FULL-DEPTH HMA PAVEMENT
HMA OVERLAY OF RUBBLIZED PCC PAVEMENT
Figure 54-7.C
STANDARD DESIGN

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 5							
	LONG SHLD JT R&S	100.00%	5,960	LIN FT	$2.00	$11,920	
	CNTR LINE JOINT R&S	100.00%	5,960	LIN FT	$2.00	$11,920	
	RNDM / THRM CRACK R&S	50.00%	4,917	LIN FT	$2.00	$9,834	
	PD PVMT PATCH M&F SURF	0.10%	12	SQ YD	$81.48	$978	
	PWFn =	0.8626		PW =	0.8626 X	$34,652	$29,891
YEAR 10							
	LONG SHLD JT R&S	100.00%	5,960	LIN FT	$2.00	$11,920	
	CNTR LINE JOINT R&S	100.00%	5,960	LIN FT	$2.00	$11,920	
	RNDM / THRM CRACK R&S	50.00%	4,917	LIN FT	$2.00	$9,834	
	PD PVMT PATCH M&F SURF	0.50%	60	SQ YD	$81.48	$4,889	
	PWFn =	0.7441		PW =	0.7441 X	$38,563	$28,694
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	15,893	SQ YD	$3.00	$47,679	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	119	SQ YD	$81.37	$9,683	
	HMA OVERLAY PVMT 2.00"	100.00%	11,920	SQ YD	$11.54	$137,515	
	HMA OVERLAY SHLD 2.00 "	100.00%	3,973	SQ YD	$8.06	$32,041	
	PWFn =	0.6419		PW =	0.6419 X	$226,918	$145,650
YEAR 20							
	LONG SHLD JT R&S	100.00%	5,960	LIN FT	$2.00	$11,920	
	CNTR LINE JOINT R&S	100.00%	5,960	LIN FT	$2.00	$11,920	
	RNDM / THRM CRACK R&S	50.00%	4,917	LIN FT	$2.00	$9,834	
	PD PVMT PATCH M&F SURF	0.10%	12	SQ YD	$81.48	$978	
	PWFn =	0.5537		PW =	0.5537 X	$34,652	$19,186
YEAR 25							
	LONG SHLD JT R&S	100.00%	5,960	LIN FT	$2.00	$11,920	
	CNTR LINE JOINT R&S	100.00%	5,960	LIN FT	$2.00	$11,920	
	RNDM / THRM CRACK R&S	50.00%	4,917	LIN FT	$2.00	$9,834	
	PD PVMT PATCH M&F SURF	0.50%	60	SQ YD	$81.48	$4,889	
	PWFn =	0.4776		PW =	0.4776 X	$38,563	$18,418
	HMA_SD						
YEAR 30	NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	15,893	SQ YD	$3.00	$47,679	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	238	SQ YD	$81.37	$19,366	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	40	SQ YD	$78.06	$3,123	
	HMA OVERLAY PVMT 2.25 "	100.00%	11,920	SQ YD	$12.94	$154,274	
	HMA OVERLAY SHLD 2.25 "	100.00%	3,973	SQ YD	$9.07	$36,046	
	PWFn =	0.4120		PW =	0.4120 X	$260,488	$107,318
YEAR 35							
	LONG SHLD JT R&S	100.00%	5,960	LIN FT	$2.00	$11,920	
	CNTR LINE JOINT R&S	100.00%	5,960	LIN FT	$2.00	$11,920	
	RNDM / THRM CRACK R&S	50.00%	4,917	LIN FT	$2.00	$9,834	
	PD PVMT PATCH M&F SURF	0.10%	12	SQ YD	$81.48	$978	
	PWFn =	0.3554		PW =	0.3554 X	$34,652	$12,315
YEAR 40							
	LONG SHLD JT R&S	100.00%	5,960	LIN FT	$2.00	$11,920	
	CNTR LINE JOINT R&S	100.00%	5,960	LIN FT	$2.00	$11,920	
	RNDM / THRM CRACK R&S	50.00%	4,917	LIN FT	$2.00	$9,834	
	PD PVMT PATCH M&F SURF	0.50%	60	SQ YD	$81.48	$4,889	
	PWFn =	0.3066		PW =	0.3066 X	$38,563	$11,822
							$373,294
	ROUTINE MAINTENANCE ACTIVITY		1.69	Lane Miles	0.00	$0	$0
					MAINTENANCE LIFE-CYCLE COST		$373,294
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE		$26,976

PCC PAVEMENT

JPCP

ROUTE			IL 53		
SECTION			0		
COUNTY			Will		
LOCATION			at Coal City Road		
FACILITY TYPE			NON-INTERSTATE		
PROJECT LENGTH			2980 FT	= = >	0.56 Miles
# OF CENTERLINES			2 CL		
# OF LANES			3 LANES		
# OF EDGES			2 EP		
LANE WIDTH - AVERAGE			12 FT		
SHOULDER WIDTH	PCC	Left	6 FT		
	PCC	Right	6 FT		
	Total Width of Paved Shoulders		12 FT		
PAVEMENT THICKNESS (RIGID)		JPCP	9.00 IN	TIED SHLD	
SHOULDER THICKNESS			9.00 IN		
POLICY OVERLAY THICKNESS			2.50 IN		

RIGID PAVEMENT TRAFFIC FACTORS		MINIMUM	ACTUAL	USE
		4.59	3.64	4.59
Worksheet Construction Type is	Reconstruction		The Pavement Type is	JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE		COST
JPC PAVEMENT	(9.00")	11,920	SQ YD	$50.72	/ SQ YD	$604,582
PAVEMENT REINFORCEMENT		0	SQ YD	$22.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	12,913	SQ YD	$19.00	/ SQ YD	$245,347
PCC SHOULDERS	(9.00" to 9.00")	3,973	SQ YD	$40.00	/ SQ YD	$158,920
CURB & GUTTER		0	LIN FT	$30.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(~ 1.66")	525	TONS	$25.00	/ TON	$13,125
IMPROVED SUBGRADE:	Modified Soil	16,224	SQ YD	$7.00	/ SQ YD	$113,568
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
PAVEMENT REMOVAL		11,920	SQ YD	$15.00	/ SQ YD	$178,800
SHOULDER REMOVAL		3,973	SQ YD	$10.00	/ SQ YD	$39,730

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$1,354,072
RIGID CONSTRUCTION ANNUAL COST PER MILE	$97,850

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL		UNIT COST	
ROUTINE MAINTENANCE ACTIVITY				$0.00	/ LANE-MILE / YEAR
HMA POLICY OVERLAY	(2.50")		2.50		
HMA POLICY OVERLAY PVMT	(2.50")	1.0000	2.50	$14.38	/ SQ YD
HMA SURFACE MIX	(1.50")	1.0000	Surface Mix 1.50	$8.64	/ SQ YD
HMA BINDER MIX	(1.00")	1.0000	eling Binder Mix 1.00	$5.74	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		Shoulder Mix 2.50	$10.08	/ SQ YD
CLASS A PAVEMENT PATCHING				$195.00	/ SQ YD
CLASS B PAVEMENT PATCHING				$150.00	/ SQ YD
CLASS C SHOULDER PATCHING				$145.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)			Surface Mix 1.50	$78.61	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")			Surface Mix 2.50	$84.35	/ SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				$2.00	/ LIN FT
CENTERLINE JOINT ROUT & SEAL				$2.00	/ LIN FT
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL				$2.00	/ LIN FT
RANDOM CRACK ROUT & SEAL	(100% Rehab = 100.00' / Station / Lane)			$2.00	/ LIN FT

RIGID TOTAL LIFE-CYCLE COST	$1,571,929
RIGID TOTAL ANNUAL COST PER MILE	$113,593

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 08/21/15

JOINTED PLAIN CONCRETE PAVEMENT
UNBONDED JOINTED PLAIN CONCRETE OVERLAY
Figure 54-7.A

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST		COST	PRESENT WORTH
YEAR 10								
	PAVEMENT PATCH CLASS B	0.10%	12	SQ YD	$150.00		$1,800	
	PWFn =	0.7441		PW =	0.7441	X	$1,800	$1,339
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	24	SQ YD	$150.00		$3,600	
	PWFn =	0.6419		PW =	0.6419	X	$3,600	$2,311
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	238	SQ YD	$150.00		$35,700	
	SHOULDER PATCH CLASS C	0.50%	20	SQ YD	$145.00		$2,900	
	LONGITUDINAL SHLD JT R&S	100.00%	5,960	LIN FT	$2.00		$11,920	
	CENTERLINE JT R&S	100.00%	5,960	LIN FT	$2.00		$11,920	
	PWFn =	0.5537		PW =	0.5537	X	$62,440	$34,572
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	358	SQ YD	$150.00		$53,700	
	SHOULDER PATCH CLASS C	1.00%	40	SQ YD	$145.00		$5,800	
	PWFn =	0.4776		PW =	0.4776	X	$59,500	$28,418
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	477	SQ YD	$150.00		$71,550	
	SHOULDER PATCH CLASS C	1.50%	60	SQ YD	$145.00		$8,700	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	11,920	SQ YD	$14.38		$171,398	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	3,973	SQ YD	$10.08		$40,051	
	PWFn =	0.4120		PW =	0.4120	X	$291,699	$120,176
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	5,960	LIN FT	$2.00		$11,920	
	CENTERLINE JT R&S	100.00%	5,960	LIN FT	$2.00		$11,920	
	RANDOM CRACK R&S	50.00%	4,470	LIN FT	$2.00		$8,940	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	2,866	LIN FT	$2.00		$5,732	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	12	SQ YD	$84.35		$1,012	
	PWFn =	0.3554		PW =	0.3554	X	$39,524	$14,046
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	60	SQ YD	$150.00		$9,000	
	LONGITUDINAL SHLD JT R&S	100.00%	5,960	LIN FT	$2.00		$11,920	
	CENTERLINE JT R&S	100.00%	5,960	LIN FT	$2.00		$11,920	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	4,298	LIN FT	$2.00		$8,596	
	RANDOM CRACK R&S	50.00%	4,470	LIN FT	$2.00		$8,940	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	60	SQ YD	$84.35		$5,061	
	PWFn =	0.3066		PW =	0.3066	X	$55,437	$16,995
								$217,857
	ROUTINE MAINTENANCE ACTIVITY		1.69	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$217,857
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$15,743

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : **8/13/15 10:44 AM**

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$1,354,072	$1,043,889
		ANNUAL COST PER MILE	$97,850	$75,435
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$217,857	$373,294
		ANNUAL COST PER MILE	$15,743	$26,976
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$1,571,929	$1,417,183
		ANNUAL COST PER MILE	$113,593	$102,411

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>		**HMA**	**$102,411**
OTHER OPTIONS (LOWEST TO HIGHEST):		TYPE / PERCENTAGE	**JPCP**	**$113,593** **10.9%**

P:\Pavement Design Stuff\D-1\IL 53 at Coal City Road [High Speed Rail] 08-17-15\IL 53 at Coal Center Road Pvmt Design Files\[IL 53-IDOT Mech Pvmt Dgn LCCA

BDE 5401 Template (Rev. 09/05/2013)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 08/21/2015

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route:	Coal City Road	Comments:	High Speed Rail		
Section:					
County:	Will	Design Date:	07/30/2015	ONP	<-- BY
Location:	at IL 53	Modify Date:			<-- BY

	ADT	Year
Current:	3,600	2013
Future:	5,600	2035

Facility Type: Unmarked State Route

# 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

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane	
PV =	No Min	4,442	92.9%	P =	50%
SU =	No Min	163	3.4%	S =	50%
MU =	No Min	177	3.7%	M =	50%
Struct. Design ADT =		4,782	(2026)		

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT			RIGID PAVEMENT		
Cpv =	0.15		Cpv =	0.15	
Csu =	112.06		Csu =	135.78	
Cmu =	385.44		Cmu =	567.21	
TF flexible (Actual) =	0.87	(Actual ADT)	TF rigid (Actual) =	1.23	(Actual ADT)
TF flexible (Min) =	No Min	(Min ADT Fig. 54-2.C)	TF rigid (Min) =	No Min	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible =	0.87	
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)
Goto Map — HMA Mixture Temp. =	76.0	deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) =	660	ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) =	125	(Fig. 54-5.E)
Full Depth HMA Design Thickness =	8.25	in. (Fig. 54-5.F)
Goto Map — Limiting Strain Criterion Thickness =	15.00	in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness =	**8.25**	**inches**

JPC Pavement

Use TF rigid =	1.23	
Edge Support =	Tied	Shoulder or C.&G.
Rigid Pavt Thick. =	**8.00**	**in. (Fig. 54-4.E)**

CRC Pavement

Use TF rigid =	1.23	
IBR value =	3	
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 =	0.87	
HMA Overlay Design Thickness =	5.50	in. (Fig. 54-5.U)
Goto Map — Limiting Strain Criterion Thickness =		in. (Fig. 54-5.V)
Use HMA Overlay Thickness =	**999.00**	**inches**

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 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 (Rev. 09/05/2013) Printed: 08/21/2015

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE		**Job Route**	
SECTION		**Job Section**	
COUNTY		**Job County**	
LOCATION		**Job Location**	
FACILITY TYPE		**INTERSTATE**	
PROJECT LENGTH		**1000** FT = = >	0.19 Miles
# OF CENTERLINES		**2** CL	
# OF LANES		**4** LANES	
# OF EDGES		**4** EP	
LANE WIDTH - AVERAGE		**12** FT	
SHOULDER WIDTH	HMA Inside	**6** FT	
	HMA Outside	**10** FT	
	Total Width of Paved Shoulders	**32** FT	
PAVEMENT THICKNESS (FLEXIBLE)		**12.00** IN	**17.00** IN MAX
SHOULDER THICKNESS		**8.00** IN	**Standard Design**
POLICY OVERLAY THICKNESS		**3.75** IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	7.11	**1.00**	**7.11**

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	**$95.00** / TON
HMA TOP BINDER	**$95.00** / TON
HMA LOWER BINDER	**$80.00** / TON
HMA BINDER (LEVELING)	**$85.00** / TON
HMA SHOULDER	**$72.00** / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(12.00")	5,333	SQ YD	**$59.62** / SQ YD	$317,988 ~
HMA SURFACE COURSE	(2.00")	601	TONS	**$95.00** / TON	$0
HMA TOP BINDER COURSE	(2.25")	687	TONS	**$95.00** / TON	$0
HMA LOWER BINDER COURSE	(7.75")	2,445	TONS	**$80.00** / TON	$0
HMA SHOULDER	(8.00")	1,593	TONS	**$72.00** / TON	$114,688 ~
CURB & GUTTER		0	LIN FT	**$30.00** / LIN FT	$0
SUBBASE GRAN MATL TY C (TONS)		499	TONS	**$25.00** / TON	$12,475
IMPROVED SUBGRADE:	Modified Soil	9,556	SQ YD	**$7.00** / SQ YD	$66,892
Reserved For User Supplied Item		0	UNITS	**$0.00** / UNITS	$0
Reserved For User Supplied Item		0	UNITS	**$0.00** / UNITS	$0
PAVEMENT REMOVAL		5,333	SQ YD	**$0.00** / SQ YD	$0
SHOULDER REMOVAL		3,556	SQ YD	**$0.00** / SQ YD	$0

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST $512,043

FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE $110,266

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			**$0.00** LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix	**$10.71** / SQ YD
HMA OVERLAY PVMT	(3.75")		**$20.21** / SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	**$8.02** / SQ YD
HMA BINDER MIX	(2.25")	Top Binder Mix	**$12.19** / SQ YD
HMA OVERLAY SHLD (Year 30)	(1.75")	Shoulder Mix	**$7.06** / SQ YD
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	**$8.06** / SQ YD
MILLING (2.00 IN)			**$3.00** / SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill Surf)	Surface Mix	**$80.64** / SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder Mix	**$78.06** / SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00 ")	Leveling Binder Mix	**$79.52** / SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")	Shoulder Mix	**$78.06** / SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL			**$2.00** / LIN FT
CENTERLINE JOINT ROUT & SEAL			**$2.00** / LIN FT
RANDOM / THERMAL CRACK ROUT & SEAL	(100% Rehab = 110.00' / Station / Lane)		**$2.00** / LIN FT

FLEXIBLE TOTAL LIFE-CYCLE COST $711,101

FLEXIBLE TOTAL ANNUAL COST PER MILE $153,133

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 08/21/15

FULL-DEPTH HMA PAVEMENT
HMA OVERLAY OF RUBBLIZED PCC PAVEMENT
Figure 54-7.C
STANDARD DESIGN

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 5							
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	RNDM / THRM CRACK R&S	50.00%	2,200	LIN FT	$2.00	$4,400	
	PD PVMT PATCH M&F SURF	0.10%	5	SQ YD	$80.64	$403	
	PWFn =	0.8626		PW =	0.8626 X	$16,803	$14,494
YEAR 10							
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	RNDM / THRM CRACK R&S	50.00%	2,200	LIN FT	$2.00	$4,400	
	PD PVMT PATCH M&F SURF	0.50%	27	SQ YD	$80.64	$2,177	
	PWFn =	0.7441		PW =	0.7441 X	$18,577	$13,823
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	8,889	SQ YD	$3.00	$26,667	
	PD PVMT M&F ADD'L 2.00"	1.00%	53	SQ YD	$79.52	$4,215	
	HMA OVERLAY PVMT 2.00"	100.00%	5,333	SQ YD	$10.71	$57,141	
	HMA OVERLAY SHLD 2.00 "	100.00%	3,556	SQ YD	$8.06	$28,672	
	PWFn =	0.6419		PW =	0.6419 X	$116,695	$74,902
YEAR 20							
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	RNDM / THRM CRACK R&S	50.00%	2,200	LIN FT	$2.00	$4,400	
	PD PVMT PATCH M&F SURF	0.10%	5	SQ YD	$80.64	$403	
	PWFn =	0.5537		PW =	0.5537 X	$16,803	$9,303
YEAR 25							
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	RNDM / THRM CRACK R&S	50.00%	2,200	LIN FT	$2.00	$4,400	
	PD PVMT PATCH M&F SURF	0.50%	27	SQ YD	$80.64	$2,177	
	PWFn =	0.4776		PW =	0.4776 X	$18,577	$8,872
	HMA_SD						
YEAR 30	INTERSTATE						
	MILL PVMT ONLY 2.00"	100.00%	5,333	SQ YD	$3.00	$15,999	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	107	SQ YD	$79.52	$8,509	
	PD SHLD PATCH M&F SURF 2.00"	1.00%	36	SQ YD	$78.06	$2,810	
	HMA OVERLAY PVMT 3.75 "	100.00%	5,333	SQ YD	$20.21	$107,785	
	HMA OVERLAY SHLD 1.75 "	100.00%	3,556	SQ YD	$7.06	$25,088	
	PWFn =	0.4120		PW =	0.4120 X	$160,191	$65,997
YEAR 35							
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	RNDM / THRM CRACK R&S	50.00%	2,200	LIN FT	$2.00	$4,400	
	PD PVMT PATCH M&F SURF	0.10%	5	SQ YD	$80.64	$403	
	PWFn =	0.3554		PW =	0.3554 X	$16,803	$5,972
YEAR 40							
	LONG SHLD JT R&S	100.00%	4,000	LIN FT	$2.00	$8,000	
	CNTR LINE JOINT R&S	100.00%	2,000	LIN FT	$2.00	$4,000	
	RNDM / THRM CRACK R&S	50.00%	2,200	LIN FT	$2.00	$4,400	
	PD PVMT PATCH M&F SURF	0.50%	27	SQ YD	$80.64	$2,177	
	PWFn =	0.3066		PW =	0.3066 X	$18,577	$5,695
							$199,058
	ROUTINE MAINTENANCE ACTIVITY		0.76	Lane Miles	0.00	$0	$0
					MAINTENANCE LIFE-CYCLE COST		$199,058
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE		$42,866

PCC PAVEMENT

JPCP

ROUTE		**Job Route**	
SECTION		**Job Section**	
COUNTY		**Job County**	
LOCATION		**Job Location**	
FACILITY TYPE		**INTERSTATE**	
PROJECT LENGTH		**1000** FT = = >	0.19 Miles
# OF CENTERLINES		**2** CL	
# OF LANES		**4** LANES	
# OF EDGES		**4** EP	
LANE WIDTH - AVERAGE		**12** FT	
SHOULDER WIDTH	PCC Inside	**6** FT	
	PCC Outside	**10** FT	
	Total Width of Paved Shoulders	**32** FT	

PAVEMENT THICKNESS (RIGID)	**JPCP**	**10.00** IN	TIED SHLD
SHOULDER THICKNESS		**10.00** IN	
POLICY OVERLAY THICKNESS		**3.75** IN	

RIGID PAVEMENT TRAFFIC FACTORS

MINIMUM	ACTUAL	USE
10.05	1.00	10.05

Worksheet Construction Type is New Construction — **The Pavement Type is** **JPCP**

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE		COST
JPC PAVEMENT	(10.00")	5,333	SQ YD	**$50.00**	/ SQ YD	$266,650
PAVEMENT REINFORCEMENT		0	SQ YD	**$22.00**	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	6,000	SQ YD	**$19.00**	/ SQ YD	$114,000
PCC SHOULDERS	(10.00" to 10.00")	3,556	SQ YD	**$40.00**	/ SQ YD	$142,240
CURB & GUTTER		0	LIN FT	**$30.00**	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(3.46")	418	TONS	**$25.00**	/ TON	$10,450
IMPROVED SUBGRADE:	Modified Soil	9,111	SQ YD	**$7.00**	/ SQ YD	$63,777
Reserved For User Supplied Item		0	UNITS	**$0.00**	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS	**$0.00**	/ UNITS	$0
PAVEMENT REMOVAL		5,333	SQ YD	**$0.00**	/ SQ YD	$0
SHOULDER REMOVAL		3,556	SQ YD	**$0.00**	/ SQ YD	$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$597,117
RIGID CONSTRUCTION ANNUAL COST PER MILE	$128,587

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY			**$0.00**	/ LANE-MILE / YEAR
HMA POLICY OVERLAY	(3.75")			
HMA POLICY OVERLAY PVMT	(3.75")		**$20.21**	/ SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	**$8.02**	/ SQ YD
HMA BINDER MIX	(2.25")	Top Binder Mix	**$12.19**	/ SQ YD
HMA POLICY OVERLAY SHLD	(3.75")	Shoulder Mix	**$15.12**	/ SQ YD
CLASS A PAVEMENT PATCHING			**$195.00**	/ SQ YD
CLASS B PAVEMENT PATCHING			**$150.00**	/ SQ YD
CLASS C SHOULDER PATCHING			**$145.00**	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	**$77.98**	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 1.50")		Surface Mix	**$77.98**	/ SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL			**$2.00**	/ LIN FT
CENTERLINE JOINT ROUT & SEAL			**$2.00**	/ LIN FT
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL			**$2.00**	/ LIN FT
RANDOM CRACK ROUT & SEAL	(100% Rehab = 100.00' / Station / Lane)		**$2.00**	/ LIN FT

RIGID TOTAL LIFE-CYCLE COST	$727,263
RIGID TOTAL ANNUAL COST PER MILE	$156,613

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 08/21/15

JOINTED PLAIN CONCRETE PAVEMENT
UNBONDED JOINTED PLAIN CONCRETE OVERLAY
Figure 54-7.A

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST		COST	PRESENT WORTH
YEAR 10								
	PAVEMENT PATCH CLASS B	0.10%	5	SQ YD	$150.00		$750	
	PWFn =	0.7441		PW =	0.7441	X	$750	$558
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	11	SQ YD	$150.00		$1,650	
	PWFn =	0.6419		PW =	0.6419	X	$1,650	$1,059
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	107	SQ YD	$150.00		$16,050	
	SHOULDER PATCH CLASS C	0.50%	18	SQ YD	$145.00		$2,610	
	LONGITUDINAL SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CENTERLINE JT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	PWFn =	0.5537		PW =	0.5537	X	$30,660	$16,976
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	160	SQ YD	$150.00		$24,000	
	SHOULDER PATCH CLASS C	1.00%	36	SQ YD	$145.00		$5,220	
	PWFn =	0.4776		PW =	0.4776	X	$29,220	$13,956
YEAR 30	INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	213	SQ YD	$150.00		$31,950	
	SHOULDER PATCH CLASS C	1.50%	53	SQ YD	$145.00		$7,685	
	HMA POLICY OVERLAY 3.75" (PVMT)	100.00%	5,333	SQ YD	$20.21		$107,785	
	HMA POLICY OVERLAY 3.75" (SHLD)	100.00%	3,556	SQ YD	$15.12		$53,760	
	PWFn =	0.4120		PW =	0.4120	X	$201,180	$82,883
YEAR 35	INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CENTERLINE JT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	RANDOM CRACK R&S	50.00%	2,000	LIN FT	$2.00		$4,000	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	1,286	LIN FT	$2.00		$2,572	
	PD PVMT PATCH M&F HMA SURF 1.50"	0.10%	5	SQ YD	$77.98		$390	
	PWFn =	0.3554		PW =	0.3554	X	$18,962	$6,739
YEAR 40	INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	27	SQ YD	$150.00		$4,050	
	LONGITUDINAL SHLD JT R&S	100.00%	4,000	LIN FT	$2.00		$8,000	
	CENTERLINE JT R&S	100.00%	2,000	LIN FT	$2.00		$4,000	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	1,930	LIN FT	$2.00		$3,860	
	RANDOM CRACK R&S	50.00%	2,000	LIN FT	$2.00		$4,000	
	PD PVMT PATCH M&F HMA SURF 1.50"	0.50%	27	SQ YD	$77.98		$2,105	
	PWFn =	0.3066		PW =	0.3066	X	$26,015	$7,975
								$130,146
	ROUTINE MAINTENANCE ACTIVITY		0.76	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$130,146
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$28,026

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 9/5/13 9:40 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$597,117	$512,043
		ANNUAL COST PER MILE	$128,587	$110,266
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$130,146	$199,058
		ANNUAL COST PER MILE	$28,026	$42,866
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$727,263	$711,101
		ANNUAL COST PER MILE	$156,613	$153,133

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**HMA**	**$153,133**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**JPCP**	**$156,613**	2.3%

P:\Pavement Design Stuff\D-1\IL 53 at Coal City Road [High Speed Rail] 08-17-15\IL 53 at Coal Center Road Pvmt Design Files\[Coal City Rd-IDOT Mech Pvmt Dgn