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: December 29, 2014

*Route: IL Route 31
Limits: Spruce Drive to n/o Huntley Road
Section: 08-00083-00-CH
Current target: 03CY16

County: Kane
Contract No.: N/A
Job No.: D-91-386-08

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:

IL 31- Reconstruction of approximately 1,400 feet of IL 31 to provide additional channelization at the intersections at Huntley Road/Main Street and Spruce Drive.

A 20-year pavement analysis was performed on the above segment. We recommend a mechanistic-rigid pavement design based on the life cycle cost analysis which favors PCC pavement by 14%.

IL 31
Reconstruction
PCC Curb and Gutter (Tied)
9 ¾" PCC Pavement[1]
12" Aggregate Subgrade Improvement[2]

[1]Designer Note 1: Use pay item **42000416, PORTLAND CEMENT CONCRETE PAVEMENT 9 ¾" (JOINTED),** paid for in square yards.

[2]Designer Note 2: Use pay item **30300112, AGGREGATE SUBGRADE IMPROVEMENT, 12"**, paid in square yards.

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

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

Illinois Department of Transportation

To:	John Fortmann	Attn: District One
From:	John D. Baranzelli	
Subject:	Pavement Design	
Date:	January 6, 2015	

FAU Route 3887 (IL 31)
Kane County
From Spruce Drive to north of Huntley Road

The project, submitted to BDE by memo dated December 29, 2014, will reconstruct IL 31 from Spruce Drive to north of Huntley Road. Additional channelization will be provided at the intersections of Huntley Road/Main Street and Spruce Drive. The LCCA favored a rigid design for IL 31 by greater than 10%. The project is not subject to alternate bidding, and did not need consideration by the Pavement Selection Committee.

The approved pavement design is as follows:

<u>IL 31 (Pavement Reconstruction)</u>

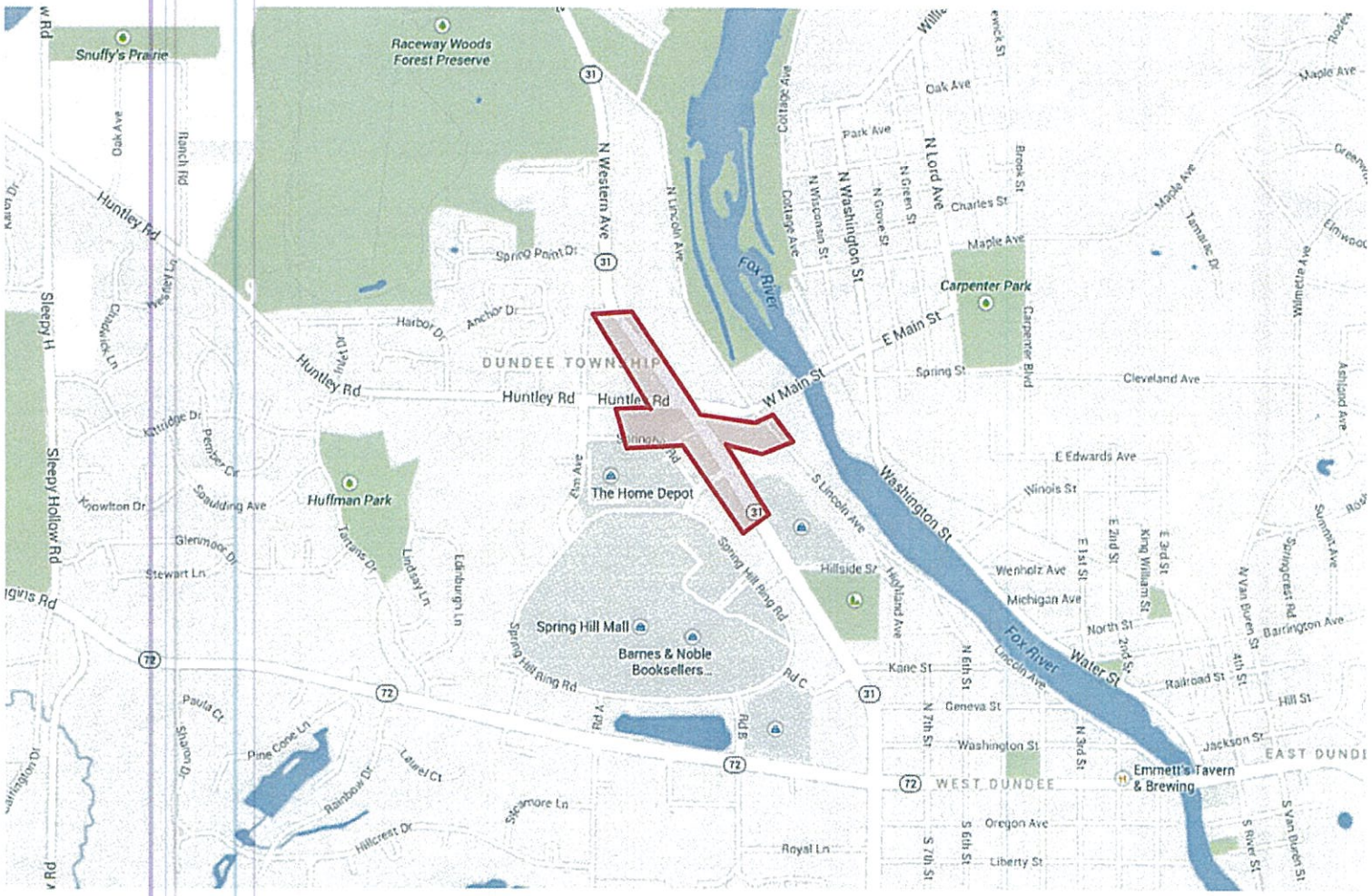
9.75 inches of Jointed PCC Pavement with Tied PCC Curb & Gutter
12 inches of Aggregate Subgrade Improvement

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

PROJECT LOCATION – ILLINOIS ROUTE 31 AT HUNTLEY ROAD

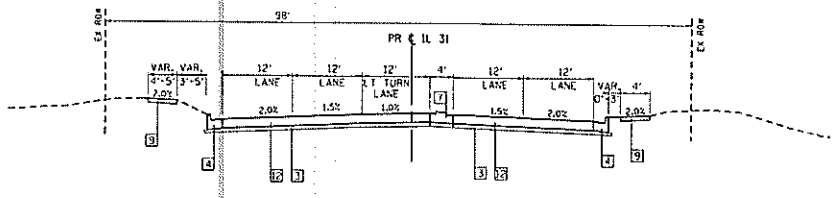
VILLAGE OF CARPENTERSVILLE

KANE COUNTY



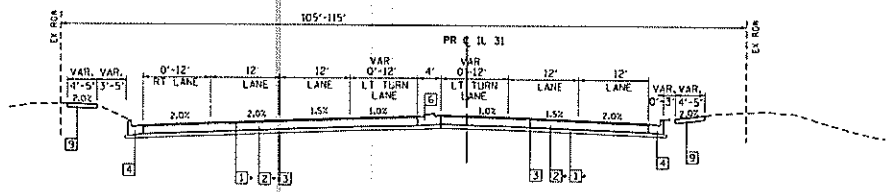
EXISTING TYPICAL SECTION LEGEND

1. HOT-MIX ASPHALT SURFACE COURSE, 1-1/2"
2. HOT-MIX ASPHALT BASE COURSE, 12"
3. SUB-BASE GRANULAR MATERIAL, TYPE B, 4"
4. COMB CONC C&G, TYPE B-6.24
5. COMB CONC C&G, TYPE M-2.12
6. CONCRETE MEDIAN, TYPE W-2
7. CONCRETE MEDIAN, TYPE SB-9.12
8. STABILIZED MEDIAN, 12"
9. SIDEWALK, 5"
10. COMB CONC C&G, TYPE M-6.12
11. OMITTED
12. PORTLAND CEMENT CONCRETE PAVEMENT, 8"
13. COMB CONC C&G, TYPE B-6.12
14. AGGREGATE SHOULDERS, TYPE B



WESTERN AVENUE (IL 31)

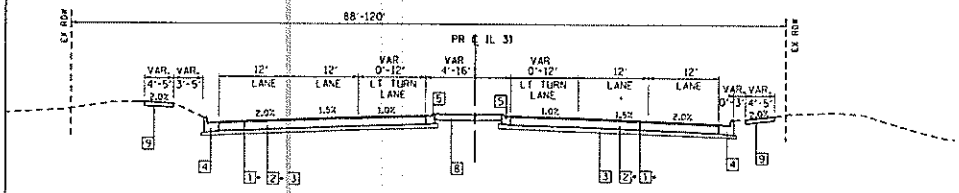
STA 519+00.00 TO STA 521+22.85



WESTERN AVENUE (IL 31)

STA 509+67.35 TO STA 513+30.91
STA 516+37.54 TO STA 519+00.00

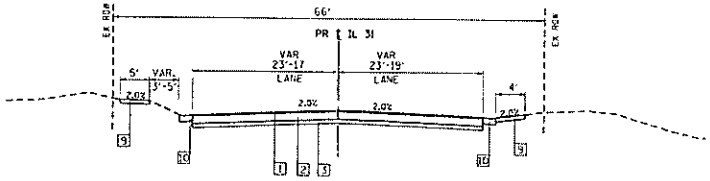
* 12 STA 516+37.94 TO STA 519+00.00



WESTERN AVENUE (IL 31)

STA 506+45.00 TO STA 509+67.35
STA 513+30.91 TO STA 516+37.54
STA 521+22.85 TO STA 526+36.34

* 12 STA 516+37.94 TO STA 519+00.00



WESTERN AVENUE (IL 31)

STA 526+36.34 TO STA 530+30.00

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EXISTING TYPICAL SECTION LEGEND

1. HOT-MIX ASPHALT SURFACE COURSE, 1-1/2"
2. HOT-MIX ASPHALT BASE COURSE, 12"
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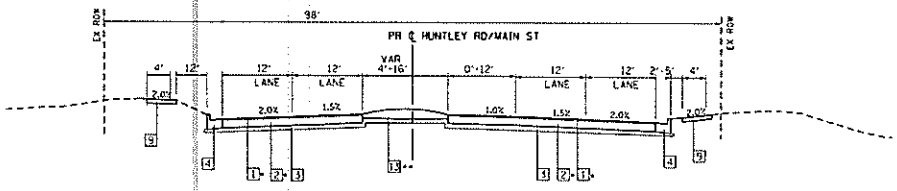
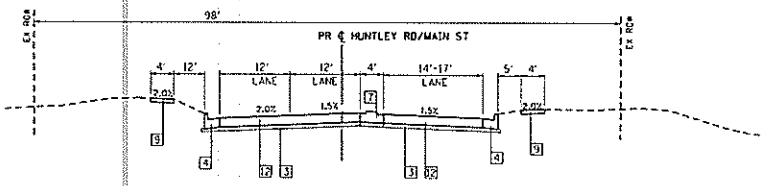
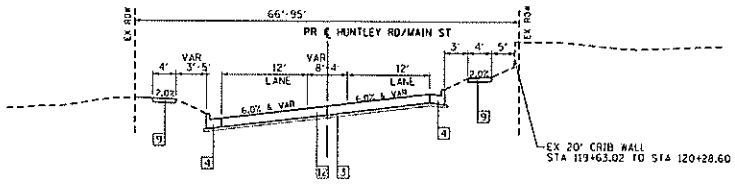


HUNTLEY ROAD/MAIN STREET
STA 106+36.69 TO STA 115+50.00

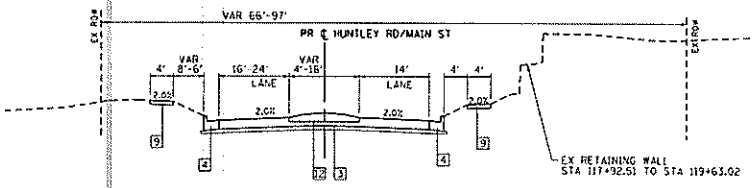
* 12 STA 113+13.96 TO STA 115+50.00
** 7 STA 106+36.69 TO STA 108+57.04
STA 113+89.29 TO STA 115+50.00



HUNTLEY ROAD/MAIN STREET
STA 115+50.00 TO STA 117+20.61



MAIN STREET
STA 119+63.02 TO STA 121+07.00



MAIN STREET
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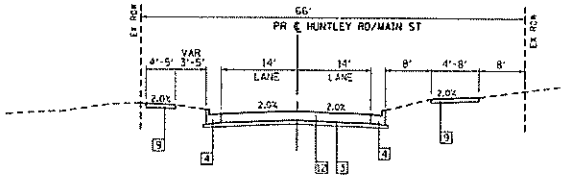

MAIN STREET
STA 121+07.00 TO STA 125+77.00

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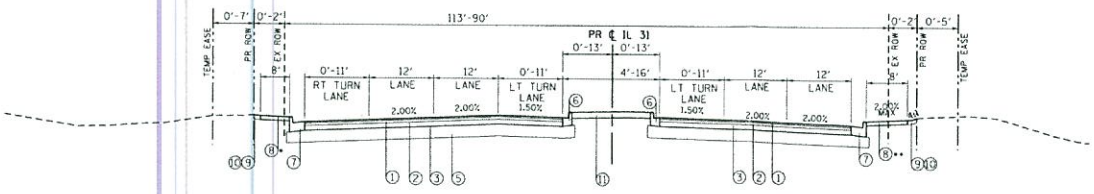
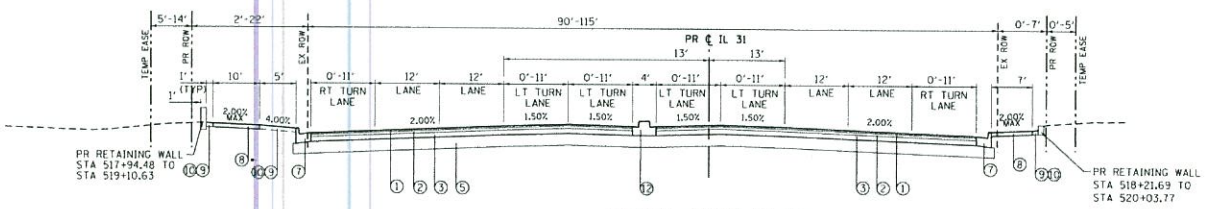


WESTERN AVENUE (IL 31)

STA 506+45.00 TO STA 509+55.15
STA 511+09.58 TO STA 513+45.13
STA 522+65.00 TO STA 526+15.00

• 10' MULTI USE PATH STA 506+45.00 TO STA 509+55.15
STA 511+09.58 TO STA 513+45.13
8' SIDEWALK (ADJACENT TO CURB) STA 522+65.00 TO STA 526+15.00

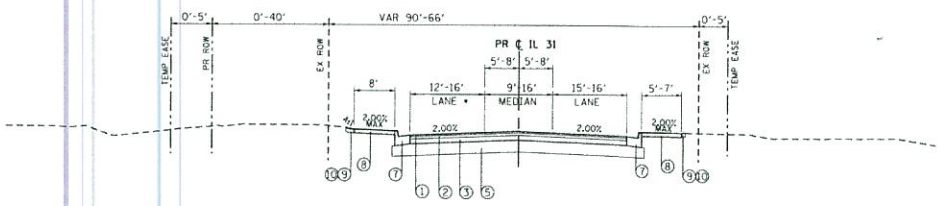
•• EXISTING SIDEWALK TO REMAIN STA 506+45.00 TO STA 509+55.15



WESTERN AVENUE (IL 31)

STA 509+55.15 TO STA 511+09.58
STA 513+45.13 TO STA 522+65.00

• 10' MULTI USE PATH STA 509+55.15 TO STA 511+09.58
STA 513+45.13 TO STA 519+00.00
8' SIDEWALK (ADJACENT TO CURB) STA 519+00.00 TO STA 522+65.00



WESTERN AVENUE (IL 31)

STA 526+15.00 TO STA 530+30.00

• PROPOSED WIDENING FOR U-TURN STA 526+45.00 TO STA 528+95.00
SEE PLAN AND PROFILE FOR ADDITIONAL INFORMATION

PROPOSED TYPICAL SECTION LEGEND

1. HOT-MIX ASPHALT SURFACE COURSE
2. HOT-MIX ASPHALT BINDER COURSE
3. HOT-MIX ASPHALT BASE COURSE
4. LEVELING BINDER (MACHINE METHOD
5. AGG SUBGRADE
6. COMB CONC C&G, TYPE B-6.12
7. COMB CONC C&G, TYPE B-6.24
8. PORTLAND CEMENT CONC SW, 5"
9. TOPSOIL FURNISH AND PLACE, 4"
10. SODDING, SALT TOLERANT
11. CONCRETE MEDIAN SURFACE, 4"
12. CONCRETE MEDIAN, TYPE SB-6.12
13. HOT-MIX ASPHALT MULTI USE PATH

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PROJECT CONTACT: Eric Nelson
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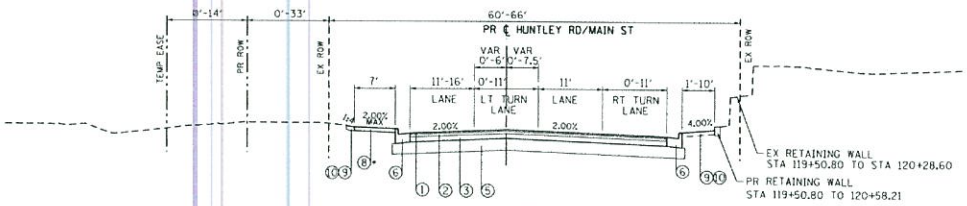
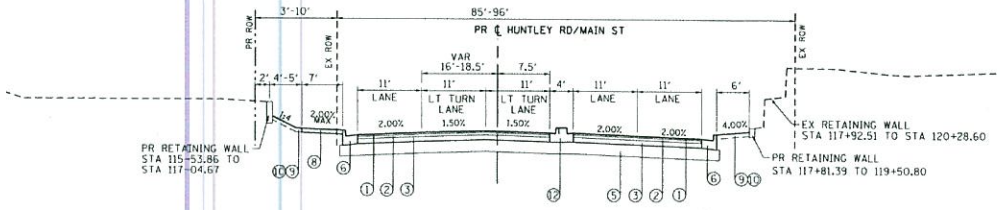


MAIN STREET

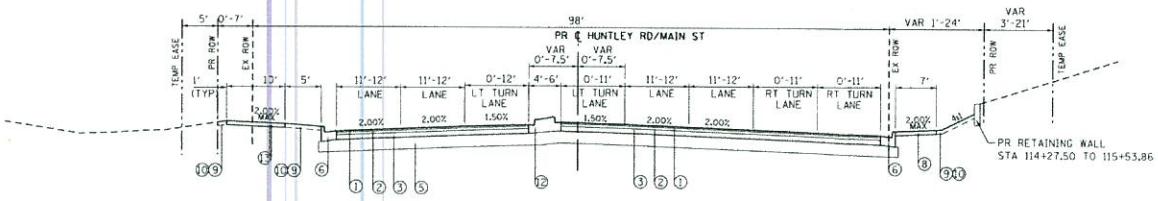
STA 119+50.80 TO STA 125+77.00

* SIDEWALK ENDS STA 121+56.08



HUNTLEY ROAD

STA 115+53.86 TO STA 119+50.80



HUNTLEY ROAD

STA 106+36.69 TO STA 115+53.86

PROPOSED TYPICAL SECTION LEGEND

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10. SODDING, SALT TOLERANT
11. CONCRETE MEDIAN SURFACE, 4"
12. CONCRETE MEDIAN, TYPE SB-6.12
13. HOT-MIX ASPHALT MULTI USE PATH

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Illinois Professional Design Firm # 184-001322

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		CONTRACT NO.		

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT

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EXISTING TYPICAL SECTION LEGEND

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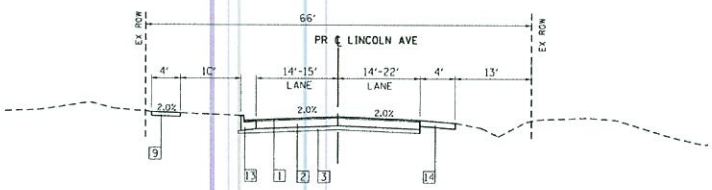
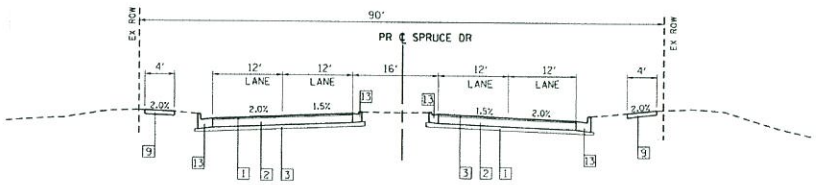


LINCOLN AVENUE

STA 602+31.00 TO STA 613+00.96



SPRUCE DRIVE

STA 201+32.97 TO STA 202+41.18

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PROPOSED TYPICAL SECTION LEGEND

1. HOT-MIX ASPHALT SURFACE COURSE
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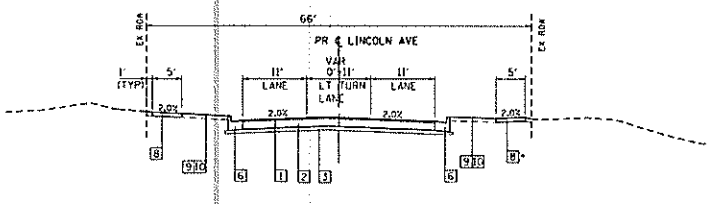
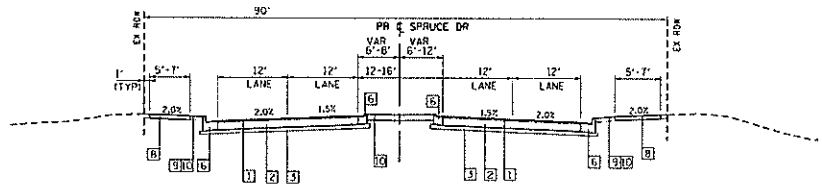


LINCOLN AVENUE

STA 602+31.00 TO STA 613+00.96

* SIDEWALK ENDS STA 607+62.94



SPRUCE DRIVE

STA 201+32.97 TO STA 202+41.18

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

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 02/10/2015

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: IL 31
Section: 08-00083-00-CH
County: Kane
Location: at Huntley Road

Comments: Local Roads project to reconstruct IL 31

Design Date: 12/09/2014 ONP <-- BY
Modify Date: <-- BY

	ADT	Year
Current:	30,500	2008
Future:	37,000	2030

Facility Type: Other Marked State Route

# of Lanes = 4

Road Class: I

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	33,132	92.5%	P =	32%
SU =	250	1,612	4.5%	S =	45%
MU =	750	1,075	3.0%	M =	45%
Struct. Design ADT =		35,818	(2026)		

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = 0.15
Csu = 132.5
Cmu = 482.53
TF flexible (Actual) = 6.62 (Actual ADT)
TF flexible (Min) = 3.56 (Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv = 0.15
Csu = 143.81
Cmu = 696.42
TF rigid (Actual) = 8.85 (Actual ADT)
TF rigid (Min) = 5.02 (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Goto Map

Use TF flexible = 6.62
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)
HMA Mixture Temp. = 74.0 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 720 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 70 (Fig. 54-5.E)

Goto Map

Full Depth HMA Design Thickness = 11.25 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 14.50 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 11.25 inches

JPC Pavement

Use TF rigid = 8.85
Edge Support = Tied Shoulder or C.&G.

Rigid Pavt Thick. = 9.75 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 8.85
IBR value = 3

CRCP Thickness = 8.75 in. (Fig. 54-4.M)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Goto Map

Use TF flexible = 6.62
HMA Overlay Design Thickness = 8.50 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: 02/10/2015

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE	IL 31
SECTION	08-00083-00-CH
COUNTY	Kane
LOCATION	at Huntley Road
FACILITY TYPE	NON-INTERSTATE

PROJECT LENGTH		1365 FT	==> 0.26 Miles
# OF CENTERLINES		2 CL	
# OF LANES		4 LANES	
# OF EDGES		4 EP	
LANE WIDTH - AVERAGE		12 FT	
SHOULDER WIDTH	HMA Inside	0 FT	
	HMA Outside	0 FT	
	Total Width of Paved Shoulders	0 FT	

PAVEMENT THICKNESS (FLEXIBLE)	11.25 IN	14.50 IN MAX
SHOULDER THICKNESS	8.00 IN	Standard Design
POLICY OVERLAY THICKNESS	2.25 IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	3.56	6.62	6.62

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$105.47 / TON
HMA TOP BINDER	$89.90 / TON
HMA LOWER BINDER	$71.48 / TON
HMA BINDER (LEVELING)	$89.90 / TON
HMA SHOULDER	$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST	
HMA PAVEMENT (FULL-DEPTH)	(11.25")	7,280	SQ YD	*	$51.66	/ SQ YD	$376,085	~
HMA SURFACE COURSE	(2.00")	821	TONS		$105.47	/ TON	$0	
HMA TOP BINDER COURSE	(2.25")	937	TONS		$89.90	/ TON	$0	
HMA LOWER BINDER COURSE	(7.00")	3,007	TONS		$71.48	/ TON	$0	
HMA SHOULDER	(8.00")	0	TONS		$72.00	/ TON	$0	~
CURB & GUTTER		5,460	LIN FT	*	$30.00	/ LIN FT	$163,800	
SUBBASE GRAN MATL TY C (TONS)		50	TONS		$25.00	/ TON	$1,250	
IMPROVED SUBGRADE:	Aggregate	8,152	SQ YD		$7.00	/ SQ YD	$57,064	
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0	
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0	
PAVEMENT REMOVAL		7,280	SQ YD		$15.00	/ SQ YD	$109,200	
SHOULDER REMOVAL		0	SQ YD		$0.00	/ SQ YD	$0	

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$707,399
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$111,601

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY			$0.00	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix	$11.89	/ SQ YD
HMA OVERLAY PVMT	(2.25")		$12.73	/ SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	$8.91	/ SQ YD
HMA BINDER MIX	(0.75")	eling Binder Mix	$3.82	/ SQ YD
HMA OVERLAY SHLD (Year 30)	(2.25")	Shoulder Mix	$9.07	/ SQ YD
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	$8.06	/ SQ YD
MILLING (2.00 IN)			$3.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill Surf)	Surface Mix	$81.81	/ 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	$80.07	/ 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	$912,134
FLEXIBLE TOTAL ANNUAL COST PER MILE	$143,900

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 02/10/15

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%	5,460	LIN FT	$2.00		$10,920	
	CNTR LINE JOINT R&S	100.00%	2,730	LIN FT	$2.00		$5,460	
	RNDM / THRM CRACK R&S	50.00%	3,003	LIN FT	$2.00		$6,006	
	PD PVMT PATCH M&F SURF	0.10%	7	SQ YD	$81.81		$573	
	PWFn =	0.8626		PW =	0.8626	X	$22,959	$19,805
YEAR 10								
	LONG SHLD JT R&S	100.00%	5,460	LIN FT	$2.00		$10,920	
	CNTR LINE JOINT R&S	100.00%	2,730	LIN FT	$2.00		$5,460	
	RNDM / THRM CRACK R&S	50.00%	3,003	LIN FT	$2.00		$6,006	
	PD PVMT PATCH M&F SURF	0.50%	36	SQ YD	$81.81		$2,945	
	PWFn =	0.7441		PW =	0.7441	X	$25,331	$18,849
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	7,280	SQ YD	$3.00		$21,840	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	73	SQ YD	$80.07		$5,845	
	HMA OVERLAY PVMT 2.00"	100.00%	7,280	SQ YD	$11.89		$86,593	
	HMA OVERLAY SHLD 2.00 "	100.00%	0	SQ YD	$8.06		$0	
	PWFn =	0.6419		PW =	0.6419	X	$114,278	$73,351
YEAR 20								
	LONG SHLD JT R&S	100.00%	5,460	LIN FT	$2.00		$10,920	
	CNTR LINE JOINT R&S	100.00%	2,730	LIN FT	$2.00		$5,460	
	RNDM / THRM CRACK R&S	50.00%	3,003	LIN FT	$2.00		$6,006	
	PD PVMT PATCH M&F SURF	0.10%	7	SQ YD	$81.81		$573	
	PWFn =	0.5537		PW =	0.5537	X	$22,959	$12,712
YEAR 25								
	LONG SHLD JT R&S	100.00%	5,460	LIN FT	$2.00		$10,920	
	CNTR LINE JOINT R&S	100.00%	2,730	LIN FT	$2.00		$5,460	
	RNDM / THRM CRACK R&S	50.00%	3,003	LIN FT	$2.00		$6,006	
	PD PVMT PATCH M&F SURF	0.50%	36	SQ YD	$81.81		$2,945	
	PWFn =	0.4776		PW =	0.4776	X	$25,331	$12,098
	HMA_SD							
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	7,280	SQ YD	$3.00		$21,840	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	146	SQ YD	$80.07		$11,690	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	0	SQ YD	$78.06		$0	
	HMA OVERLAY PVMT 2.25 "	100.00%	7,280	SQ YD	$12.73		$92,679	
	HMA OVERLAY SHLD 2.25 "	100.00%	0	SQ YD	$9.07		$0	
	PWFn =	0.4120		PW =	0.4120	X	$126,209	$51,996
YEAR 35								
	LONG SHLD JT R&S	100.00%	5,460	LIN FT	$2.00		$10,920	
	CNTR LINE JOINT R&S	100.00%	2,730	LIN FT	$2.00		$5,460	
	RNDM / THRM CRACK R&S	50.00%	3,003	LIN FT	$2.00		$6,006	
	PD PVMT PATCH M&F SURF	0.10%	7	SQ YD	$81.81		$573	
	PWFn =	0.3554		PW =	0.3554	X	$22,959	$8,159
YEAR 40								
	LONG SHLD JT R&S	100.00%	5,460	LIN FT	$2.00		$10,920	
	CNTR LINE JOINT R&S	100.00%	2,730	LIN FT	$2.00		$5,460	
	RNDM / THRM CRACK R&S	50.00%	3,003	LIN FT	$2.00		$6,006	
	PD PVMT PATCH M&F SURF	0.50%	36	SQ YD	$81.81		$2,945	
	PWFn =	0.3066		PW =	0.3066	X	$25,331	$7,765
								$204,735
	ROUTINE MAINTENANCE ACTIVITY		1.03	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$204,735
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$32,299

PCC PAVEMENT

JPCP

ROUTE	IL 31
SECTION	08-00083-00-CH
COUNTY	Kane
LOCATION	at Huntley Road
FACILITY TYPE	NON-INTERSTATE

PROJECT LENGTH			1365 FT	==> 0.26 Miles
# OF CENTERLINES			2 CL	
# OF LANES			4 LANES	
# OF EDGES			4 EP	
LANE WIDTH - AVERAGE			12 FT	
SHOULDER WIDTH	PCC	Inside	0 FT	
	PCC	Outside	0 FT	
	Total Width of Paved Shoulders		0 FT	

PAVEMENT THICKNESS (RIGID)	JPCP	9.75 IN	TIED SHLD
SHOULDER THICKNESS		9.75 IN	

POLICY OVERLAY THICKNESS 2.50 IN

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	5.02	8.85	8.85
Worksheet Construction Type is Reconstruction		The Pavement Type is	JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST
JPC PAVEMENT	(9.75")	7,280	SQ YD		$48.33	/ SQ YD	$351,842
PAVEMENT REINFORCEMENT		0	SQ YD		$22.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	0	SQ YD	*	$19.00	/ SQ YD	$0
PCC SHOULDERS	(9.75" to 9.75")	0	SQ YD		$40.00	/ SQ YD	$0
CURB & GUTTER		5,460	LIN FT	*	$30.00	/ LIN FT	$163,800
SUBBASE GRAN MATL TY C	(~ 0.00")	0	TONS		$25.00	/ TON	$0
IMPROVED SUBGRADE:	Aggregate	7,583	SQ YD		$7.00	/ SQ YD	$53,081
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0
PAVEMENT REMOVAL		7,280	SQ YD		$15.00	/ SQ YD	$109,200
SHOULDER REMOVAL		0	SQ YD		$0.00	/ SQ YD	$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$677,923
RIGID CONSTRUCTION ANNUAL COST PER MILE	$106,951

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")		$14.01	/ SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	$8.91	/ SQ YD
HMA BINDER MIX	(1.00")	Binding Binder Mix	$5.10	/ 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	$78.86	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	$84.77	/ 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	$797,071
RIGID TOTAL ANNUAL COST PER MILE	$125,748

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 02/10/15

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%	146	SQ YD	$150.00		$21,900	
	SHOULDER PATCH CLASS C	0.50%	0	SQ YD	$145.00		$0	
	LONGITUDINAL SHLD JT R&S	100.00%	5,460	LIN FT	$2.00		$10,920	
	CENTERLINE JT R&S	100.00%	2,730	LIN FT	$2.00		$5,460	
	PWFn =	0.5537		PW =	0.5537	X	$38,280	$21,195
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	218	SQ YD	$150.00		$32,700	
	SHOULDER PATCH CLASS C	1.00%	0	SQ YD	$145.00		$0	
	PWFn =	0.4776		PW =	0.4776	X	$32,700	$15,618
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	291	SQ YD	$150.00		$43,650	
	SHOULDER PATCH CLASS C	1.50%	0	SQ YD	$145.00		$0	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	7,280	SQ YD	$14.01		$101,992	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	0	SQ YD	$10.08		$0	
	PWFn =	0.4120		PW =	0.4120	X	$145,642	$60,003
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	5,460	LIN FT	$2.00		$10,920	
	CENTERLINE JT R&S	100.00%	2,730	LIN FT	$2.00		$5,460	
	RANDOM CRACK R&S	50.00%	2,730	LIN FT	$2.00		$5,460	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	1,747	LIN FT	$2.00		$3,494	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	7	SQ YD	$84.77		$593	
	PWFn =	0.3554		PW =	0.3554	X	$25,927	$9,214
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	36	SQ YD	$150.00		$5,400	
	LONGITUDINAL SHLD JT R&S	100.00%	5,460	LIN FT	$2.00		$10,920	
	CENTERLINE JT R&S	100.00%	2,730	LIN FT	$2.00		$5,460	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	2,621	LIN FT	$2.00		$5,242	
	RANDOM CRACK R&S	50.00%	2,730	LIN FT	$2.00		$5,460	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	36	SQ YD	$84.77		$3,052	
	PWFn =	0.3066		PW =	0.3066	X	$35,534	$10,893
								$119,148
	ROUTINE MAINTENANCE ACTIVITY		1.03	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$119,148
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$18,797

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 12/15/14 10:23 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$677,923	$707,399
		ANNUAL COST PER MILE	$106,951	$111,601
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$119,148	$204,735
		ANNUAL COST PER MILE	$18,797	$32,299
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$797,071	$912,134
		ANNUAL COST PER MILE	$125,748	$143,900

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**JPCP**	**$125,748**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**HMA**	**$143,900**	**14.4%**

P:\Pavement Design Stuff\D-1\IL 31 from Spruce Drive to Huntley Road\[IL 31 - Mechanistic Design LCCA 09-05-13.xlsm]LifeCycleCost