Illinois Department of Transportation

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

FAP Route 846/OR 129 (IL 53/129)
D1HSRR2016-06
Will County
At Division Street

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:

<u>IL 53/129 (Pavement Reconstruction)</u>

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

12 inches of Aggregate Subgrade Improvement

<u>Division Street (Pavement Reconstruction)</u>

7.25 inches of Full Depth HMA Pavement with HMA Shoulder
- 2 inches of HMA Surface Course, Mix "D", N70
- 5.25 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/IL 129 (High Speed Rail)
Limits: at Division Street
Section: D1HSRR2016-06

County: Will
Contract No.: 62B37
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 Center Street in Will County to facilitate the High Speed Rail program. Improvements will include reconstruction of IL 53, IL 129 and Division Street.

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 18% for IL 53 and 19% for IL 129. Division Street is under local jurisdiction and the local agency is requesting flexible pavement.

<u>IL 53</u>
<u>IL 129</u>
Reconstruction
HMA Shoulder[5]
10 ¼" Full Depth HMA[1, 4]
    2" HMA Surface Course, Mix "D", N70
    8 ¼" HMA Base Course, IL-19.0, N70
12" Aggregate Subgrade Improvement[3]

Division Street[6]
Reconstruction
HMA Shoulder[5]
7 ¼" Full Depth HMA[2, 4]
2" HMA Surface Course, Mix "D", N70
5 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 **40701826, HOT-MIX ASPHALT PAVEMENT (FULL-DEPTH), 7 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.

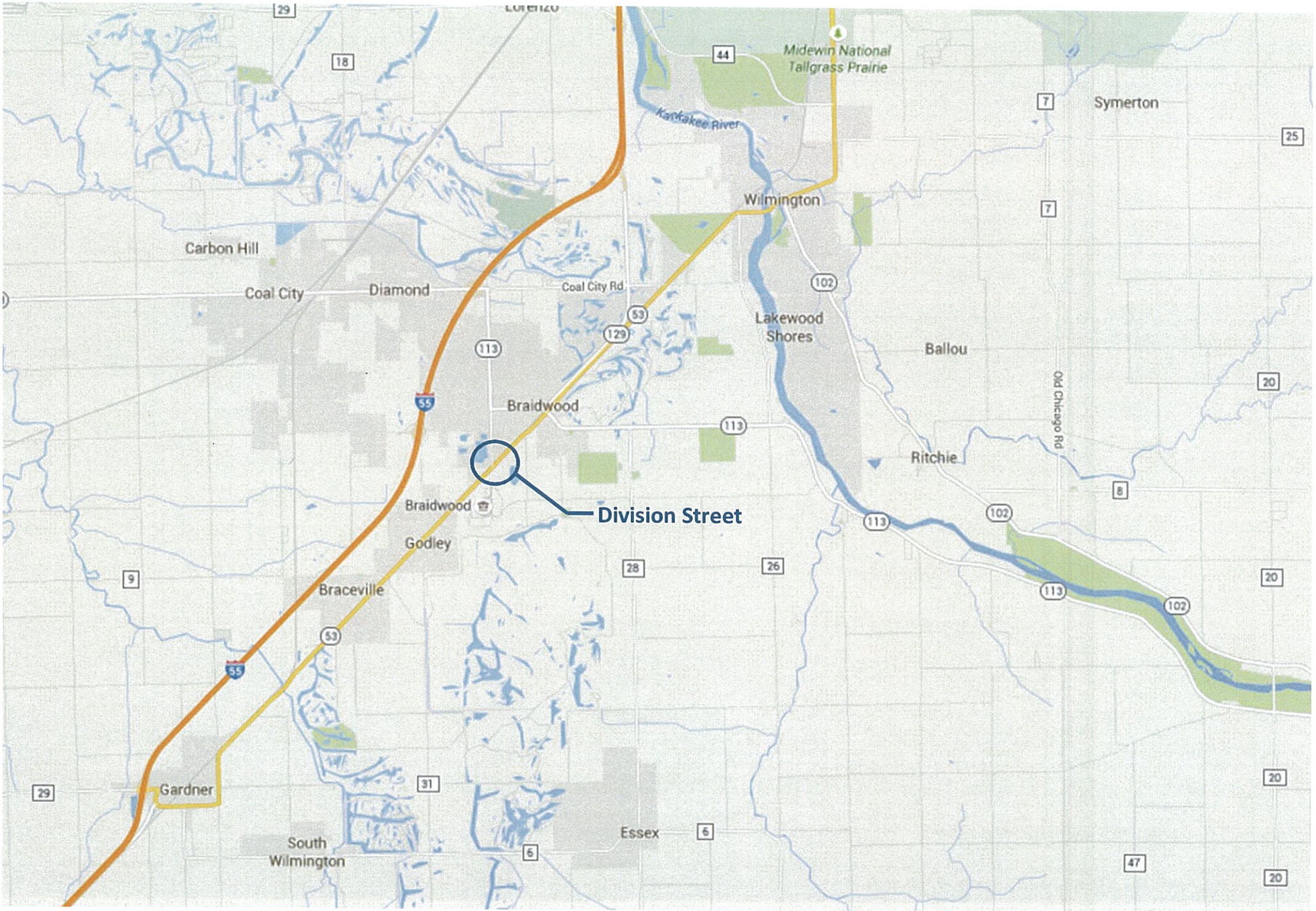
[5] Designer Note 5: The designer shall utilize IDOT Highway Standards in conjunction with guidelines in BDE Manual 34-2.02 if necessary for shoulder thicknesses.

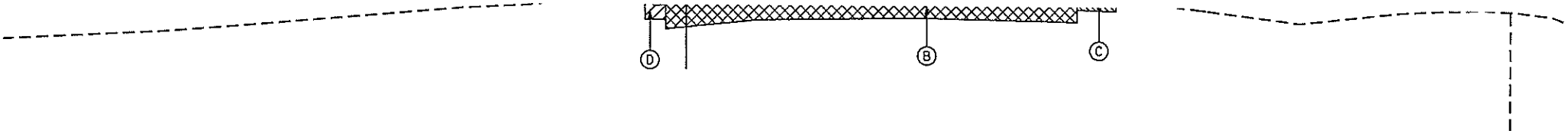
[6]Designer Note 6: Division Street is subject to local jurisdictional approval and concurrence.

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

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

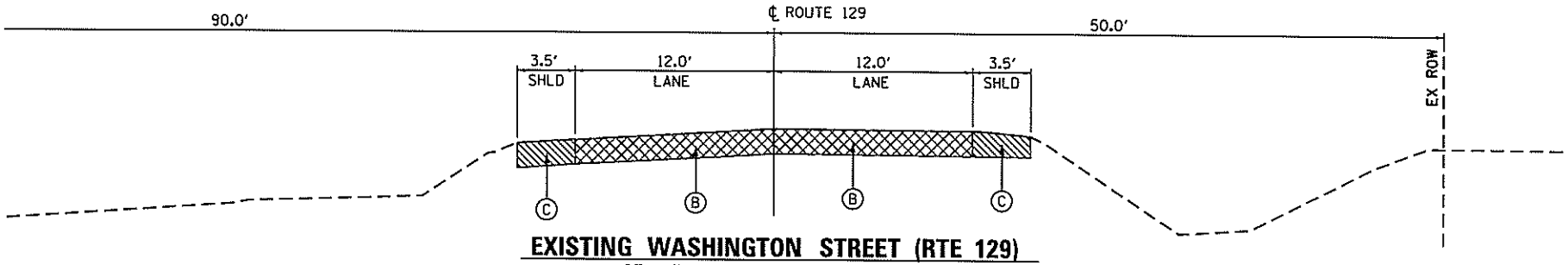
MP58.41 – Division Street – Braidwood, IL – DOT #290508A





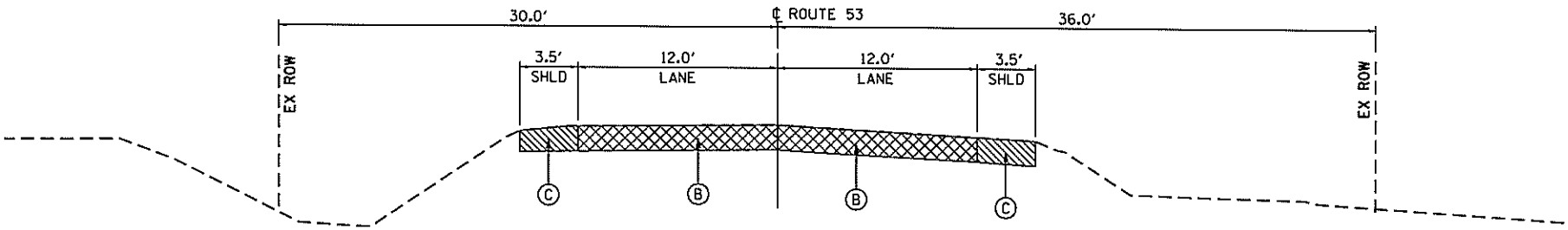
EXISTING WASHINGTON STREET (RTE 129)

STA. 313+92.00 TO STA. 317+35.00



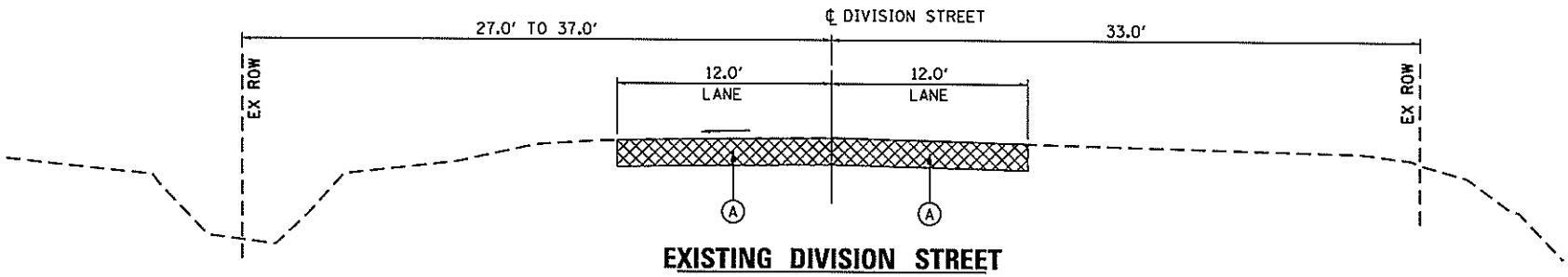
EXISTING WASHINGTON STREET (RTE 129)

STA. 304+10.00 TO STA. 313+92.00
STA. 317+35.00 TO STA. 329+60.00



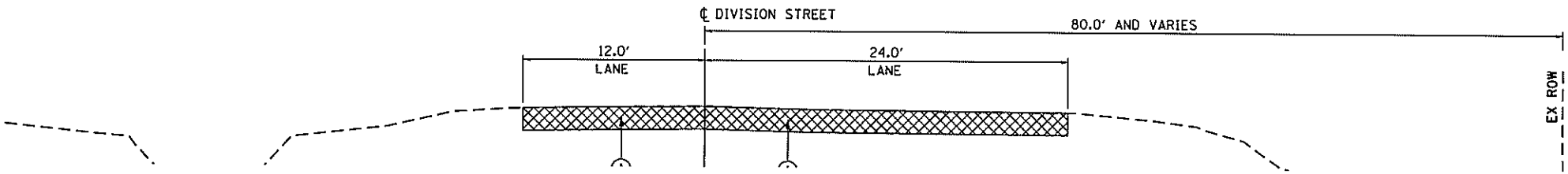
EXISTING FRONT STREET (RTE 53)

STA. 204+50.00 TO STA 232+20.00



EXISTING DIVISION STREET

STA. 53+58.00 TO STA 59+64.00



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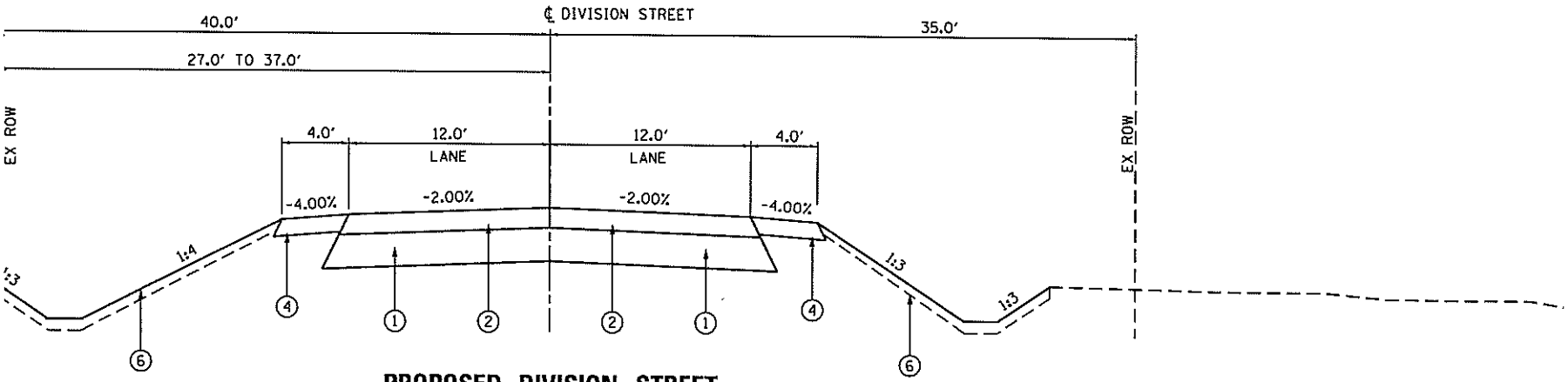
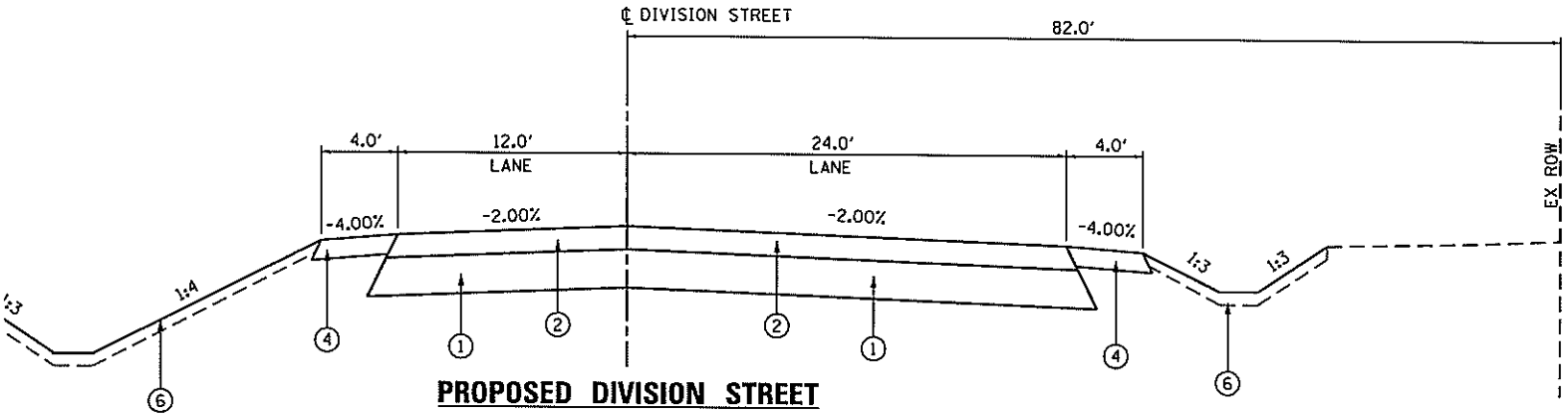


PROPOSED DIVISION STREET

STA. 53+58.00 TO STA 59+64.00

HM

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



PROPOSED DIVISION STREET

STA. 51+00.00 TO STA 53+58.00

STRUCTURAL I

STRUCTURAL DES
PV = 887

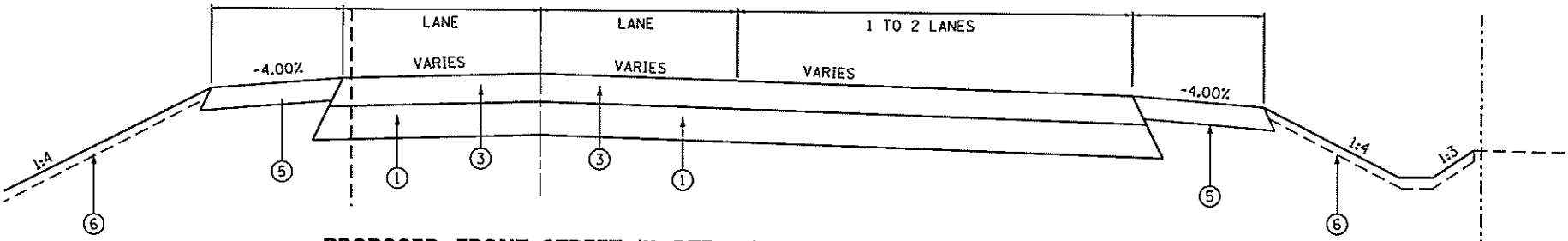
ROAD / STREET

PERCENT OF STR
P = 50%

TRAFFIC FACTOR

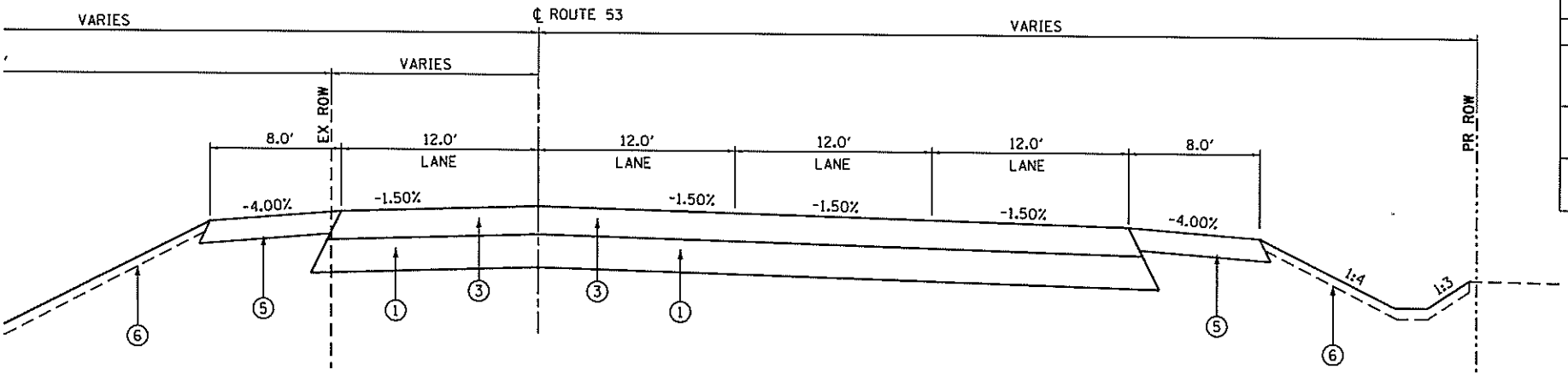
PG GRADE: BIND

SUBGRADE SUPPO
SSR = POOR



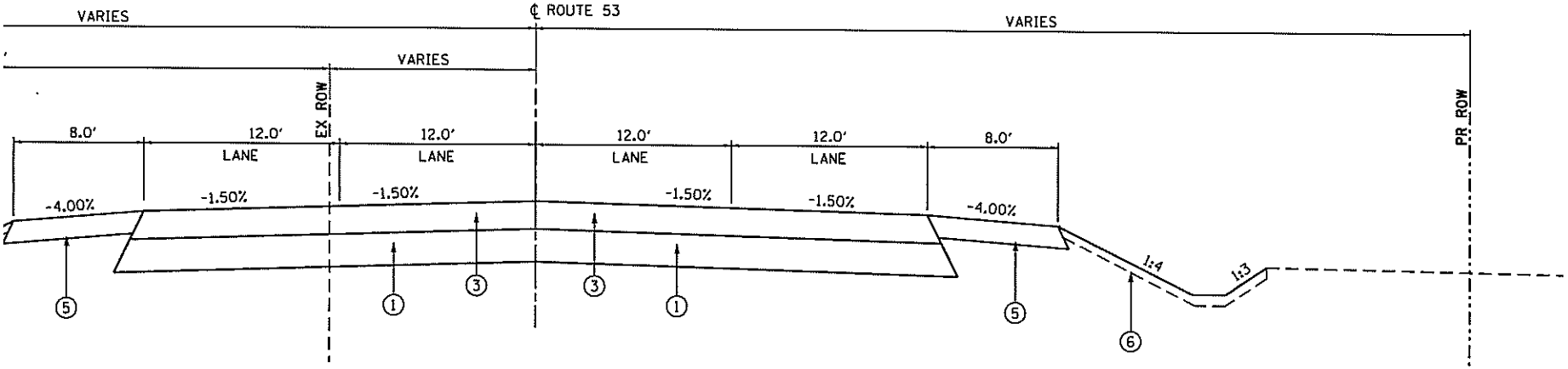
PROPOSED FRONT STREET (IL RTE 53)

STA. 207+15.00 TO STA 214+60.00



PROPOSED FRONT STREET (IL RTE 53)

STA. 214+60.00 TO STA 218+43.09



PROPOSED FRONT STREET (IL RTE 53)

STA. 218+43.09 TO STA 222+24.77

HM

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

STRUCTURA

STRUCTURAL D
PV = 3424

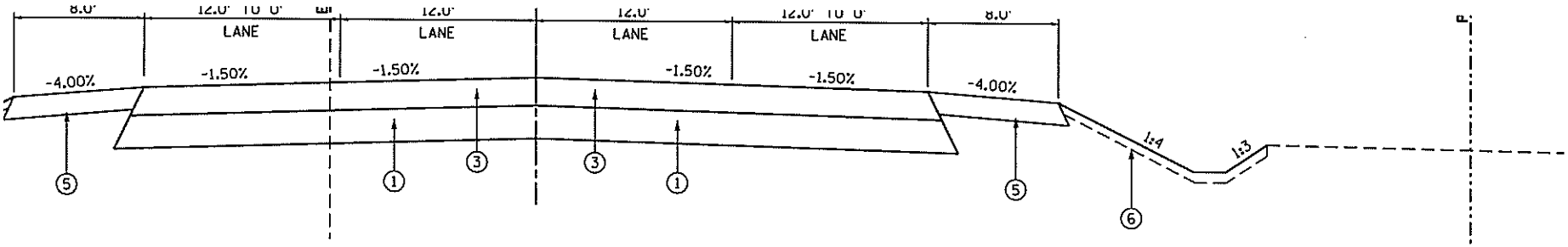
ROAD / STREE

PERCENT OF S
P = 50%

TRAFFIC FACT

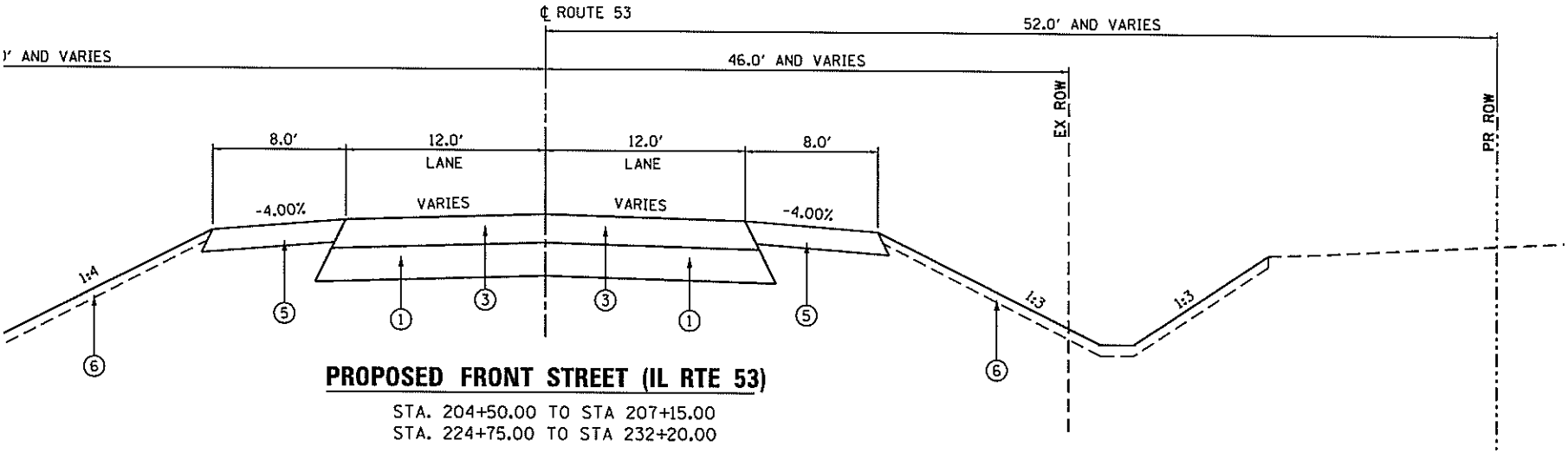
PG GRADE: BI

SUBGRADE SUF
SSR = PC



PROPOSED FRONT STREET (IL RTE 53)

STA. 222+24.77 TO STA 224+75.00



PROPOSED FRONT STREET (IL RTE 53)

STA. 204+50.00 TO STA 207+15.00
STA. 224+75.00 TO STA 232+20.00

HM

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

STRUCTURA

STRUCTURAL D
PV = 3424

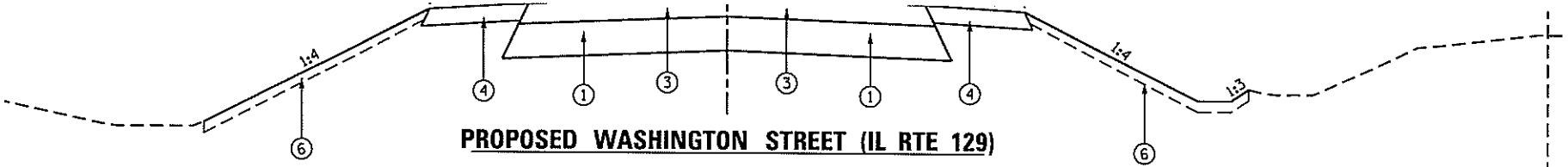
ROAD / STREE

PERCENT OF S
P = 50%

TRAFFIC FACT

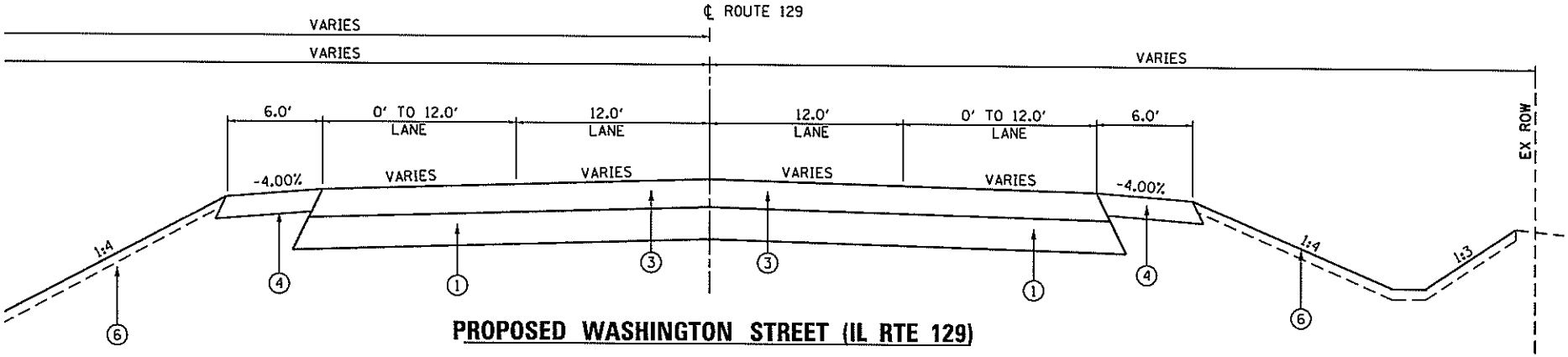
PG GRADE: BI

SUBGRADE SUF
SSR = PC



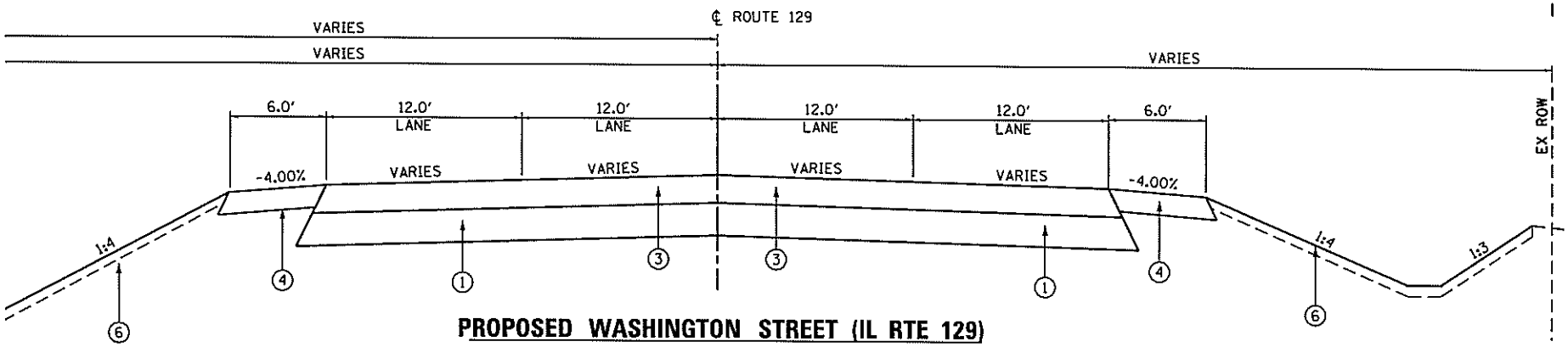
PROPOSED WASHINGTON STREET (IL RTE 129)

STA. 304+10.00 TO STA 310+81.92
STA. 328+10.00 TO STA 329+60.00



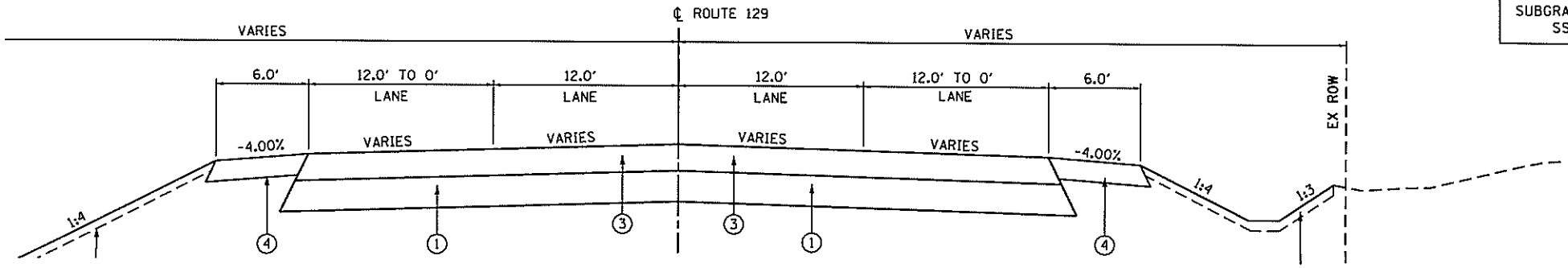
PROPOSED WASHINGTON STREET (IL RTE 129)

STA. 310+08.92 TO STA 313+53.38



PROPOSED WASHINGTON STREET (IL RTE 129)

STA. 313+53.38 TO STA 318+08.79



STRUCTURAL I

(

STRUCTURAL DES:
PV = 1084

ROAD / STREET (

PERCENT OF STRU
P = 50%

TRAFFIC FACTOR:

PG GRADE: BINDE

SUBGRADE SUPPOR
SSR = POOR

(4)
(5)
(6)

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 Division Street

Comments: High Speed Rail

Design Date: 07/31/2015 ONP <-- BY
Modify Date: <-- BY

	ADT	Year
Current:	2,940	2013
Future:	4,550	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

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane	
PV =	0	3,740	96.1%	P =	50%
SU =	250	86	2.2%	S =	50%
MU =	750	66	1.7%	M =	50%

Struct. Design ADT = 3,891 (2026)

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = 0.15
Csu = 112.06
Cmu = 385.44
TF flexible (Actual) = 0.36 (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) = 0.50 (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)
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)
Full Depth HMA Design Thickness = 10.25 in. (Fig. 54-5.F)
Goto Map
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
HMA Overlay Design Thickness = 7.50 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	IL 53
SECTION	
COUNTY	Will
LOCATION	at Division Street
FACILITY TYPE	NON-INTERSTATE

PROJECT LENGTH		2770 FT	==> 0.52 Miles
# OF CENTERLINES		1 CL	
# OF LANES		2 LANES	
# OF EDGES		2 EP	
LANE WIDTH - AVERAGE		12 FT	
SHOULDER WIDTH	HMA Left	8 FT	
	HMA Right	8 FT	
	Total Width of Paved Shoulders	16 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	0.36	3.17

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$77.99 / TON
HMA TOP BINDER	$67.90 / TON
HMA LOWER BINDER	$67.90 / TON
HMA BINDER (LEVELING)	$72.95 / TON
HMA SHOULDER	$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(10.25")	7,387	SQ YD *	$40.49 / SQ YD	$299,086 ~
HMA SURFACE COURSE	(2.00")	833	TONS	$77.99 / TON	$0
HMA TOP BINDER COURSE	(2.25")	951	TONS	$67.90 / TON	$0
HMA LOWER BINDER COURSE	(6.00")	2,607	TONS	$67.90 / TON	$0
HMA SHOULDER	(8.00")	2,206	TONS	$72.00 / TON	$158,843 ~
CURB & GUTTER		0	LIN FT	$30.00 / LIN FT	$0
SUBBASE GRAN MATL TY C (TONS)		204	TONS	$25.00 / TON	$5,100
IMPROVED SUBGRADE:	Modified Soil	13,145	SQ YD	$7.00 / SQ YD	$92,015
Reserved For User Supplied Item		0	UNITS	$0.00 / UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00 / UNITS	$0
PAVEMENT REMOVAL		7,387	SQ YD	$15.00 / SQ YD	$110,805
SHOULDER REMOVAL		4,924	SQ YD	$10.00 / SQ YD	$49,240

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$715,089
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$55,593

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix	$8.80 / SQ YD
HMA OVERLAY PVMT	(2.25")		$9.69 / SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	$6.59 / SQ YD
HMA BINDER MIX	(0.75")	eling Binder Mix	$3.10 / 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	$78.73 / 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	$78.17 / 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	$959,531
FLEXIBLE TOTAL ANNUAL COST PER MILE	$74,596

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%	5,540	LIN FT	$2.00		$11,080	
	CNTR LINE JOINT R&S	100.00%	2,770	LIN FT	$2.00		$5,540	
	RNDM / THRM CRACK R&S	50.00%	3,047	LIN FT	$2.00		$6,094	
	PD PVMT PATCH M&F SURF	0.10%	7	SQ YD	$78.73		$551	
	PWFn =	0.8626		PW =	0.8626	X	$23,265	$20,069
YEAR 10								
	LONG SHLD JT R&S	100.00%	5,540	LIN FT	$2.00		$11,080	
	CNTR LINE JOINT R&S	100.00%	2,770	LIN FT	$2.00		$5,540	
	RNDM / THRM CRACK R&S	50.00%	3,047	LIN FT	$2.00		$6,094	
	PD PVMT PATCH M&F SURF	0.50%	37	SQ YD	$78.73		$2,913	
	PWFn =	0.7441		PW =	0.7441	X	$25,627	$19,069
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	12,311	SQ YD	$3.00		$36,933	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	74	SQ YD	$78.17		$5,785	
	HMA OVERLAY PVMT 2.00"	100.00%	7,387	SQ YD	$8.80		$64,970	
	HMA OVERLAY SHLD 2.00 "	100.00%	4,924	SQ YD	$8.06		$39,711	
	PWFn =	0.6419		PW =	0.6419	X	$147,399	$94,610
YEAR 20								
	LONG SHLD JT R&S	100.00%	5,540	LIN FT	$2.00		$11,080	
	CNTR LINE JOINT R&S	100.00%	2,770	LIN FT	$2.00		$5,540	
	RNDM / THRM CRACK R&S	50.00%	3,047	LIN FT	$2.00		$6,094	
	PD PVMT PATCH M&F SURF	0.10%	7	SQ YD	$78.73		$551	
	PWFn =	0.5537		PW =	0.5537	X	$23,265	$12,881
YEAR 25								
	LONG SHLD JT R&S	100.00%	5,540	LIN FT	$2.00		$11,080	
	CNTR LINE JOINT R&S	100.00%	2,770	LIN FT	$2.00		$5,540	
	RNDM / THRM CRACK R&S	50.00%	3,047	LIN FT	$2.00		$6,094	
	PD PVMT PATCH M&F SURF	0.50%	37	SQ YD	$78.73		$2,913	
	PWFn =	0.4776		PW =	0.4776	X	$25,627	$12,240
	HMA_SD							
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	12,311	SQ YD	$3.00		$36,933	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	148	SQ YD	$78.17		$11,569	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	49	SQ YD	$78.06		$3,825	
	HMA OVERLAY PVMT 2.25 "	100.00%	7,387	SQ YD	$9.69		$71,570	
	HMA OVERLAY SHLD 2.25 "	100.00%	4,924	SQ YD	$9.07		$44,675	
	PWFn =	0.4120		PW =	0.4120	X	$168,572	$69,449
YEAR 35								
	LONG SHLD JT R&S	100.00%	5,540	LIN FT	$2.00		$11,080	
	CNTR LINE JOINT R&S	100.00%	2,770	LIN FT	$2.00		$5,540	
	RNDM / THRM CRACK R&S	50.00%	3,047	LIN FT	$2.00		$6,094	
	PD PVMT PATCH M&F SURF	0.10%	7	SQ YD	$78.73		$551	
	PWFn =	0.3554		PW =	0.3554	X	$23,265	$8,268
YEAR 40								
	LONG SHLD JT R&S	100.00%	5,540	LIN FT	$2.00		$11,080	
	CNTR LINE JOINT R&S	100.00%	2,770	LIN FT	$2.00		$5,540	
	RNDM / THRM CRACK R&S	50.00%	3,047	LIN FT	$2.00		$6,094	
	PD PVMT PATCH M&F SURF	0.50%	37	SQ YD	$78.73		$2,913	
	PWFn =	0.3066		PW =	0.3066	X	$25,627	$7,856
								$244,442
	ROUTINE MAINTENANCE ACTIVITY		1.05	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$244,442
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$19,003

PCC PAVEMENT

JPCP

ROUTE		IL 53	
SECTION		0	
COUNTY		Will	
LOCATION		at Division Street	
FACILITY TYPE		NON-INTERSTATE	
PROJECT LENGTH		2770 FT	==> 0.52 Miles
# OF CENTERLINES		1 CL	
# OF LANES		2 LANES	
# OF EDGES		2 EP	
LANE WIDTH - AVERAGE		12 FT	
SHOULDER WIDTH	PCC Left	8 FT	
	PCC Right	8 FT	
	Total Width of Paved Shoulders	16 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	0.50	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")	7,387	SQ YD	$50.03	/ SQ YD	$369,572
PAVEMENT REINFORCEMENT		0	SQ YD	$22.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	8,310	SQ YD	$19.00	/ SQ YD	$157,890
PCC SHOULDERS	(9.00" to 9.00")	4,924	SQ YD	$40.00	/ SQ YD	$196,960
CURB & GUTTER		0	LIN FT	$30.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(~ 1.80")	601	TONS	$25.00	/ TON	$15,025
IMPROVED SUBGRADE:	Modified Soil	12,619	SQ YD	$7.00	/ SQ YD	$88,333
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
PAVEMENT REMOVAL		7,387	SQ YD	$15.00	/ SQ YD	$110,805
SHOULDER REMOVAL		4,924	SQ YD	$10.00	/ SQ YD	$49,240

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$987,825
RIGID CONSTRUCTION ANNUAL COST PER MILE	$76,796

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY			$0.00	/ LANE-MILE / YEAR
HMA POLICY OVERLAY	(2.50")			
HMA POLICY OVERLAY PVMT	(2.50")		$10.73	/ SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	$6.59	/ SQ YD
HMA BINDER MIX	(1.00")	ling Binder Mix	$4.14	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")	Shoulder Mix	$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	$76.55	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	$80.92	/ 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	$1,128,980
RIGID TOTAL ANNUAL COST PER MILE	$87,769

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%	7	SQ YD	$150.00		$1,050	
	PWFn =	0.7441		PW =	0.7441	X	$1,050	$781
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	15	SQ YD	$150.00		$2,250	
	PWFn =	0.6419		PW =	0.6419	X	$2,250	$1,444
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	148	SQ YD	$150.00		$22,200	
	SHOULDER PATCH CLASS C	0.50%	25	SQ YD	$145.00		$3,625	
	LONGITUDINAL SHLD JT R&S	100.00%	5,540	LIN FT	$2.00		$11,080	
	CENTERLINE JT R&S	100.00%	2,770	LIN FT	$2.00		$5,540	
	PWFn =	0.5537		PW =	0.5537	X	$42,445	$23,501
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	222	SQ YD	$150.00		$33,300	
	SHOULDER PATCH CLASS C	1.00%	49	SQ YD	$145.00		$7,105	
	PWFn =	0.4776		PW =	0.4776	X	$40,405	$19,298
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	295	SQ YD	$150.00		$44,250	
	SHOULDER PATCH CLASS C	1.50%	74	SQ YD	$145.00		$10,730	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	7,387	SQ YD	$10.73		$79,238	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	4,924	SQ YD	$10.08		$49,638	
	PWFn =	0.4120		PW =	0.4120	X	$183,856	$75,746
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	5,540	LIN FT	$2.00		$11,080	
	CENTERLINE JT R&S	100.00%	2,770	LIN FT	$2.00		$5,540	
	RANDOM CRACK R&S	50.00%	2,770	LIN FT	$2.00		$5,540	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	1,776	LIN FT	$2.00		$3,552	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	7	SQ YD	$80.92		$566	
	PWFn =	0.3554		PW =	0.3554	X	$26,278	$9,339
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	37	SQ YD	$150.00		$5,550	
	LONGITUDINAL SHLD JT R&S	100.00%	5,540	LIN FT	$2.00		$11,080	
	CENTERLINE JT R&S	100.00%	2,770	LIN FT	$2.00		$5,540	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	2,664	LIN FT	$2.00		$5,328	
	RANDOM CRACK R&S	50.00%	2,770	LIN FT	$2.00		$5,540	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	37	SQ YD	$80.92		$2,994	
	PWFn =	0.3066		PW =	0.3066	X	$36,032	$11,046
								$141,155
	ROUTINE MAINTENANCE ACTIVITY		1.05	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$141,155
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$10,974

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 8/14/15 8:31 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$987,825	$715,089
		ANNUAL COST PER MILE	$76,796	$55,593
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$141,155	$244,442
		ANNUAL COST PER MILE	$10,974	$19,003
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$1,128,980	$959,531
		ANNUAL COST PER MILE	$87,769	$74,596

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	HMA	$74,596	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	JPCP	$87,769	17.7%

P:\Pavement Design Stuff\D-1\IL 53-129 at Division Street [High Speed Rail] 08-17-15\IL 53-129 at Division Street Pavement Design Files\[IL 53-IDOT Mech Pvmt D

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 129
Section:
County: Will
Location: at Division Street

Comments: High Speed Rail
Design Date: 07/31/2015 ONP <-- BY
Modify Date: <-- BY

	ADT	Year
Current:	1,200	2013
Future:	1,440	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: III

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	1,303	97.1%	P = 50%
SU =	250	19	1.4%	S = 50%
MU =	750	20	1.5%	M = 50%
Struct. Design ADT =		1,342	(2026)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = 0.15
Csu = 109.14
Cmu = 384.35
TF flexible (Actual) = 0.10 (Actual ADT)
TF flexible (Min) = 3.16 (Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv = 0.15
Csu = 129.58
Cmu = 562.47
TF rigid (Actual) = 0.14 (Actual ADT)
TF rigid (Min) = 4.54 (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 3.16
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}) = 87 (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 = 4.54
Edge Support = Tied Shoulder or C.&G.

Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 4.54
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 = 3.16
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 129
SECTION	
COUNTY	Will
LOCATION	at Division Street
FACILITY TYPE	NON-INTERSTATE

PROJECT LENGTH		2550 FT	==> 0.48 Miles
# OF CENTERLINES		1 CL	
# OF LANES		2 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
	3.16	0.10	3.16

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$77.99 / TON
HMA TOP BINDER	$67.90 / TON
HMA LOWER BINDER	$67.90 / TON
HMA BINDER (LEVELING)	$72.95 / TON
HMA SHOULDER	$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(10.25")	6,800	SQ YD *	$40.49 / SQ YD	$275,332 ~
HMA SURFACE COURSE	(2.00")	767	TONS	$77.99 / TON	$0
HMA TOP BINDER COURSE	(2.25")	875	TONS	$67.90 / TON	$0
HMA LOWER BINDER COURSE	(6.00")	2,400	TONS	$67.90 / TON	$0
HMA SHOULDER	(8.00")	1,523	TONS	$72.00 / TON	$109,670 ~
CURB & GUTTER		0	LIN FT	$30.00 / LIN FT	$0
SUBBASE GRAN MATL TY C (TONS)		208	TONS	$25.00 / TON	$5,200
IMPROVED SUBGRADE:	Modified Soil	10,967	SQ YD	$7.00 / SQ YD	$76,769
Reserved For User Supplied Item		0	UNITS	$0.00 / UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00 / UNITS	$0
PAVEMENT REMOVAL		6,800	SQ YD	$15.00 / SQ YD	$102,000
SHOULDER REMOVAL		3,400	SQ YD	$10.00 / SQ YD	$34,000

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$602,971
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$50,920

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY				$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix	$8.80 / SQ YD
HMA OVERLAY PVMT		(2.25")		$9.69 / SQ YD
HMA SURFACE MIX		(1.50")	Surface Mix	$6.59 / SQ YD
HMA BINDER MIX		(0.75")	eling Binder Mix	$3.10 / 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	$78.73 / 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	$78.17 / 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	$814,012
FLEXIBLE TOTAL ANNUAL COST PER MILE	$68,743

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%	5,100	LIN FT	$2.00		$10,200	
	CNTR LINE JOINT R&S	100.00%	2,550	LIN FT	$2.00		$5,100	
	RNDM / THRM CRACK R&S	50.00%	2,805	LIN FT	$2.00		$5,610	
	PD PVMT PATCH M&F SURF	0.10%	7	SQ YD	$78.73		$551	
	PWFn =	0.8626		PW =	0.8626	X	$21,461	$18,512
YEAR 10								
	LONG SHLD JT R&S	100.00%	5,100	LIN FT	$2.00		$10,200	
	CNTR LINE JOINT R&S	100.00%	2,550	LIN FT	$2.00		$5,100	
	RNDM / THRM CRACK R&S	50.00%	2,805	LIN FT	$2.00		$5,610	
	PD PVMT PATCH M&F SURF	0.50%	34	SQ YD	$78.73		$2,677	
	PWFn =	0.7441		PW =	0.7441	X	$23,587	$17,551
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	10,200	SQ YD	$3.00		$30,600	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	68	SQ YD	$78.17		$5,316	
	HMA OVERLAY PVMT 2.00"	100.00%	6,800	SQ YD	$8.80		$59,810	
	HMA OVERLAY SHLD 2.00 "	100.00%	3,400	SQ YD	$8.06		$27,418	
	PWFn =	0.6419		PW =	0.6419	X	$123,144	$79,041
YEAR 20								
	LONG SHLD JT R&S	100.00%	5,100	LIN FT	$2.00		$10,200	
	CNTR LINE JOINT R&S	100.00%	2,550	LIN FT	$2.00		$5,100	
	RNDM / THRM CRACK R&S	50.00%	2,805	LIN FT	$2.00		$5,610	
	PD PVMT PATCH M&F SURF	0.10%	7	SQ YD	$78.73		$551	
	PWFn =	0.5537		PW =	0.5537	X	$21,461	$11,882
YEAR 25								
	LONG SHLD JT R&S	100.00%	5,100	LIN FT	$2.00		$10,200	
	CNTR LINE JOINT R&S	100.00%	2,550	LIN FT	$2.00		$5,100	
	RNDM / THRM CRACK R&S	50.00%	2,805	LIN FT	$2.00		$5,610	
	PD PVMT PATCH M&F SURF	0.50%	34	SQ YD	$78.73		$2,677	
	PWFn =	0.4776		PW =	0.4776	X	$23,587	$11,265
	HMA_SD							
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	10,200	SQ YD	$3.00		$30,600	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	136	SQ YD	$78.17		$10,631	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	34	SQ YD	$78.06		$2,654	
	HMA OVERLAY PVMT 2.25 "	100.00%	6,800	SQ YD	$9.69		$65,886	
	HMA OVERLAY SHLD 2.25 "	100.00%	3,400	SQ YD	$9.07		$30,845	
	PWFn =	0.4120		PW =	0.4120	X	$140,616	$57,932
YEAR 35								
	LONG SHLD JT R&S	100.00%	5,100	LIN FT	$2.00		$10,200	
	CNTR LINE JOINT R&S	100.00%	2,550	LIN FT	$2.00		$5,100	
	RNDM / THRM CRACK R&S	50.00%	2,805	LIN FT	$2.00		$5,610	
	PD PVMT PATCH M&F SURF	0.10%	7	SQ YD	$78.73		$551	
	PWFn =	0.3554		PW =	0.3554	X	$21,461	$7,627
YEAR 40								
	LONG SHLD JT R&S	100.00%	5,100	LIN FT	$2.00		$10,200	
	CNTR LINE JOINT R&S	100.00%	2,550	LIN FT	$2.00		$5,100	
	RNDM / THRM CRACK R&S	50.00%	2,805	LIN FT	$2.00		$5,610	
	PD PVMT PATCH M&F SURF	0.50%	34	SQ YD	$78.73		$2,677	
	PWFn =	0.3066		PW =	0.3066	X	$23,587	$7,231
								$211,041
	ROUTINE MAINTENANCE ACTIVITY		0.97	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$211,041
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$17,822

PCC PAVEMENT

JPCP

ROUTE		IL 129	
SECTION		0	
COUNTY		Will	
LOCATION		at Division Street	
FACILITY TYPE		NON-INTERSTATE	
PROJECT LENGTH		2550 FT	= = > 0.48 Miles
# OF CENTERLINES		1 CL	
# OF LANES		2 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
	4.54	0.14	4.54
Worksheet Construction Type is Reconstruction		The Pavement Type is	JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE		COST
JPC PAVEMENT	(9.00")	6,800	SQ YD	$50.03	/ SQ YD	$340,204
PAVEMENT REINFORCEMENT		0	SQ YD	$22.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	7,650	SQ YD	$19.00	/ SQ YD	$145,350
PCC SHOULDERS	(9.00" to 9.00")	3,400	SQ YD	$40.00	/ SQ YD	$136,000
CURB & GUTTER		0	LIN FT	$30.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(~ 1.86")	449	TONS	$25.00	/ TON	$11,225
IMPROVED SUBGRADE:	Modified Soil	10,483	SQ YD	$7.00	/ SQ YD	$73,381
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
PAVEMENT REMOVAL		6,800	SQ YD	$15.00	/ SQ YD	$102,000
SHOULDER REMOVAL		3,400	SQ YD	$10.00	/ SQ YD	$34,000

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$842,160
RIGID CONSTRUCTION ANNUAL COST PER MILE	$71,120

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")		2.50	$10.73	/ SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	1.50	$6.59	/ SQ YD
HMA BINDER MIX	(1.00")	aling Binder Mix	1.00	$4.14	/ 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	$76.55	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	2.50	$80.92	/ 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	$965,189
RIGID TOTAL ANNUAL COST PER MILE	$81,510

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%	7	SQ YD	$150.00		$1,050	
	PWFn =	0.7441		PW =	0.7441	X	$1,050	$781
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	14	SQ YD	$150.00		$2,100	
	PWFn =	0.6419		PW =	0.6419	X	$2,100	$1,348
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	136	SQ YD	$150.00		$20,400	
	SHOULDER PATCH CLASS C	0.50%	17	SQ YD	$145.00		$2,465	
	LONGITUDINAL SHLD JT R&S	100.00%	5,100	LIN FT	$2.00		$10,200	
	CENTERLINE JT R&S	100.00%	2,550	LIN FT	$2.00		$5,100	
	PWFn =	0.5537		PW =	0.5537	X	$38,165	$21,131
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	204	SQ YD	$150.00		$30,600	
	SHOULDER PATCH CLASS C	1.00%	34	SQ YD	$145.00		$4,930	
	PWFn =	0.4776		PW =	0.4776	X	$35,530	$16,969
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	272	SQ YD	$150.00		$40,800	
	SHOULDER PATCH CLASS C	1.50%	51	SQ YD	$145.00		$7,395	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	6,800	SQ YD	$10.73		$72,945	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	3,400	SQ YD	$10.08		$34,272	
	PWFn =	0.4120		PW =	0.4120	X	$155,412	$64,028
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	5,100	LIN FT	$2.00		$10,200	
	CENTERLINE JT R&S	100.00%	2,550	LIN FT	$2.00		$5,100	
	RANDOM CRACK R&S	50.00%	2,550	LIN FT	$2.00		$5,100	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	1,632	LIN FT	$2.00		$3,264	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	7	SQ YD	$80.92		$566	
	PWFn =	0.3554		PW =	0.3554	X	$24,230	$8,611
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	34	SQ YD	$150.00		$5,100	
	LONGITUDINAL SHLD JT R&S	100.00%	5,100	LIN FT	$2.00		$10,200	
	CENTERLINE JT R&S	100.00%	2,550	LIN FT	$2.00		$5,100	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	2,448	LIN FT	$2.00		$4,896	
	RANDOM CRACK R&S	50.00%	2,550	LIN FT	$2.00		$5,100	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	34	SQ YD	$80.92		$2,751	
	PWFn =	0.3066		PW =	0.3066	X	$33,147	$10,161
								$123,029
	ROUTINE MAINTENANCE ACTIVITY		0.97	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$123,029
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$10,390

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 8/14/15 8:35 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$842,160	$602,971
		ANNUAL COST PER MILE	$71,120	$50,920
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$123,029	$211,041
		ANNUAL COST PER MILE	$10,390	$17,822
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$965,189	$814,012
		ANNUAL COST PER MILE	$81,510	$68,743

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**HMA**	**$68,743**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**JPCP**	**$81,510**	**18.6%**

P:\Pavement Design Stuff\D-1\IL 53-129 at Division Street [High Speed Rail] 08-17-15\IL 53-129 at Division Street Pavement Design Files\[IL 129-IDOT Mech Pvmt

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: Division Street
Section:
County: Will
Location: at IL 53

Comments: High Speed Rail
Design Date: 07/31/2015 ONP <-- BY
Modify Date: <-- BY

	ADT	Year
Current:	1,850	2013
Future:	2,800	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

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	No Min	2,317	96.1%	P = 50%
SU =	No Min	53	2.2%	S = 50%
MU =	No Min	41	1.7%	M = 50%
Struct. Design ADT =		2,411	(2026)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = 0.15
Csu = 112.06
Cmu = 385.44
TF flexible (Actual) = 0.22 (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) = 0.31 (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)
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}) = 147 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 7.25 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 15.00 in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness = 7.25 inches

JPC Pavement

Use TF rigid = 0.31
Edge Support = Tied Shoulder or C.&G.
Rigid Pavt Thick. = 7.50 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 0.31
IBR value = 3
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
Goto Map
HMA Overlay Design Thickness = 4.75 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	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

HMA_SD

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 PATCH 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	T	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY				$0.00	/ LANE-MILE / YEAR
HMA POLICY OVERLAY	(3.75")		3.75		
HMA POLICY OVERLAY PVMT	(3.75")		3.75	$20.21	/ SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	1.50	$8.02	/ SQ YD
HMA BINDER MIX	(2.25")	Top Binder Mix	2.25	$12.19	/ SQ YD
HMA POLICY OVERLAY SHLD	(3.75")	Shoulder Mix	3.75	$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	1.50	$77.98	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 1.50")		Surface Mix	1.50	$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 53-129 at Division Street [High Speed Rail] 08-17-15\IL 53-129 at Division Street Pavement Design Files\[Division St-IDOT Mech P