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)
D1HSRR2016-05
Will County
At Center 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:

IL 53/129 (Pavement Reconstruction)

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

Center Street/Kennedy Road/Reed Street (Pavement Reconstruction)

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 Center Street
Section: D1HSRR2016-05

County: Will
Contract No.: 62B36
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 Center Street/Kennedy Road/Reed 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 21% for IL 53 and 19% for IL 129. Center Street, Kennedy Road and Reed Street are under local jurisdiction and the local agencies are requesting flexible pavement.

IL 53
IL 129
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]

Center Street/Kennedy Road/Reed 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.

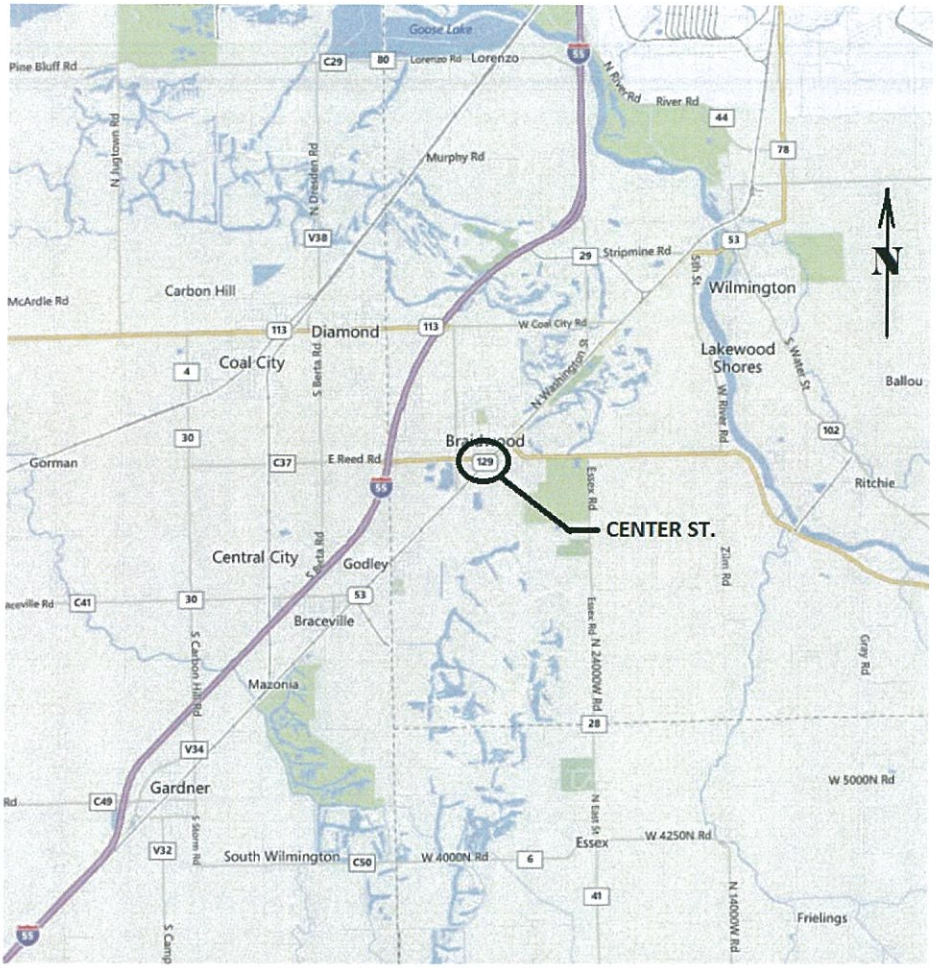
[6]Designer Note 6: Center Street, Kennedy Road, and Reed Street are subject to local jurisdictional approval and concurrence.

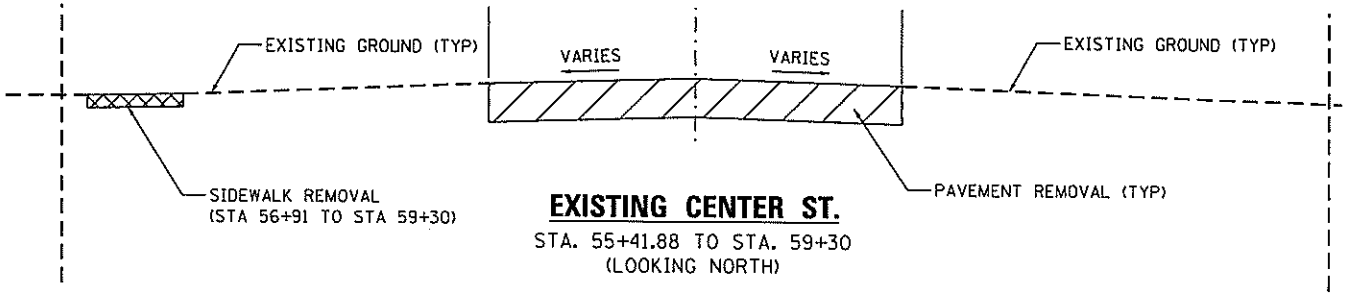
If you have any questions or need additional information, please contact Ojas Patel, Pavement Design Engineer, at (847)705-4550.

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

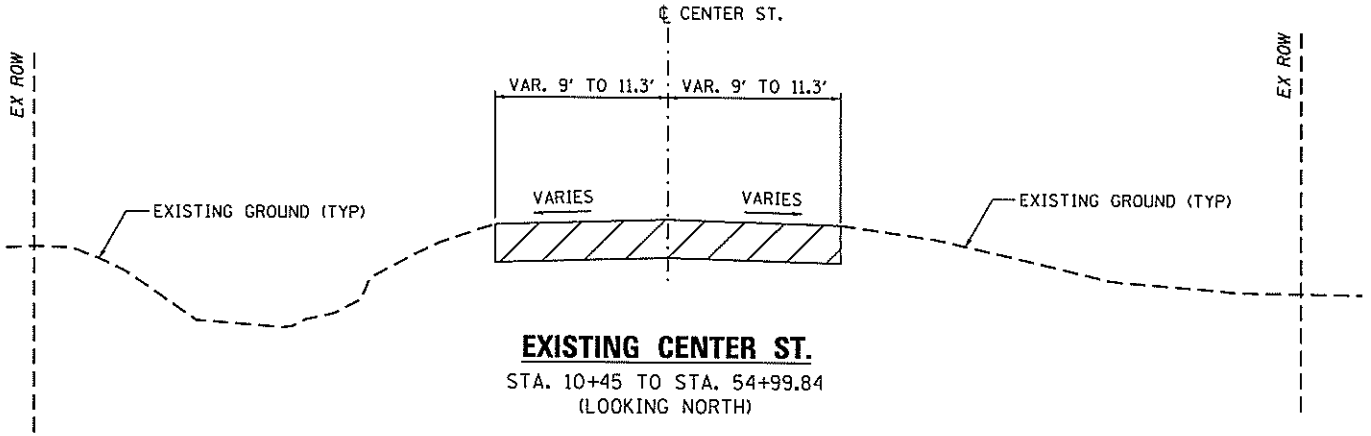
LOCATION MAP

MP 57.71 CENTER STREET, DOT #290507T

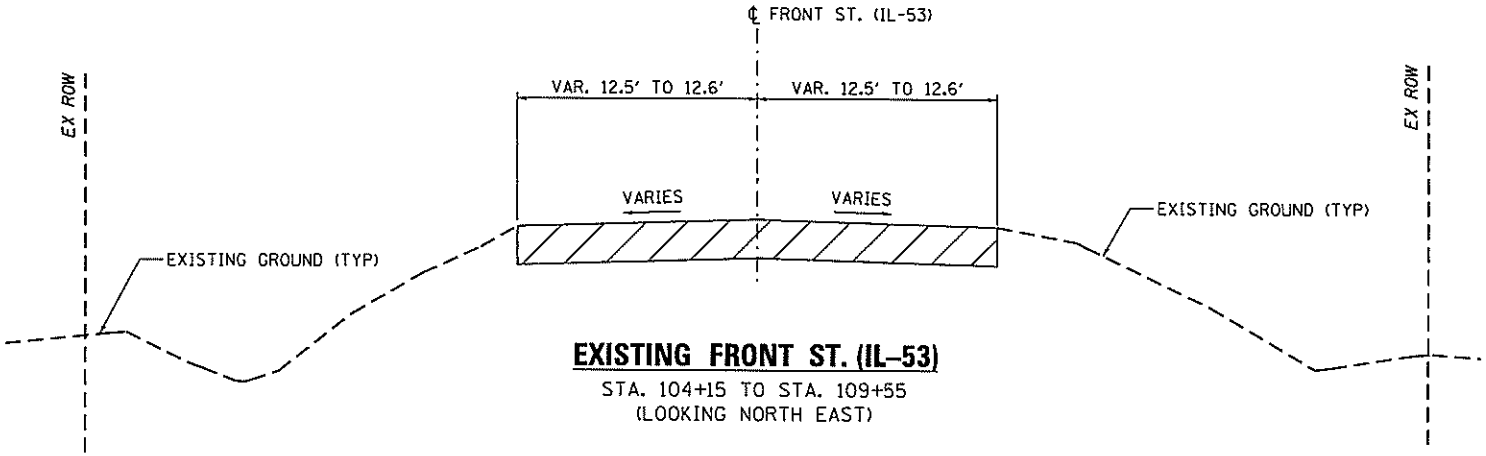




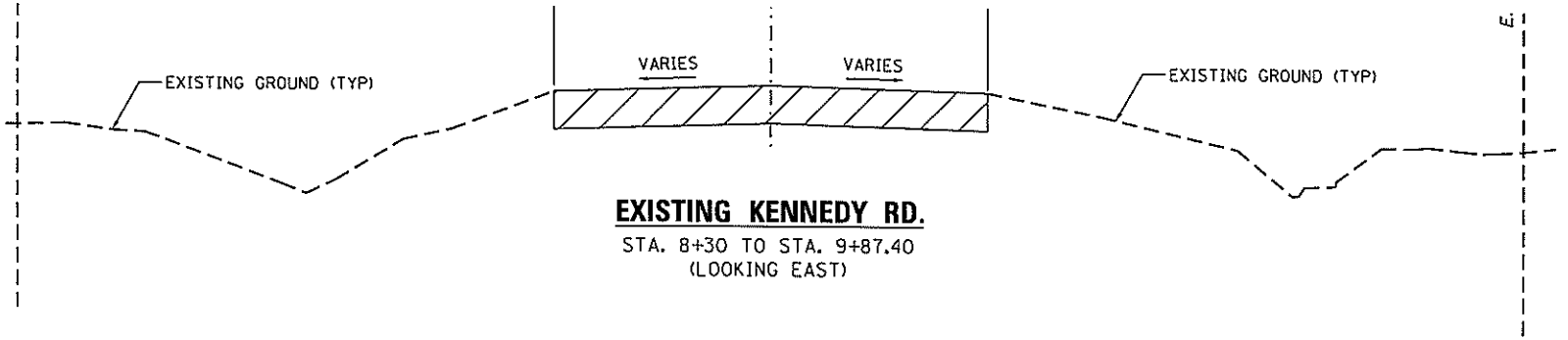
EXISTING CENTER ST.
STA. 55+41.88 TO STA. 59+30
(LOOKING NORTH)



EXISTING CENTER ST.
STA. 10+45 TO STA. 54+99.84
(LOOKING NORTH)

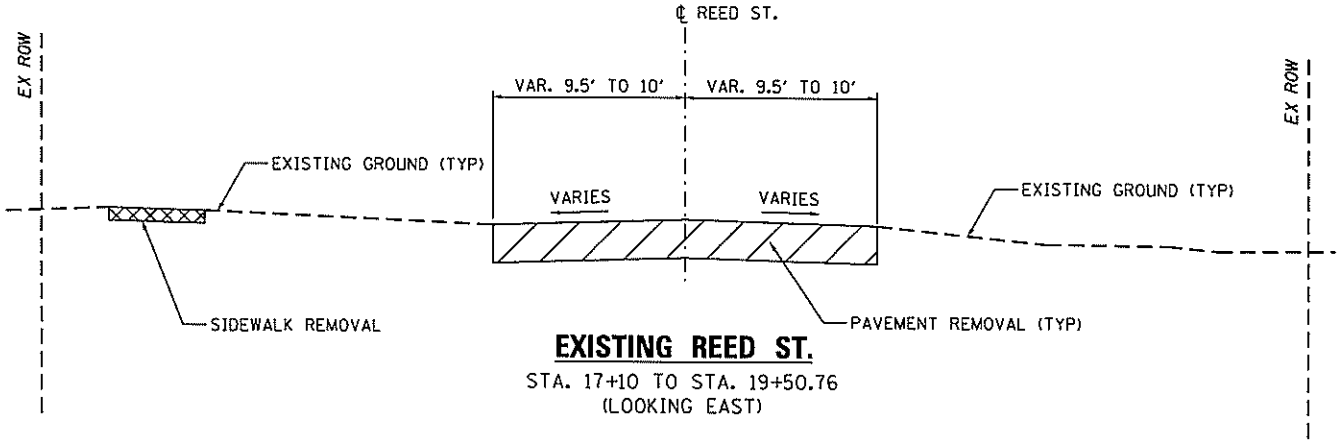


EXISTING FRONT ST. (IL-53)
STA. 104+15 TO STA. 109+55
(LOOKING NORTH EAST)



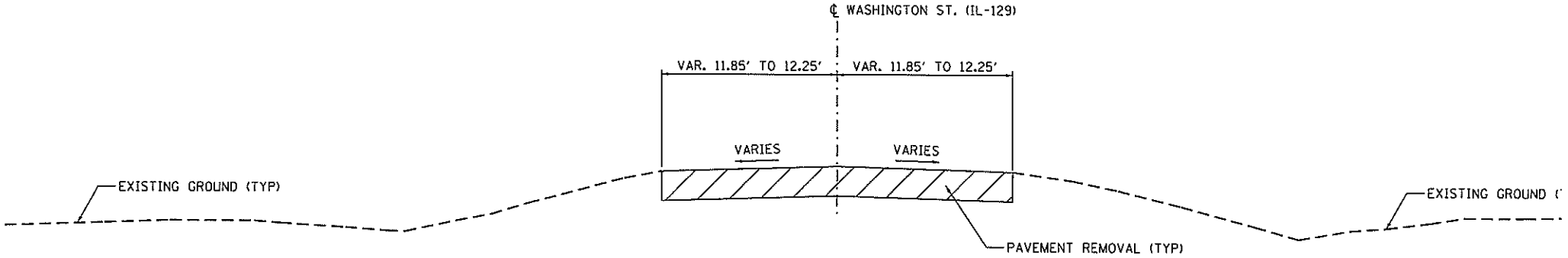
EXISTING KENNEDY RD.

STA. 8+30 TO STA. 9+87.40
(LOOKING EAST)



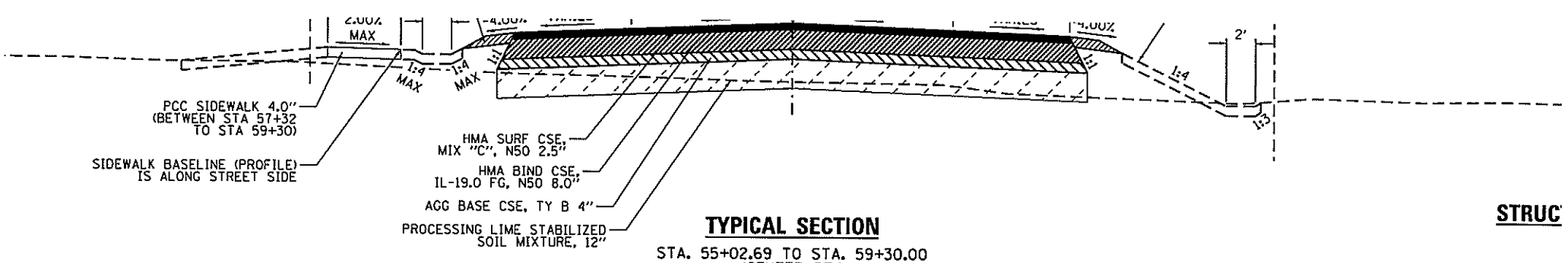
EXISTING REED ST.

STA. 17+10 TO STA. 19+50.76
(LOOKING EAST)



EXISTING WASHINGTON ST. (IL-129)

STA. 198+00 TO STA. 220+75

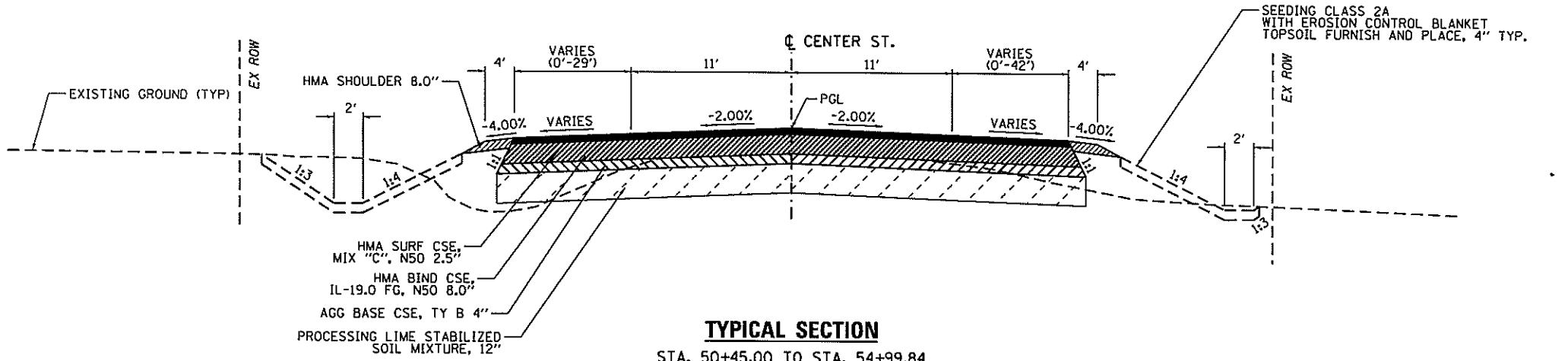


TYPICAL SECTION

STA. 55+02.69 TO STA. 59+30.00
(CENTER ST.)
(LOOKING NORTH)

STRUC

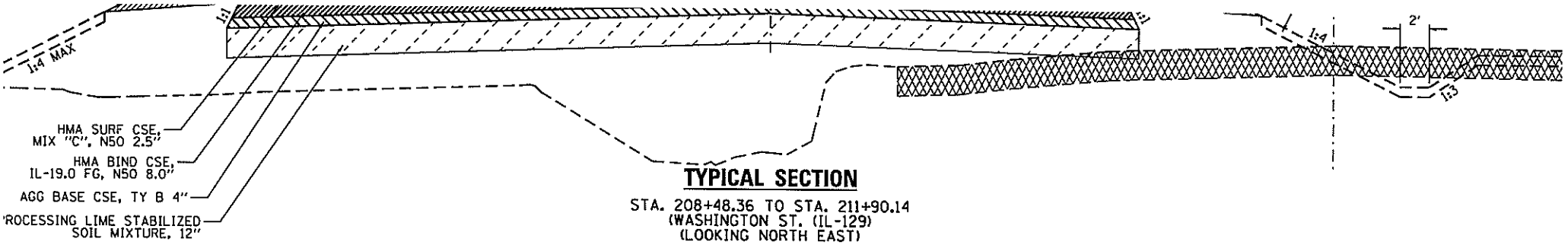
STRUC
PV =
ROAD
PERCE
P =
TRAFF
PG GR
SUBGR



TYPICAL SECTION

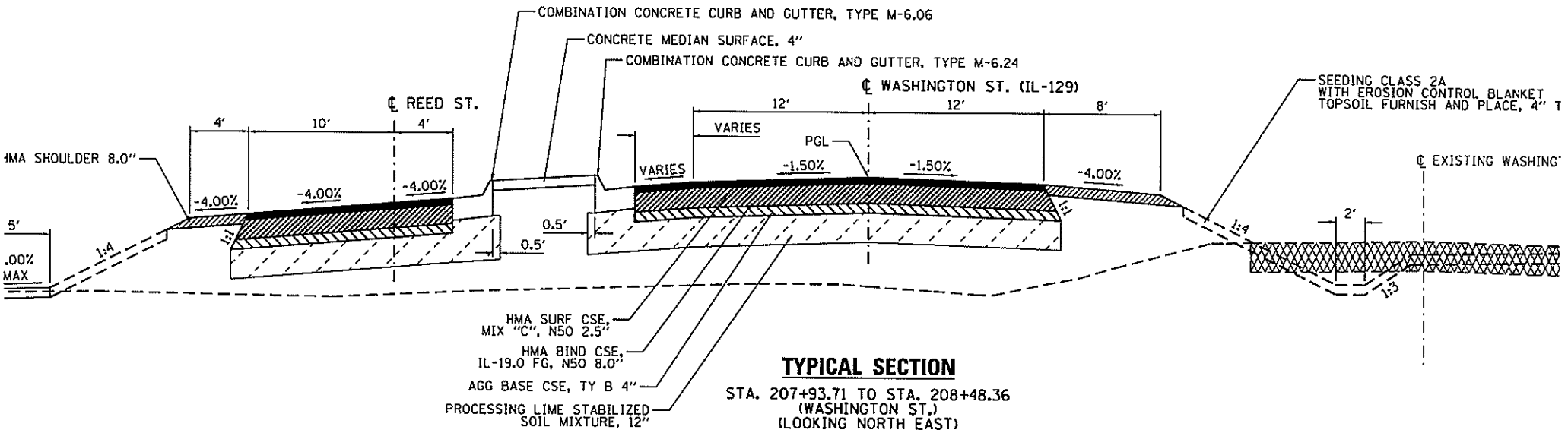
STA. 50+45.00 TO STA. 54+99.84
(CENTER ST.)
(LOOKING NORTH)

PG
DES



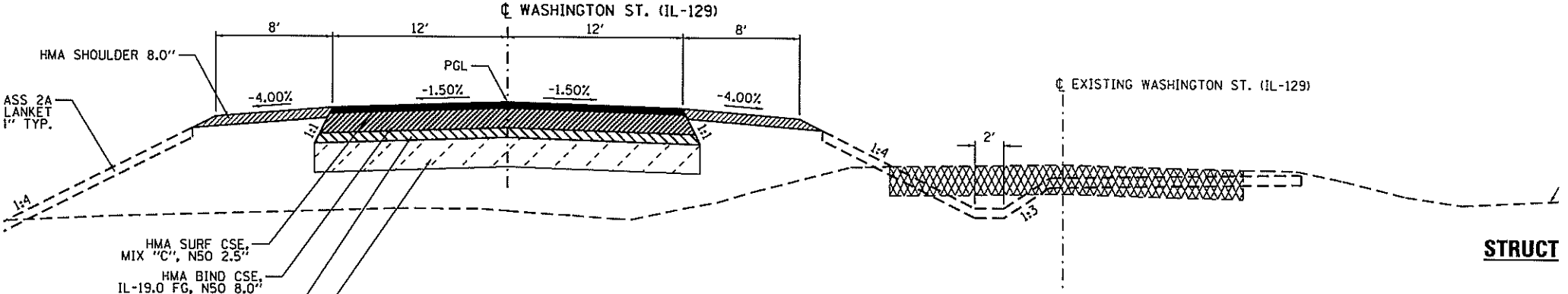
TYPICAL SECTION

STA. 208+48.36 TO STA. 211+90.14
(WASHINGTON ST. (IL-129)
(LOOKING NORTH EAST)



TYPICAL SECTION

STA. 207+93.71 TO STA. 208+48.36
(WASHINGTON ST.)
(LOOKING NORTH EAST)



TYPICAL SECTION

STA. 198+00 TO STA. 207+93.71
STA. 211+90.14 TO STA. 221+75.50
(WASHINGTON ST.)
(LOOKING NORTH EAST)

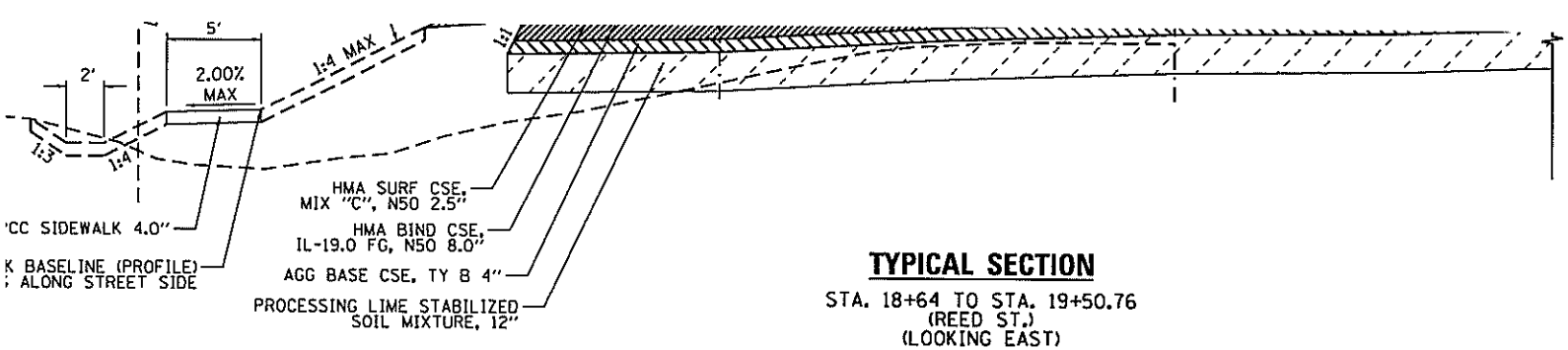
*WASHINGTON ST. (IL-129) - REVERSE CROWN

1.5% 1.5%	207+82.10
1.5% 0%	208+15.60
1.5%	208+49.10

HMA MIXTURE REQUIREMENTS

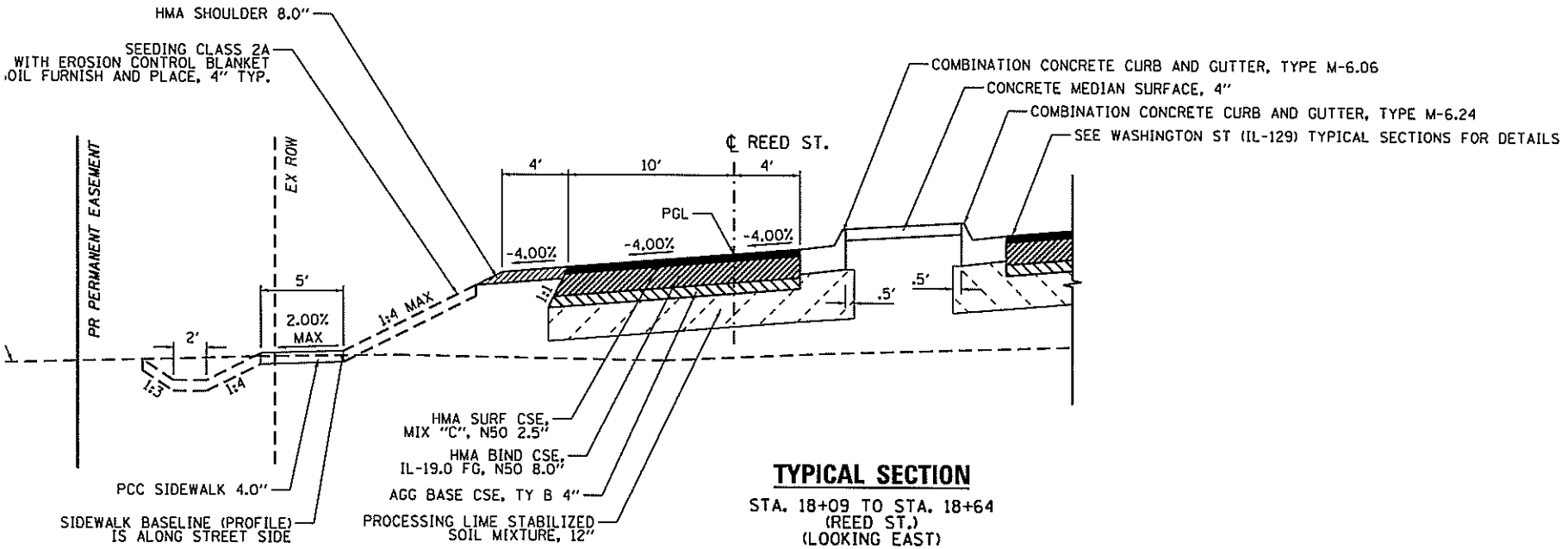
	HMA BINDER	HMA SURFACE	INCIDENTAL HMA
PG GRADE	PG 64 -22	PG 64 -22	PG 64 -22
DESIGN AIR VOIDS	4.0% @ N=50	4.0% @ N=50	4.0% @ N=50

STRUCT
PV =
ROAD /
PERCEN
P = 5(



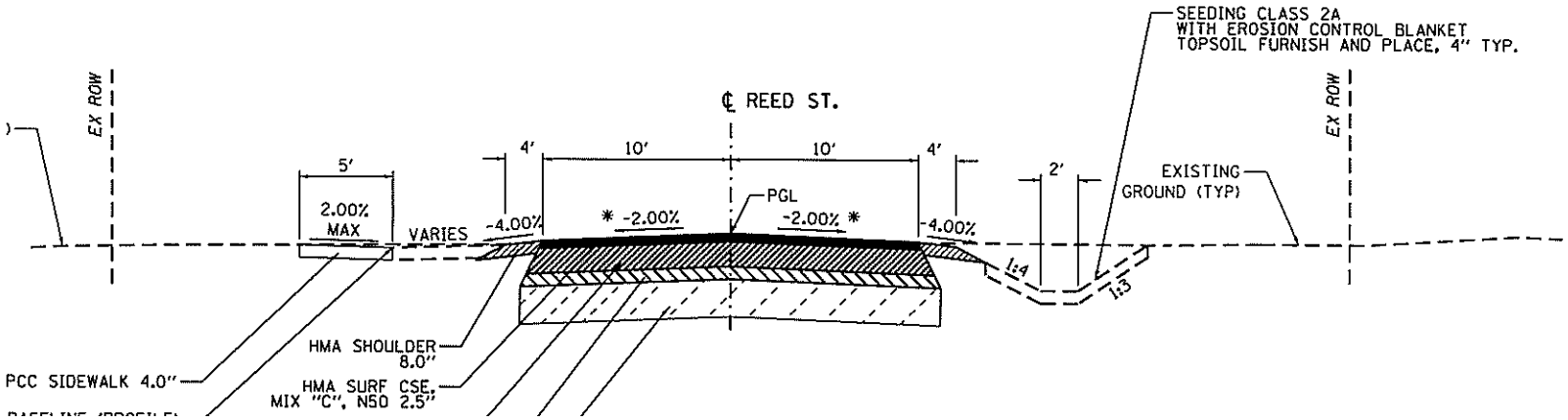
TYPICAL SECTION

STA. 18+64 TO STA. 19+50.76
(REED ST.)
(LOOKING EAST)

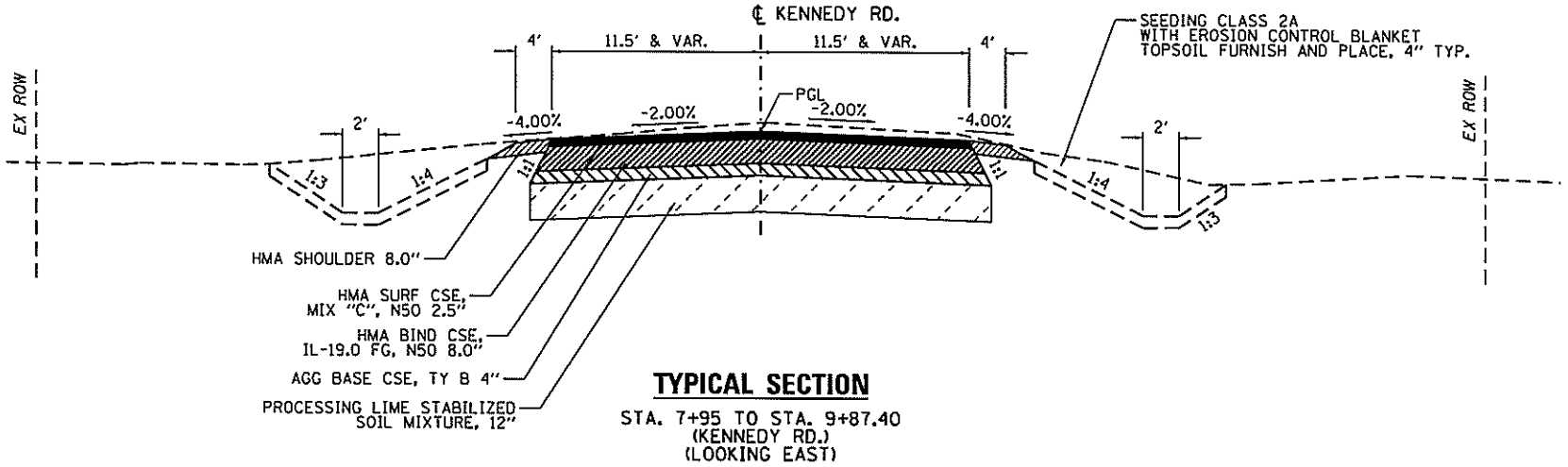


TYPICAL SECTION

STA. 18+09 TO STA. 18+64
(REED ST.)
(LOOKING EAST)

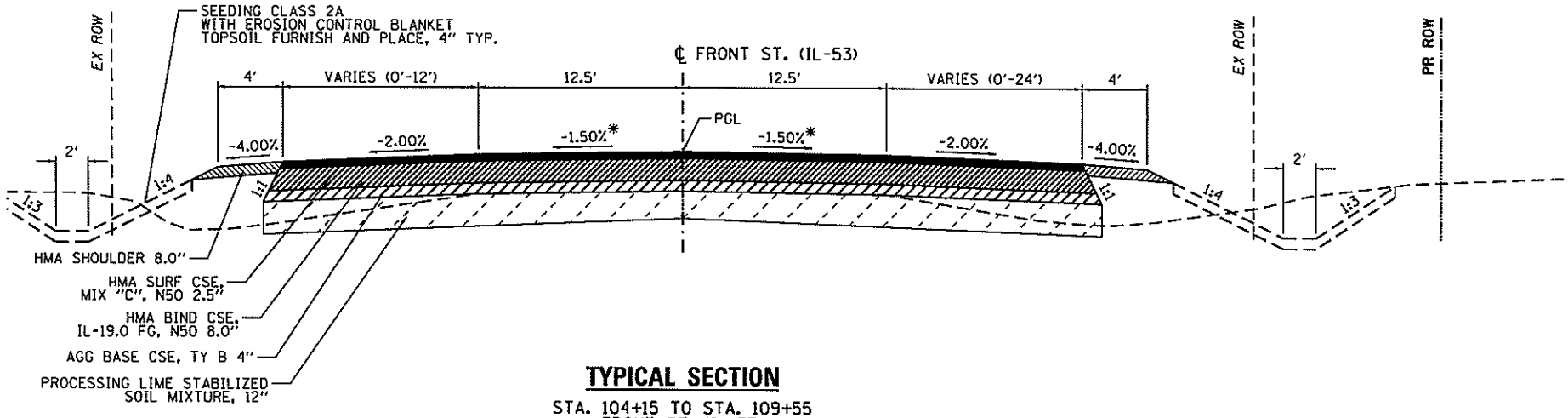


DESIGN AIR VOIDS	4.0% @ N=50	4.0% @ N=50	4.0% @ N=50
MIXTURE COMPOSITION	IL-19.0FG	IL-9.5	IL-9.5
FRICTION AGGREGATE		MIXTURE C	MIXTURE C
DENSITY TEST METHOD	CORES	CORES	SATISFACTION OF ENGINEER



TYPICAL SECTION

STA. 7+95 TO STA. 9+87.40
(KENNEDY RD.)
(LOOKING EAST)



TYPICAL SECTION

STA. 104+15 TO STA. 109+55
FRONT ST. (IL-53)

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 Center Street

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

	ADT	Year
Current:	3,590	2013
Future:	5,450	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	4,075	86.9%	P = 50%
SU =	250	352	7.5%	S = 50%
MU =	750	263	5.6%	M = 50%
		Struct. Design ADT =	4,689	(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) =	1.41	(Actual ADT)	TF rigid (Actual) =	1.97	(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
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	**Job Route**
SECTION	**Job Section**
COUNTY	**Job County**
LOCATION	**Job Location**

FACILITY TYPE: **NON-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	**2.25** IN		

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

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	**$88.31** / TON
HMA TOP BINDER	**$68.70** / TON
HMA LOWER BINDER	**$68.70** / TON
HMA BINDER (LEVELING)	**$78.50** / 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	*	**$42.04**	/ SQ YD	$224,213	~
HMA SURFACE COURSE	(2.00")	601	TONS		**$88.31**	/ TON	$0	
HMA TOP BINDER COURSE	(2.25")	687	TONS		**$68.70**	/ TON	$0	
HMA LOWER BINDER COURSE	(7.75")	2,445	TONS		**$68.70**	/ 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		**$10.00**	/ SQ YD	$53,330	
SHOULDER REMOVAL		3,556	SQ YD		**$15.00**	/ SQ YD	$53,340	

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$524,938
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$113,043

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY				**$0.00**	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix	**$9.96**	/ SQ YD
HMA OVERLAY PVMT		(2.25")		**$10.80**	/ SQ YD
HMA SURFACE MIX		(1.50")	Surface Mix	**$7.46**	/ SQ YD
HMA BINDER MIX		(0.75")	eling Binder Mix	**$3.34**	/ 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	**$79.89**	/ 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	**$78.79**	/ 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	$707,984
FLEXIBLE TOTAL ANNUAL COST PER MILE	$152,461

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	$79.89		$399	
	PWFn =	0.8626		PW =	0.8626	X	$16,799	$14,491
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	$79.89		$2,157	
	PWFn =	0.7441		PW =	0.7441	X	$18,557	$13,808
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	$78.79		$4,176	
	HMA OVERLAY PVMT 2.00"	100.00%	5,333	SQ YD	$9.96		$53,117	
	HMA OVERLAY SHLD 2.00 "	100.00%	3,556	SQ YD	$8.06		$28,672	
	PWFn =	0.6419		PW =	0.6419	X	$112,632	$72,294
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	$79.89		$399	
	PWFn =	0.5537		PW =	0.5537	X	$16,799	$9,301
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	$79.89		$2,157	
	PWFn =	0.4776		PW =	0.4776	X	$18,557	$8,863
	HMA_SD							
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	8,889	SQ YD	$3.00		$26,667	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	107	SQ YD	$78.79		$8,431	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	36	SQ YD	$78.06		$2,810	
	HMA OVERLAY PVMT 2.25 "	100.00%	5,333	SQ YD	$10.80		$57,582	
	HMA OVERLAY SHLD 2.25 "	100.00%	3,556	SQ YD	$9.07		$32,256	
	PWFn =	0.4120		PW =	0.4120	X	$127,746	$52,630
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	$79.89		$399	
	PWFn =	0.3554		PW =	0.3554	X	$16,799	$5,970
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	$79.89		$2,157	
	PWFn =	0.3066		PW =	0.3066	X	$18,557	$5,689
								$183,046
	ROUTINE MAINTENANCE ACTIVITY		0.76	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$183,046
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$39,418

PCC PAVEMENT

JPCP

ROUTE			Job Route	
SECTION			Job Section	
COUNTY			Job County	
LOCATION			Job Location	
FACILITY TYPE			NON-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 2.50 IN

RIGID PAVEMENT TRAFFIC FACTORS		MINIMUM	ACTUAL	USE
		10.05	1.00	10.05
Worksheet Construction Type is	Reconstruction		The Pavement Type is	JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE		COST
JPC PAVEMENT	(10.00")	5,333	SQ YD	$51.88	/ SQ YD	$276,676
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	(~ 3.48")	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	$10.00	/ SQ YD	$53,330
SHOULDER REMOVAL		3,556	SQ YD	$15.00	/ SQ YD	$53,340

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$713,813
RIGID CONSTRUCTION ANNUAL COST PER MILE	$153,717

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")		$11.91	/ SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	$7.46	/ SQ YD
HMA BINDER MIX	(1.00")	aling Binder Mix	$4.46	/ 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	$77.42	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	$82.36	/ 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	$818,393
RIGID TOTAL ANNUAL COST PER MILE	$176,237

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	NON-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 2.5" (PVMT)	100.00%	5,333	SQ YD	$11.91		$63,540	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	3,556	SQ YD	$10.08		$35,840	
	PWFn = 0.4120			PW =	0.4120	X	$139,015	$57,272
YEAR 35	NON-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 2.50"	0.10%	5	SQ YD	$82.36		$412	
	PWFn = 0.3554			PW =	0.3554	X	$18,984	$6,747
YEAR 40	NON-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 2.50"	0.50%	27	SQ YD	$82.36		$2,224	
	PWFn = 0.3066			PW =	0.3066	X	$26,134	$8,012
								$104,580
	ROUTINE MAINTENANCE ACTIVITY		0.76	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$104,580
45	YEAR LIFE CYCLE CRFn = 0.0407852				MAINTENANCE ANNUAL COST PER MILE			$22,521

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : **8/21/15 2:53 PM**

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$713,813	$524,938
		ANNUAL COST PER MILE	$153,717	$113,043
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$104,580	$183,046
		ANNUAL COST PER MILE	$22,521	$39,418
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$818,393	$707,984
		ANNUAL COST PER MILE	$176,237	$152,461

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**HMA**	**$152,461**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**JPCP**	**$176,237**	**15.6%**

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

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 Center Street

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

	ADT	Year
Current:	2,450	2013
Future:	3,790	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	3,080	95.0%	P = 50%
SU =	250	130	4.0%	S = 50%
MU =	750	32	1.0%	M = 50%
		Struct. Design ADT = 3,242	(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) =	0.27	(Actual ADT)	TF rigid (Actual) =	0.36	(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)

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

Class	Traffic Factor ESAL Coefficients: Rigid (Fig. 54-4.C) Csu	Cmu	Flexible (Fig. 54-5.B) 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

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B): Rural P	S	M	Urban 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 Center Street	
FACILITY TYPE			NON-INTERSTATE	
PROJECT LENGTH			2375 FT = = >	0.45 Miles
# OF CENTERLINES			3 CL	
# OF LANES			4 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	0.27	3.17

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$88.31 / TON
HMA TOP BINDER	$68.70 / TON
HMA LOWER BINDER	$68.70 / TON
HMA BINDER (LEVELING)	$78.50 / TON
HMA SHOULDER	$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(10.25")	12,667	SQ YD *	$42.04 / SQ YD	$532,507 ~
HMA SURFACE COURSE	(2.00")	1,424	TONS	$88.31 / TON	$0
HMA TOP BINDER COURSE	(2.25")	1,613	TONS	$68.70 / TON	$0
HMA LOWER BINDER COURSE	(6.00")	4,363	TONS	$68.70 / TON	$0
HMA SHOULDER	(8.00")	1,892	TONS	$72.00 / TON	$136,192 ~
CURB & GUTTER		0	LIN FT	$30.00 / LIN FT	$0
SUBBASE GRAN MATL TY C (TONS)		175	TONS	$25.00 / TON	$4,375
IMPROVED SUBGRADE:	Modified Soil	17,604	SQ YD	$7.00 / SQ YD	$123,228
Reserved For User Supplied Item		0	UNITS	$0.00 / UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00 / UNITS	$0
PAVEMENT REMOVAL		12,667	SQ YD	$15.00 / SQ YD	$190,005
SHOULDER REMOVAL		4,222	SQ YD	$10.00 / SQ YD	$42,220

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$1,028,527
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$93,258

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY				$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix	$9.93 / SQ YD
HMA OVERLAY PVMT		(2.25")		$10.76 / SQ YD
HMA SURFACE MIX		(1.50")	Surface Mix	$7.44 / SQ YD
HMA BINDER MIX		(0.75")	eling Binder Mix	$3.32 / 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	$79.89 / 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	$78.79 / 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	$1,394,754
FLEXIBLE TOTAL ANNUAL COST PER MILE	$126,465

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%	4,750	LIN FT	$2.00	$9,500	
	CNTR LINE JOINT R&S	100.00%	7,125	LIN FT	$2.00	$14,250	
	RNDM / THRM CRACK R&S	50.00%	5,225	LIN FT	$2.00	$10,450	
	PD PVMT PATCH M&F SURF	0.10%	13	SQ YD	$79.89	$1,039	
	PWFn =	0.8626		PW =	0.8626 X	$35,239	$30,397
YEAR 10							
	LONG SHLD JT R&S	100.00%	4,750	LIN FT	$2.00	$9,500	
	CNTR LINE JOINT R&S	100.00%	7,125	LIN FT	$2.00	$14,250	
	RNDM / THRM CRACK R&S	50.00%	5,225	LIN FT	$2.00	$10,450	
	PD PVMT PATCH M&F SURF	0.50%	63	SQ YD	$79.89	$5,033	
	PWFn =	0.7441		PW =	0.7441 X	$39,233	$29,193
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	16,889	SQ YD	$3.00	$50,667	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	127	SQ YD	$78.79	$10,007	
	HMA OVERLAY PVMT 2.00"	100.00%	12,667	SQ YD	$9.93	$125,717	
	HMA OVERLAY SHLD 2.00 "	100.00%	4,222	SQ YD	$8.06	$34,048	
	PWFn =	0.6419		PW =	0.6419 X	$220,439	$141,491
YEAR 20							
	LONG SHLD JT R&S	100.00%	4,750	LIN FT	$2.00	$9,500	
	CNTR LINE JOINT R&S	100.00%	7,125	LIN FT	$2.00	$14,250	
	RNDM / THRM CRACK R&S	50.00%	5,225	LIN FT	$2.00	$10,450	
	PD PVMT PATCH M&F SURF	0.10%	13	SQ YD	$79.89	$1,039	
	PWFn =	0.5537		PW =	0.5537 X	$35,239	$19,511
YEAR 25							
	LONG SHLD JT R&S	100.00%	4,750	LIN FT	$2.00	$9,500	
	CNTR LINE JOINT R&S	100.00%	7,125	LIN FT	$2.00	$14,250	
	RNDM / THRM CRACK R&S	50.00%	5,225	LIN FT	$2.00	$10,450	
	PD PVMT PATCH M&F SURF	0.50%	63	SQ YD	$79.89	$5,033	
	PWFn =	0.4776		PW =	0.4776 X	$39,233	$18,738
	HMA_SD						
YEAR 30	NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	16,889	SQ YD	$3.00	$50,667	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	253	SQ YD	$78.79	$19,934	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	42	SQ YD	$78.06	$3,279	
	HMA OVERLAY PVMT 2.25 "	100.00%	12,667	SQ YD	$10.76	$136,240	
	HMA OVERLAY SHLD 2.25 "	100.00%	4,222	SQ YD	$9.07	$38,304	
	PWFn =	0.4120		PW =	0.4120 X	$248,424	$102,347
YEAR 35							
	LONG SHLD JT R&S	100.00%	4,750	LIN FT	$2.00	$9,500	
	CNTR LINE JOINT R&S	100.00%	7,125	LIN FT	$2.00	$14,250	
	RNDM / THRM CRACK R&S	50.00%	5,225	LIN FT	$2.00	$10,450	
	PD PVMT PATCH M&F SURF	0.10%	13	SQ YD	$79.89	$1,039	
	PWFn =	0.3554		PW =	0.3554 X	$35,239	$12,523
YEAR 40							
	LONG SHLD JT R&S	100.00%	4,750	LIN FT	$2.00	$9,500	
	CNTR LINE JOINT R&S	100.00%	7,125	LIN FT	$2.00	$14,250	
	RNDM / THRM CRACK R&S	50.00%	5,225	LIN FT	$2.00	$10,450	
	PD PVMT PATCH M&F SURF	0.50%	63	SQ YD	$79.89	$5,033	
	PWFn =	0.3066		PW =	0.3066 X	$39,233	$12,027
							$366,227
	ROUTINE MAINTENANCE ACTIVITY		1.80	Lane Miles	0.00	$0	$0
					MAINTENANCE LIFE-CYCLE COST		$366,227
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE		$33,206

PCC PAVEMENT

JPCP

ROUTE			IL 129		
SECTION			0		
COUNTY			Will		
LOCATION			at Center Street		
FACILITY TYPE			NON-INTERSTATE		
PROJECT LENGTH			2375 FT	= = >	0.45 Miles
# OF CENTERLINES			3 CL		
# OF LANES			4 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	0.36	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")	12,667	SQ YD	$51.88	/ SQ YD	$657,164
PAVEMENT REINFORCEMENT		0	SQ YD	$22.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	13,458	SQ YD	$19.00	/ SQ YD	$255,702
PCC SHOULDERS	(9.00" to 9.00")	4,222	SQ YD	$40.00	/ SQ YD	$168,880
CURB & GUTTER		0	LIN FT	$30.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(~ 1.80")	515	TONS	$25.00	/ TON	$12,875
IMPROVED SUBGRADE:	Modified Soil	17,153	SQ YD	$7.00	/ SQ YD	$120,071
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
PAVEMENT REMOVAL		12,667	SQ YD	$15.00	/ SQ YD	$190,005
SHOULDER REMOVAL		4,222	SQ YD	$10.00	/ SQ YD	$42,220

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$1,446,917
RIGID CONSTRUCTION ANNUAL COST PER MILE	$131,195

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")		$11.86	/ SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	$7.44	/ SQ YD
HMA BINDER MIX	(1.00")	Binding Binder Mix	$4.43	/ 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	$77.42	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	$82.36	/ 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	$1,663,120
RIGID TOTAL ANNUAL COST PER MILE	$150,798

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%	13	SQ YD	$150.00		$1,950	
	PWFn = 0.7441			PW =	0.7441	X	$1,950	$1,451
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	25	SQ YD	$150.00		$3,750	
	PWFn = 0.6419			PW =	0.6419	X	$3,750	$2,407
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	253	SQ YD	$150.00		$37,950	
	SHOULDER PATCH CLASS C	0.50%	21	SQ YD	$145.00		$3,045	
	LONGITUDINAL SHLD JT R&S	100.00%	4,750	LIN FT	$2.00		$9,500	
	CENTERLINE JT R&S	100.00%	7,125	LIN FT	$2.00		$14,250	
	PWFn = 0.5537			PW =	0.5537	X	$64,745	$35,848
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	380	SQ YD	$150.00		$57,000	
	SHOULDER PATCH CLASS C	1.00%	42	SQ YD	$145.00		$6,090	
	PWFn = 0.4776			PW =	0.4776	X	$63,090	$30,132
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	507	SQ YD	$150.00		$76,050	
	SHOULDER PATCH CLASS C	1.50%	63	SQ YD	$145.00		$9,135	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	12,667	SQ YD	$11.86		$150,276	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	4,222	SQ YD	$10.08		$42,560	
	PWFn = 0.4120			PW =	0.4120	X	$278,021	$114,541
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	4,750	LIN FT	$2.00		$9,500	
	CENTERLINE JT R&S	100.00%	7,125	LIN FT	$2.00		$14,250	
	RANDOM CRACK R&S	50.00%	4,750	LIN FT	$2.00		$9,500	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	3,034	LIN FT	$2.00		$6,068	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	13	SQ YD	$82.36		$1,071	
	PWFn = 0.3554			PW =	0.3554	X	$40,389	$14,354
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	63	SQ YD	$150.00		$9,450	
	LONGITUDINAL SHLD JT R&S	100.00%	4,750	LIN FT	$2.00		$9,500	
	CENTERLINE JT R&S	100.00%	7,125	LIN FT	$2.00		$14,250	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	4,550	LIN FT	$2.00		$9,100	
	RANDOM CRACK R&S	50.00%	4,750	LIN FT	$2.00		$9,500	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	63	SQ YD	$82.36		$5,189	
	PWFn = 0.3066			PW =	0.3066	X	$56,989	$17,470
								$216,203
	ROUTINE MAINTENANCE ACTIVITY		1.80	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$216,203
45	YEAR LIFE CYCLE CRFn = 0.0407852				MAINTENANCE ANNUAL COST PER MILE			$19,604

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 8/13/15 1:31 PM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$1,446,917	$1,028,527
		ANNUAL COST PER MILE	$131,195	$93,258
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$216,203	$366,227
		ANNUAL COST PER MILE	$19,604	$33,206
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$1,663,120	$1,394,754
		ANNUAL COST PER MILE	$150,798	$126,465

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**HMA**	**$126,465**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**JPCP**	**$150,798**	**19.2%**

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

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: Center St/Kennedy Rd/Reed St
Section:
County: Will
Location: at IL 53
Comments: High Speed Rail
Design Date: 07/30/2015 ONP <-- BY
Modify Date: <-- BY

	ADT	Year
Current:	2,700	2013
Future:	4,240	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	3,430	95.0%	P = 50%
SU =	No Min	144	4.0%	S = 50%
MU =	No Min	36	1.0%	M = 50%
		Struct. Design ADT =	3,610	(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) =	0.31	(Actual ADT)	TF rigid (Actual) =	0.41	(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 = 0.50 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 = 0.41
Edge Support = Tied Shoulder or C.&G.

Rigid Pavt Thick. = 7.75 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 0.41
IBR value = 3

CRCP Thickness = 5.25 in. (Fig. 54-4.N)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible = 0.50
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

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 Center Street [High Speed Rail] 08-17-15\IL 53-129 at Center Street Pavement Design Files\[Center_Kennedy_Reed-IDC