Illinois Department of Transportation

To:	Anthony J. Quigley	Attn: John Baczek	
From:	Jack A. Elston	By: Michael Brand	Michael Brand
Subject:	Pavement Design Approval		
Date:	June 2, 2020		

Route:	IL 72	Job No.:	D-91-254-18
Section:	32R-DR-1	Contract No.:	62G11
County:	Kane	Target Letting:	Sept 2020
Limits:	Intersection with State St. and Getzelman Rd.		

We have reviewed the pavement design for the above referenced project which was submitted on May 28, 2020. The project will reconstruct the intersection.

We concur with the district this is a special design due to the high stress induced by having more than 200 MU's in the design lanes. We also agree with the District's recommendation to use a mechanistic flexible pavement design for consistency with the adjacent overlaid sections.

In summary, the approved pavement design is as follows:

<u>IL 72 and Getzelman Road - Reconstruction</u>
9.75" Full-Depth HMA with PCC Curb & Gutter / portions with HMA Shoulders
12" Aggregate Subgrade Improvement

<u>State Street - Reconstruction</u>
8.75" Full Depth HMA with PCC Curb & Gutter
12" Aggregate Subgrade Improvement

If you have any questions, please contact Mike Brand at (217) 782-7651.

Illinois Department of Transportation

Memorandum

To: Jack Elston Attn: Michael Brand

From: Jose A. Dominguez By: Ojas Patel

Subject: Pavement Analysis*

Date: May 28, 2020

*Route: Illinois Route 72
Limits: at State St./Getzelman Rd.
Section: 32R-DR-1
Current target: 09CY20

County: Kane
Contract No.: 62G11
Job No.: D-91-254-18

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:

Reconstruction of the IL 72 @ State St./Getzelman Rd. intersection including culvert replacement at the north and east legs.

A 20-year pavement analysis was performed on the above segments. IL 72 at State Street is a "High Stress" intersection since the design lane MU ADT exceeds 200 vehicles. As such, this pavement design will be classified as a "Special Design" per BDE Figure 54-1.A. A mechanistic-flexible pavement design is recommended for consistency and ease of future maintenance as the surrounding roadway network is HMA surfaced.

Our recommendation is as follows:

IL 72/Getzelman Road[5]
Pavement Reconstruction[4]
Portions PCC Curb and Gutter and Portions HMA Shoulder
9 ¾" Full Depth HMA[1]
- 2" Polymerized HMA Surface Course, SMA, 9.5, Mix "F", N80
- 2 ¼" Polymerized HMA Binder Course, IL-19.0, N90
- 5 ½" HMA Base Course, IL-19.0, N70

12" Aggregate Subgrade Improvement[3]

State Street[5]
Pavement Reconstruction[4]
PCC Curb and Gutter
8 ¾" Full Depth HMA[2]
2" Polymerized HMA Surface Course, SMA, 9.5, Mix "F", N80
2 ¼" Polymerized HMA Binder Course, IL-19.0, N90
4 ½" HMA Base Course, IL-19.0, N70
12" Aggregate Subgrade Improvement[3]

[1]Designer Note 1: Use pay item **40701876, HOT-MIX ASPHALT PAVEMENT (FULL-DEPTH), 9 ¾"**, paid for in square yards.

[2]Designer Note 2: Use pay item **40701856, HOT-MIX ASPHALT PAVEMENT (FULL-DEPTH), 8 ¾"**, paid for in square yards.

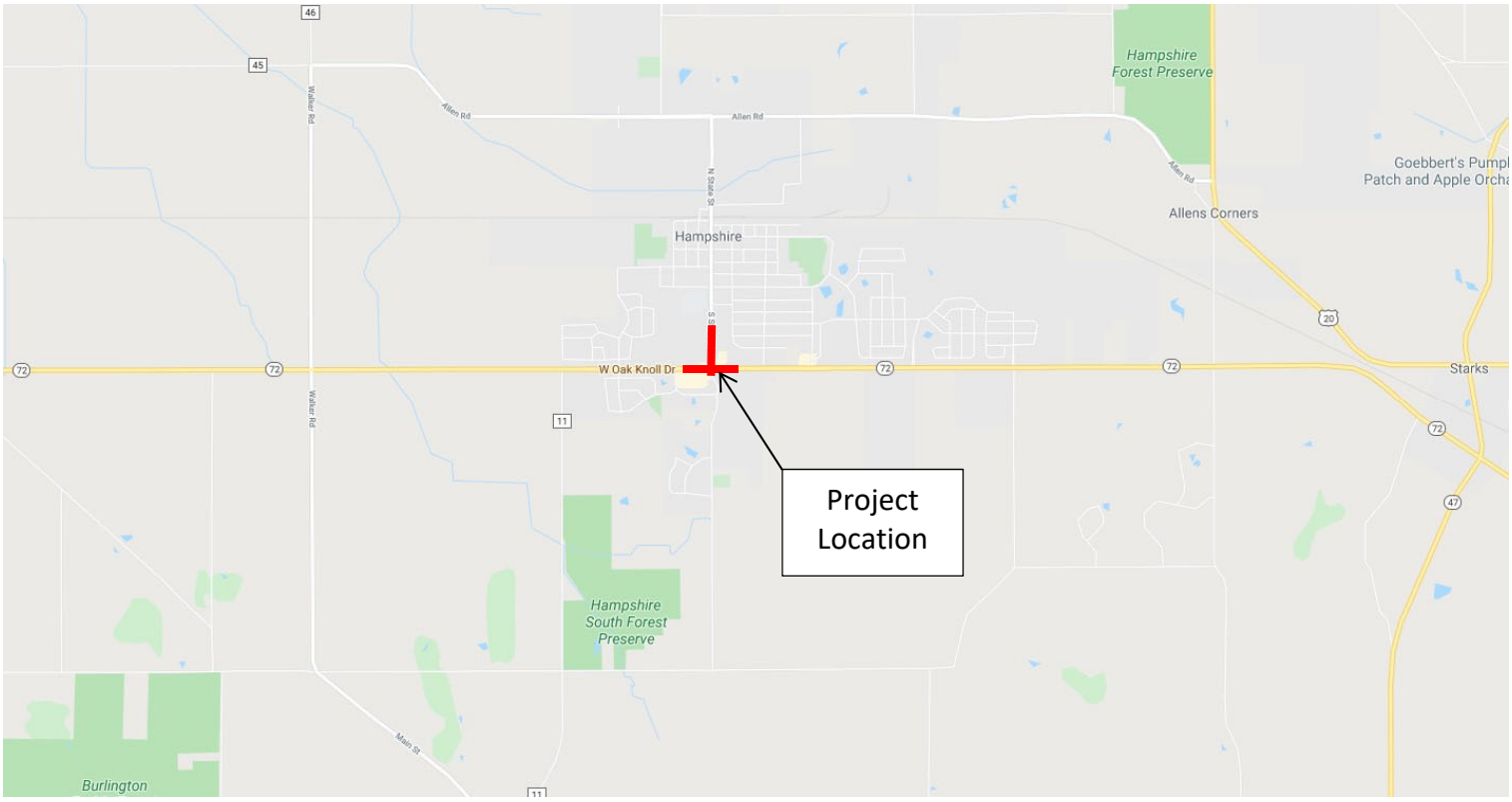
[3]Designer Note 3: Use pay item **30300112, AGGREGATE SUBGRADE IMPROVEMENT, 12"** paid for in square yards.

[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: State Street and Getzelman Road are subject to local jurisdictional approval and concurrence.

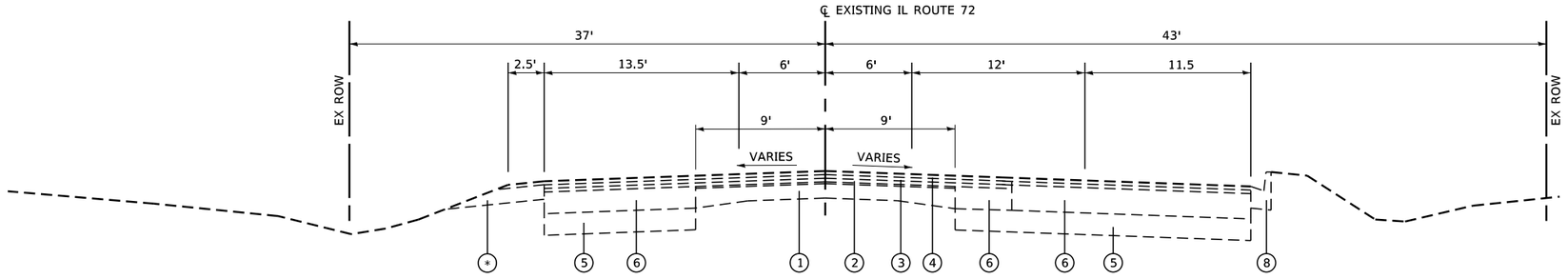
If you have any questions or need additional information, please contact Ojas Patel, Pavement Design Engineer, at (847)705-4550.

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


Hampshire Forest Preserve
Allen Rd
Allens Corners
Hampshire
W Oak Knoll Dr
Starks
Project Location
Hampshire South Forest Preserve
Burlington
Main St
Walter Rd

LEGEND

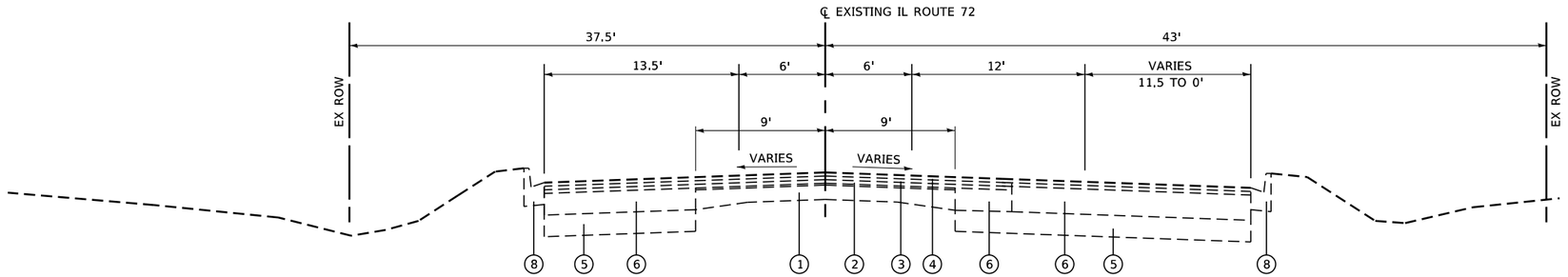
1. EXISTING 9-6-9 VARIABLE DEPTH, CONCRETE PAVEMENT
2. EXISTING LEVELING BINDER, 3/4"
3. EXISTING BITUMINOUS BINDER COURSE, 1 1/2"
4. EXISTING BITUMINOUS SURFACE COURSE, 1 1/2"
5. EXISTING POROUS GRANULAR BASE
6. EXISTING BITUMINOUS COURSE, 9"
7. EXISTING 6" AGGREGATE SHOULDER
8. EXISTING COMBINATION CONCRETE CURB & GUTTER, TYPE B-6.12
9. EXISTING SIDEWALK



EXISTING IL ROUTE 72 TYPICAL SECTION

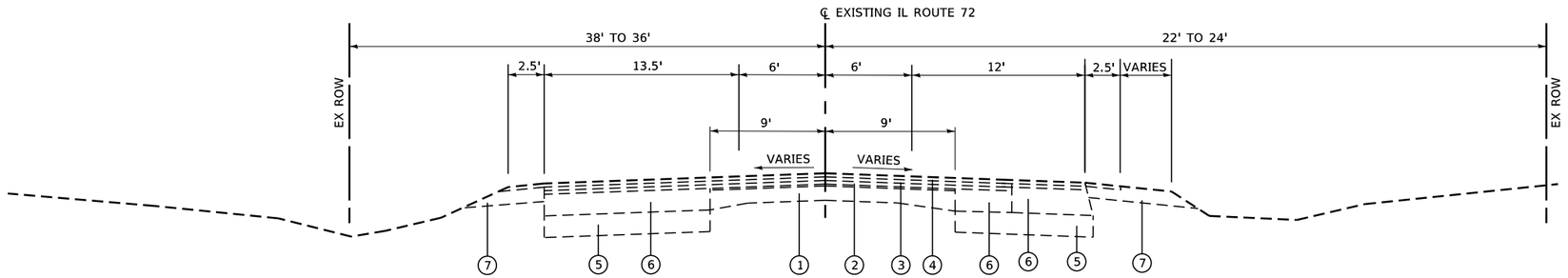
STA 491+50.00 TO STA 500+00.00

* SHOULDER ENDS
STA 498+12, LT
CURB AND GUTTER
BEGINS STA 498+12, LT.



EXISTING IL ROUTE 72 TYPICAL SECTION

STA 500+00.00TO STA 501+08.50



EXISTING IL ROUTE 72 TYPICAL SECTION

STA 501+08.50 TO STA 504+84.00

FILE NAME: S:\Projects\418-00093-0HY IL-72 & State Street\Design\CADD Sheets\D1622G11-sht-typicals exist.dgn

LOCHMUELLER GROUP
1928 Srk Bradley B. Smith Drive
Troy, IL 62294
PHONE: 618.667.1400

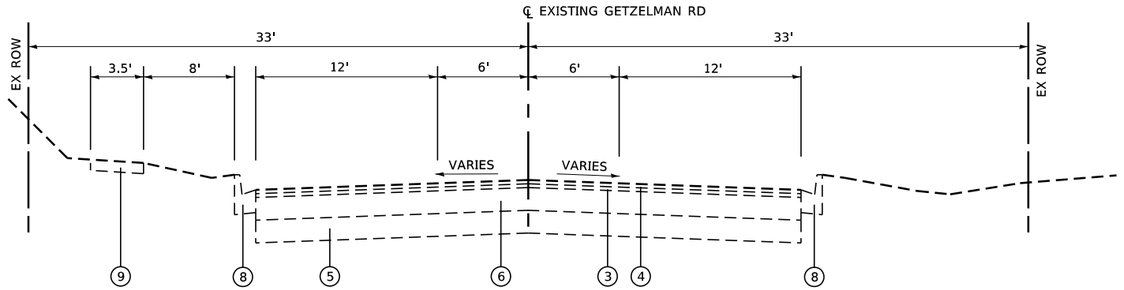
USER NAME = jkofoot	DESIGNED - ESW	REVISED -	
MODEL NAME = Typ 01	DRAWN - LEC	REVISED -	
PLOT SCALE = 10.0000 ' / in.	CHECKED - BRM	REVISED -	
PLOT DATE = 3/9/2020	DATE -	REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

EXISTING TYPICAL SECTIONS
IL ROUTE 72

SCALE: 1"=5' | SHEET 1 OF 2 SHEETS | STA. | TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
557	32R-DR-1	KANE		15
		CONTRACT NO. 62G11		
	ILLINOIS	FED. AID PROJECT		

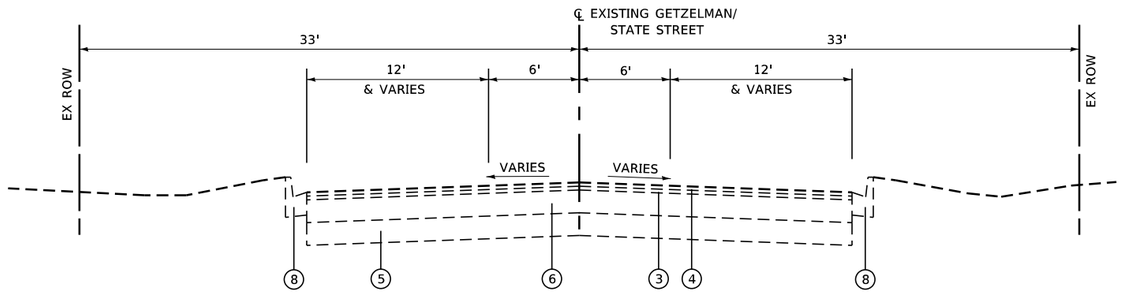


EXISTING GETZELMAN ROAD TYPICAL SECTION

STA 199+23.00 TO STA 200+00.00

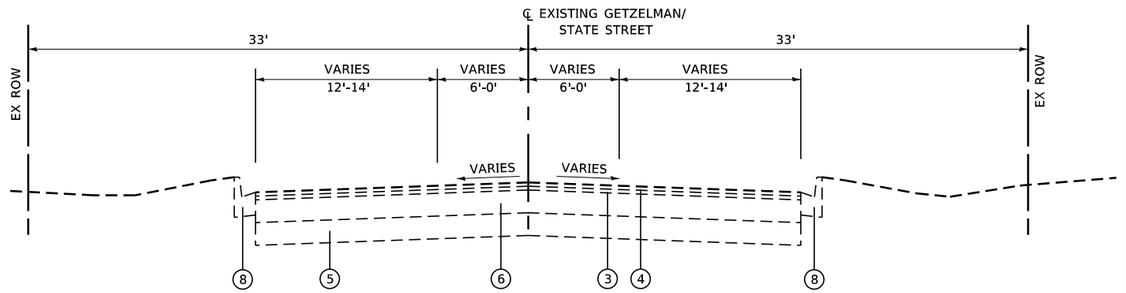
LEGEND

1. EXISTING 9-6-9 VARIABLE DEPTH, CONCRETE PAVEMENT
2. EXISTING LEVELING BINDER, 3/4"
3. EXISTING BITUMINOUS BINDER COURSE, 1 1/2"
4. EXISTING BITUMINOUS SURFACE COURSE, 1 1/2"
5. EXISTING POROUS GRANULAR BASE
6. EXISTING BITUMINOUS COURSE, 9"
7. EXISTING 6" AGGREGATE SHOULDER
8. EXISTING COMBINATION CONCRETE CURB & GUTTER, TYPE B-6.12
9. EXISTING SIDEWALK



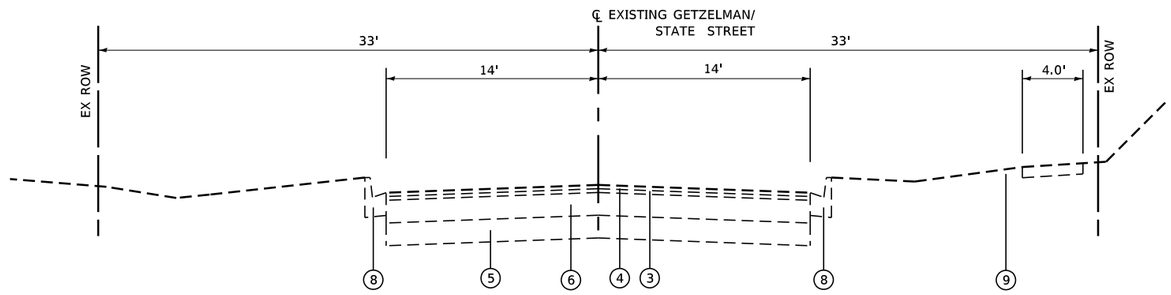
EXISTING STATE STREET TYPICAL SECTION

STA 200+00.00 TO STA 201+35.00



EXISTING STATE STREET TYPICAL SECTION

STA 201+35.00 TO STA 202+60.00



EXISTING GETZELMAN/STATE STREET TYPICAL SECTION

STA 201+94.00 TO STA 204+00.00

FILE NAME: S:\Projects\418-2020\0HY IL-72 & State Street\Design\CADD Sheets\D162G11-sht-typicals exist.dgn

LOCHMUELLER GROUP
1928 StA Bradley R. Smith's Drive
Troy, IL 62294
PHONE: 618.667.1400

USER NAME	= jkofoot	DESIGNED	- ESW	REVISED	-
MODEL NAME	= Typ 02	DRAWN	- LEC	REVISED	-
PLOT SCALE	= 10.0000 ' / in.	CHECKED	- BRM	REVISED	-
PLOT DATE	= 3/9/2020	DATE	-	REVISED	-

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

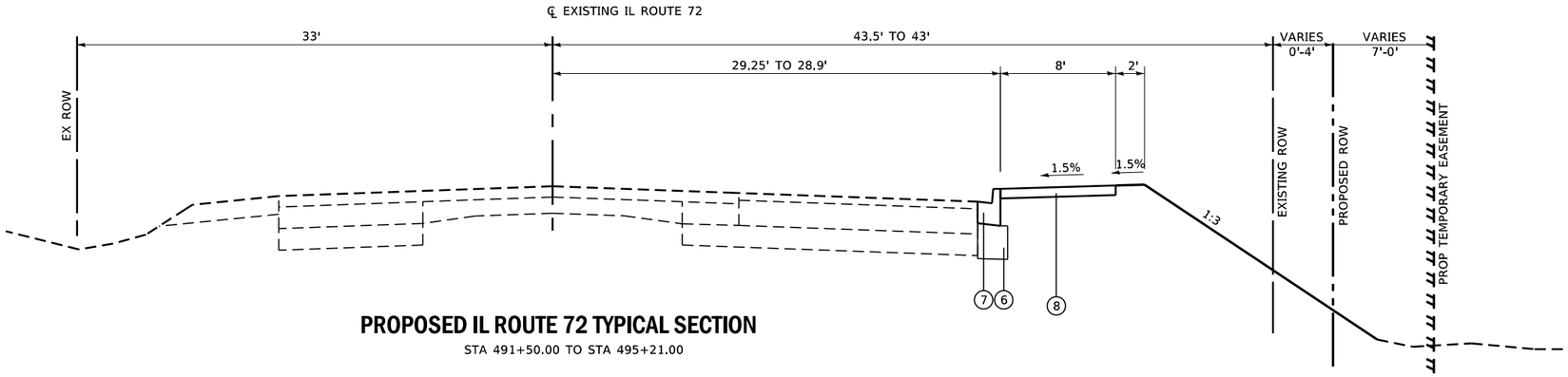
EXISTING TYPICAL SECTIONS
STATE STREET

SCALE: 1"=5' | SHEET 2 OF 2 SHEETS | STA. | TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
557	32R-DR-1	KANE		16
		CONTRACT NO. 62G11		
	ILLINOIS	FED. AID PROJECT		

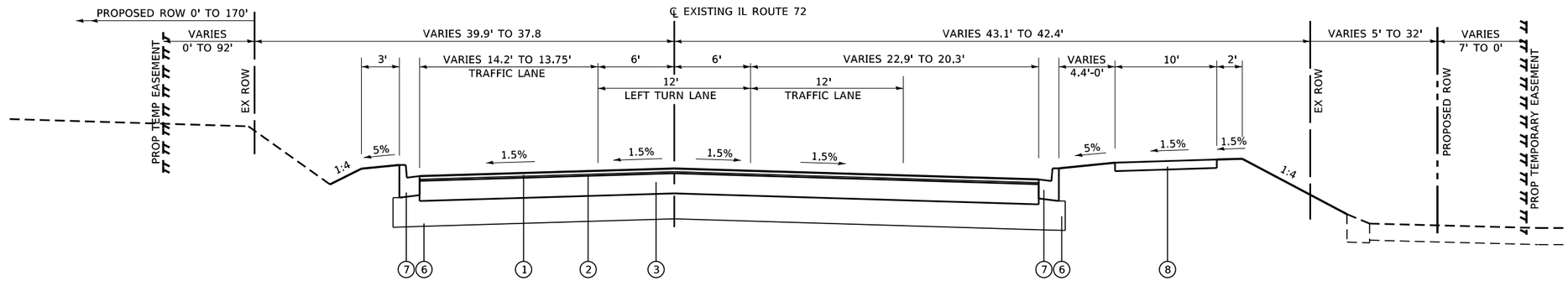
LEGEND

1. PROPOSED POLYMERIZED HMA SURFACE COURSE, MIX "F", N90, 2"
2. PROPOSED POLYMERIZED HMA BINDER COURSE, IL-19.0, N90, 2 1/4"
3. PROPOSED HMA BASE COURSE, IL-19.0, N70, 6"
4. PROPOSED HMA BASE COURSE, IL-19.0, N70, 4"
5. PROPOSED HOT-MIX ASPHALT SHOULDERS, 8"
6. PROPOSED AGGREGATE SUBGRADE IMPROVEMENT, 12"
7. PROPOSED COMBINATION CURB AND GUTTER TYPE B-6.12
8. PROPOSED PORTLAND CEMENT CONCRETE SIDEWALK, 6 INCH



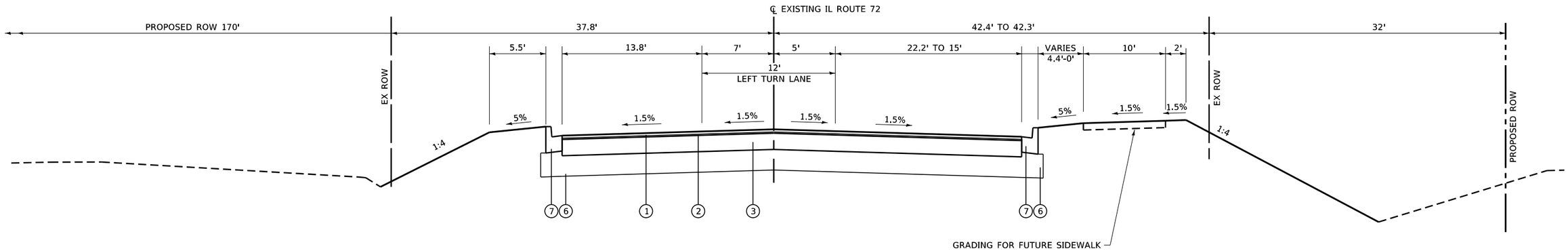
PROPOSED IL ROUTE 72 TYPICAL SECTION

STA 491+50.00 TO STA 495+21.00



PROPOSED IL ROUTE 72 TYPICAL SECTION

STA 495+21.00 TO STA 500+64.00 (LEFT)
STA 495+21.00 TO STA 500+84.30 (RIGHT)



PROPOSED IL ROUTE 72 TYPICAL SECTION

STA 500+64.00 TO STA 501+16.30 (LEFT)
STA 500+84.30 TO STA 501+35.80 (RIGHT)

FILE NAME: S:\Projects\418-0009-0HY IL-72 & State Street\Design\CADD Sheets\D162G11-sht-typicals PAVMNT DES.dgn

LOCHMUELLER GROUP
1928 SrA Bradley R. Smith Drive
Troy, IL 62294
PHONE: 618.667.1400

USER NAME = Betsy		DESIGNED - ESW		REVISED -	
MODEL NAME = Typ 01		DRAWN - LEC		REVISED -	
PLOT SCALE = 10.0000 ' / in.		CHECKED - BRM		REVISED -	
PLOT DATE = 3/6/2020		DATE -		REVISED -	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

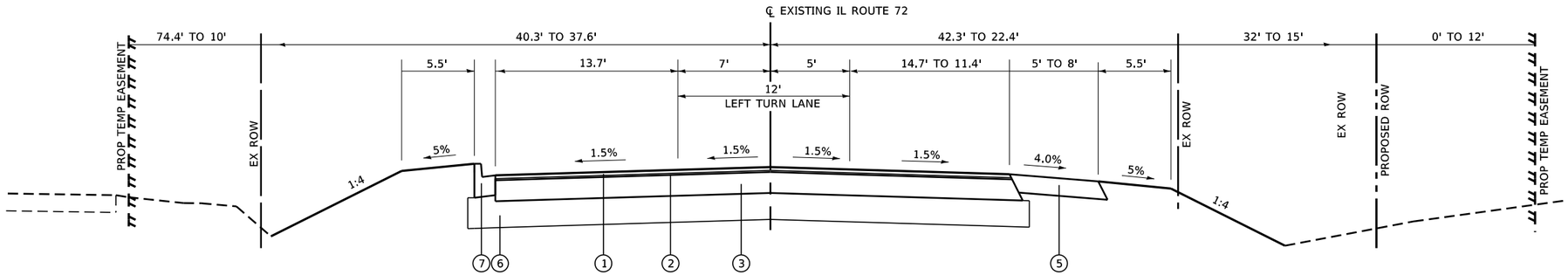
PROPOSED TYPICAL SECTIONS
IL ROUTE 72

SCALE: 1"=5' | SHEET 1 OF 4 SHEETS | STA. | TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
557	32R-DR-1	KANE		15
		CONTRACT NO. 62G11		
	ILLINOIS	FED. AID PROJECT		

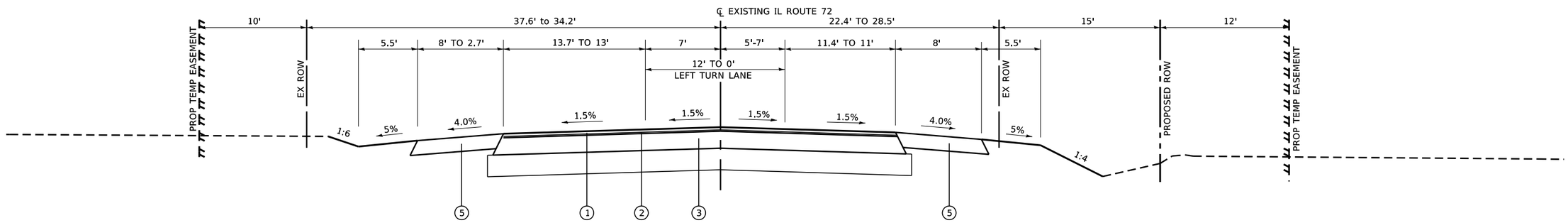
LEGEND

1. PROPOSED POLYMERIZED HMA SURFACE COURSE, MIX "F", N90, 2"
2. PROPOSED POLYMERIZED HMA BINDER COURSE, IL-19.0, N90, 2 1/4"
3. PROPOSED HMA BASE COURSE, IL-19.0, N70, 6"
4. PROPOSED HMA BASE COURSE, IL-19.0, N70, 4"
5. PROPOSED HOT-MIX ASPHALT SHOULDERS, 8"
6. PROPOSED AGGREGATE SUBGRADE IMPROVEMENT, 12"
7. PROPOSED COMBINATION CURB AND GUTTER TYPE B-6.12
8. PROPOSED PORTLAND CEMENT CONCRETE SIDEWALK, 6 INCH



PROPOSED IL ROUTE 72 TYPICAL SECTION

STA 501+16.30 TO STA 502+45.00 (LEFT)
STA 501+35.80 TO STA 502+45.00 (RIGHT)



* RIGHT SHOULDER WORK TO 505+00

PROPOSED IL ROUTE 72 TYPICAL SECTION

STA 502+45.00 TO STA 504+84.00

LOCHMUELLER GROUP
3928 SrA Bradley R. Smith Drive
Troy, IL 62294
PHONE: 618.667.1400

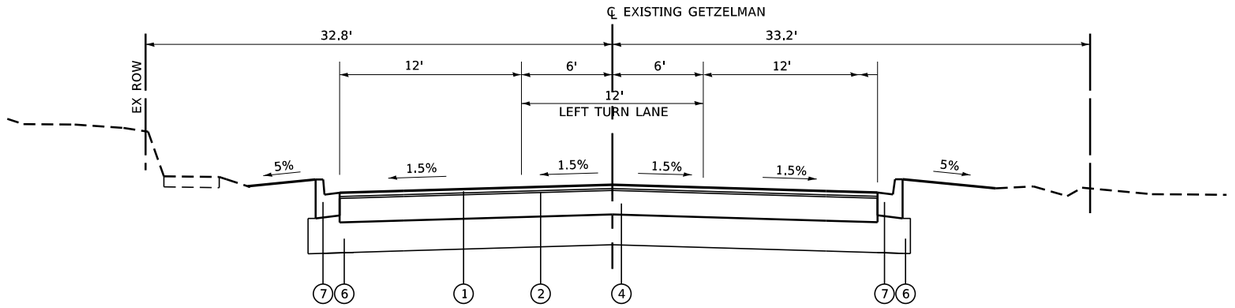
USER NAME = Betsy	DESIGNED - ESW	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	PROPOSED TYPICAL SECTIONS IL ROUTE 72	
MODEL NAME = Typ 02	DRAWN - LEC	REVISED -			
PLOT SCALE = 10.0000 ' / in.	CHECKED - BRM	REVISED -			
PLOT DATE = 3/6/2020	DATE -	REVISED -		SCALE: 1 "=5 ' SHEET 2 OF 4 SHEETS STA. TO STA.	

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
557	32R-DR-1	KANE		16
		CONTRACT NO. 62G11		
	ILLINOIS	FED. AID PROJECT		

FILE NAME: S:\Projects\418-02003-00HY IL-72 & State Street\Design\CADD Sheets\D162G11-sht-typicals PAVMNT DES.dgn

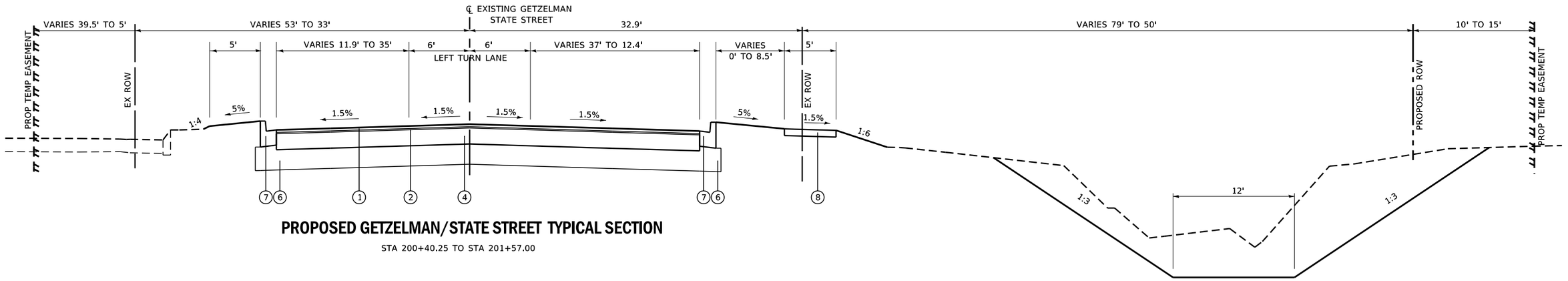
LEGEND

1. PROPOSED POLYMERIZED HMA SURFACE COURSE, MIX "F", N90, 2"
2. PROPOSED POLYMERIZED HMA BINDER COURSE, IL-19.0, N90, 2 1/4"
3. PROPOSED HMA BASE COURSE, IL-19.0, N70, 6"
4. PROPOSED HMA BASE COURSE, IL-19.0, N70, 4"
5. PROPOSED HOT-MIX ASPHALT SHOULDERS, 8"
6. PROPOSED AGGREGATE SUBGRADE IMPROVEMENT, 12"
7. PROPOSED COMBINATION CURB AND GUTTER TYPE B-6.12
8. PROPOSED PORTLAND CEMENT CONCRETE SIDEWALK, 6 INCH



PROPOSED GETZELMAN/STATE STREET TYPICAL SECTION

STA 199+23.24 TO STA 199+50.00



PROPOSED GETZELMAN/STATE STREET TYPICAL SECTION

STA 200+40.25 TO STA 201+57.00

FILE NAME: S:\Projects\418-2020\01HY IL-72 & State Street\Design\CADD Sheets\D162G11-sht-typicals PAVMNT DES.dgn

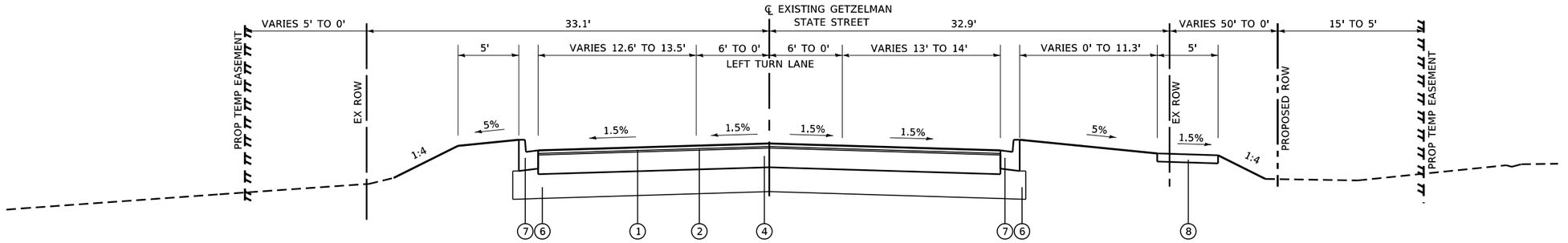
LOCHMUELLER GROUP
1928 S.R. Bradley R. Smith Drive
Troy, IL 62294
PHONE: 618.667.1400

USER NAME = Betsy	DESIGNED - ESW	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	PROPOSED TYPICAL SECTIONS STATE STREET	
MODEL NAME = Typ 03	DRAWN - LEC	REVISED -			
PLOT SCALE = 10.0000 ' / in.	CHECKED - BRM	REVISED -			
PLOT DATE = 3/6/2020	DATE -	REVISED -		SCALE: 1 "= 5 ' SHEET 3 OF 4 SHEETS STA. TO STA.	

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
557	32R-DR-1	KANE		17
		CONTRACT NO. 62G11		
	ILLINOIS	FED. AID PROJECT		

LEGEND

1. PROPOSED POLYMERIZED HMA SURFACE COURSE, MIX "F", N90, 2"
2. PROPOSED POLYMERIZED HMA BINDER COURSE, IL-19.0, N90, 2 1/4"
3. PROPOSED HMA BASE COURSE, IL-19.0, N70, 6"
4. PROPOSED HMA BASE COURSE, IL-19.0, N70, 4"
5. PROPOSED HOT-MIX ASPHALT SHOULDERS, 8"
6. PROPOSED AGGREGATE SUBGRADE IMPROVEMENT, 12"
7. PROPOSED COMBINATION CURB AND GUTTER TYPE B-6.12
8. PROPOSED PORTLAND CEMENT CONCRETE SIDEWALK, 6 INCH



PROPOSED STATE STREET TYPICAL SECTION

STA 201+57.00 TO STA 204+00.00

FILE NAME: S:\Projects\18-02003-00\IL-72 & State Street\Design\CADD Sheets\D162G11-sht-typicals PAVMNT DES.dgn

LOCHMUELLER GROUP
1928 Srk Bradley K. Smith Drive
Troy, IL 62294
PHONE: 618.667.1400

USER NAME = Betsy	DESIGNED - ESW	REVISED -
MODEL NAME = Typ 04	DRAWN - LEC	REVISED -
PLOT SCALE = 10.0000 ' / in.	CHECKED - BRM	REVISED -
PLOT DATE = 3/6/2020	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

PROPOSED TYPICAL SECTIONS
STATE STREET

SCALE: 1 "=5 ' | SHEET 4 OF 4 SHEETS | STA. | TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
557	32R-DR-1	KANE		18
		CONTRACT NO. 62G11		
	ILLINOIS	FED. AID PROJECT		

BDE 5401 Template (Rev. 11/22/2019)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 06/02/2020

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: IL 72
Section:
County: Kane
Location: at State St./Getzelman

Comments: IL 72 at State/Getzelman
Design Date: 05/26/2020 ONP
Modify Date:

	ADT	Year
<-- BY		
<-- BY		
Current:	11,700	2019
Future:	14,000	2040

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: 2021
Design Period (DP) = 20 years

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	12,194	93.7%	P = 50%
SU =	250	338	2.6%	S = 50%
MU =	750	482	3.7%	M = 50%
Struct. Design ADT =		13,014	(2031)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT			RIGID PAVEMENT		
Cpv =	0.15		Cpv =	0.15	
Csu =	112.06		Csu =	135.78	
Cmu =	385.44		Cmu =	567.21	
TF flexible (Actual) =	2.25	(Actual ADT)	TF rigid (Actual) =	3.21	(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.O)
Goto Map
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}) = 86 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 9.75 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 14.50 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 9.75 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 Pavement Over Rubblized PCC

Use TF flexible = 3.17
Goto Map
HMA Overlay Design Thickness = 7.25 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 RESEARCH 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. 11/22/2019) Printed: 06/02/2020

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	HMA_SD Standard Design
HMA OVERLAY THICKNESS	3.75 IN	

USER OVERRIDE COLUMN

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE	On User Override
	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 (IL-9.5FG or IL-4.75)	$85.00 / TON
HMA SHOULDER	$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS		100% QUANTITY	UNIT	UNIT PRICE		COST	USER SUPPLIED QUANTITY	USER SUPPLIED UNIT PRICE
HMA PAVEMENT (FULL-DEPTH)	(12.00")	5333	5,333	SQ YD	$59.62	/ SQ YD	$317,988	~	
HMA SURFACE COURSE	(2.00")	1.0069	601	TONS	$95.00	/ TON	$0		
HMA TOP BINDER COURSE	(2.25")	1.0217	687	TONS	$95.00	/ TON	$0		
HMA LOWER BINDER COURSE	(7.75")	1.0564	2,445	TONS	$80.00	/ TON	$0		
HMA SHOULDER	(8.00")	3556	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	Width = 86.0'	9,111	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	T	UNIT COST		Schedule Quantity	Unit Cost Override
ROUTINE MAINTENANCE ACTIVITY						$0.00	LANE-MILE / YEAR		
HMA OVERLAY PVMT SURF		(2.00")	1.0069	Surface Mix	2.00	$10.71	/ SQ YD	5333	
HMA OVERLAY PVMT		(3.75")	1.0130		3.75	$20.21	/ SQ YD	5333	
HMA SURFACE MIX		(1.50")	1.0052	Surface Mix	1.50	$8.02	/ SQ YD	5333	
HMA BINDER MIX		(2.25")	1.0182	Top Binder Mix	2.25	$12.19	/ SQ YD	5333	
HMA OVERLAY SHLD	(Year 30)	(1.75")		Shoulder Mix	1.75	$7.06	/ SQ YD	3556	
HMA OVERLAY SHLD		(2.00")		Shoulder Mix	2.00	$8.06	/ SQ YD	3556	
MILLING (2.00 IN)					2.00	$3.00	/ SQ YD		
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)		Surface Mix	2.00	$80.64	/ SQ YD		
PARTIAL DEPTH SHLD PATCH		(Mill & Fill Surf)		Shoulder Mix	2.00	$78.06	/ SQ YD		
PARTIAL DEPTH PVMT PATCH		(Mill & Fill +2.00 ")		Binder Mix	2.00	$79.52	/ SQ YD		
PARTIAL DEPTH SHLD PATCH		(Mill & Fill +2.00 ")		Shoulder Mix	2.00	$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 06/02/20

FULL-DEPTH HMA PAVEMENT
HMA PAVEMENT OVER 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	
HMA OVERLAY THICKNESS	3.75 IN	

USER OVERRIDE COLUMN

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE	On User Override
	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	USER SUPPLIED QUANTITY
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		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 Width = 82.0'	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		Schedule Quantity	Unit Cost Override
ROUTINE MAINTENANCE ACTIVITY					$0.00	/ LANE-MILE / YEAR		
HMA OVERLAY	(3.75")			3.75				
HMA OVERLAY PAVEMENT	(3.75")	1.0130		3.75	$20.21	/ SQ YD	5333	
HMA SURFACE MIX	(1.50")	1.0052	Surface Mix	1.50	$8.02	/ SQ YD	5333	
HMA BINDER MIX	(2.25")	1.0182	Top Binder Mix	2.25	$12.19	/ SQ YD	5333	
HMA OVERLAY SHOULDER	(3.75")		Shoulder Mix	3.75	$15.12	/ SQ YD	3556	
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

JPCP MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 06/02/20

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 OVERLAY 3.75" (PVMT)	100.00%	5,333	SQ YD	$20.21		$107,785	
HMA 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

RECONSTRUCTION - HMA OVER RUBBLIZED PAVEMENT

RECONSTRUCTION - PCC UNBONDED OVERLAY

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 10/31/19 11:36 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%

S:\GEN\WPDOCS\Pavement Designs\D-1\IL 72 at State St-Getzelman Rd - 62G11\[IL 72 - BDE 5401.xlsm]LifeCycleCost

BDE 5401 Template (Rev. 11/22/2019)

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 06/02/2020

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: State St/Getzelman Rd
Section:
County: Kane
Location: at IL 72

Comments: IL 72 at State/Getzelman
Design Date: 05/26/2020 ONP
Modify Date:

	ADT	Year
<-- BY		
<-- BY	ADT	Year
Current:	3,450	2019
Future:	7,000	2040

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: 2021
Design Period (DP) = 20 years

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	No Min	4,903	89.5%	P = 50%
SU =	No Min	219	4.0%	S = 50%
MU =	No Min	356	6.5%	M = 50%
Struct. Design ADT =		5,479	(2031)	

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) =	1.63	(Actual ADT)	TF rigid (Actual) =	2.32	(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 = 1.63
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.O)
Goto Map
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}) = 105 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 8.75 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 14.50 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 8.75 inches

JPC Pavement

Use TF rigid = 2.32
Edge Support = Tied Shoulder or C&G

Rigid Pavt Thick. = 8.25 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 2.32
IBR value = 3

CRCP Thickness = 7.00 in. (Fig. 54-4.N)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Pavement Over Rubblized PCC

Use TF flexible = 1.63
Goto Map
HMA Overlay Design Thickness = 6.25 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 RESEARCH 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. 11/22/2019) Printed: 06/02/2020

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	HMA_SD Standard Design
HMA OVERLAY THICKNESS	3.75 IN	

USER OVERRIDE COLUMN

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE	On User Override
	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 (IL-9.5FG or IL-4.75)	$85.00 / TON
HMA SHOULDER	$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS		100% QUANTITY	UNIT	UNIT PRICE		COST	USER SUPPLIED QUANTITY	USER SUPPLIED UNIT PRICE
HMA PAVEMENT (FULL-DEPTH)	(12.00")	5333	5,333	SQ YD	$59.62	/ SQ YD	$317,988	~	
HMA SURFACE COURSE	(2.00")	1.0069	601	TONS	$95.00	/ TON	$0		
HMA TOP BINDER COURSE	(2.25")	1.0217	687	TONS	$95.00	/ TON	$0		
HMA LOWER BINDER COURSE	(7.75")	1.0564	2,445	TONS	$80.00	/ TON	$0		
HMA SHOULDER	(8.00")	3556	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	Width = 86.0'	9,111	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	T	UNIT COST		Schedule Quantity	Unit Cost Override
ROUTINE MAINTENANCE ACTIVITY						$0.00	LANE-MILE / YEAR		
HMA OVERLAY PVMT SURF		(2.00")	1.0069	Surface Mix	2.00	$10.71	/ SQ YD	5333	
HMA OVERLAY PVMT		(3.75")	1.0130		3.75	$20.21	/ SQ YD	5333	
HMA SURFACE MIX		(1.50")	1.0052	Surface Mix	1.50	$8.02	/ SQ YD	5333	
HMA BINDER MIX		(2.25")	1.0182	Top Binder Mix	2.25	$12.19	/ SQ YD	5333	
HMA OVERLAY SHLD	(Year 30)	(1.75")		Shoulder Mix	1.75	$7.06	/ SQ YD	3556	
HMA OVERLAY SHLD		(2.00")		Shoulder Mix	2.00	$8.06	/ SQ YD	3556	
MILLING (2.00 IN)					2.00	$3.00	/ SQ YD		
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)		Surface Mix	2.00	$80.64	/ SQ YD		
PARTIAL DEPTH SHLD PATCH		(Mill & Fill Surf)		Shoulder Mix	2.00	$78.06	/ SQ YD		
PARTIAL DEPTH PVMT PATCH		(Mill & Fill +2.00 ")		Binder Mix	2.00	$79.52	/ SQ YD		
PARTIAL DEPTH SHLD PATCH		(Mill & Fill +2.00 ")		Shoulder Mix	2.00	$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 06/02/20

FULL-DEPTH HMA PAVEMENT
HMA PAVEMENT OVER 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	
HMA OVERLAY THICKNESS	3.75 IN	

USER OVERRIDE COLUMN

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE	On User Override
	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	USER SUPPLIED QUANTITY
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		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 Width = 82.0'	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		Schedule Quantity	Unit Cost Override
ROUTINE MAINTENANCE ACTIVITY					$0.00	/ LANE-MILE / YEAR		
HMA OVERLAY	(3.75")			3.75				
HMA OVERLAY PAVEMENT	(3.75")	1.0130		3.75	$20.21	/ SQ YD	5333	
HMA SURFACE MIX	(1.50")	1.0052	Surface Mix	1.50	$8.02	/ SQ YD	5333	
HMA BINDER MIX	(2.25")	1.0182	Top Binder Mix	2.25	$12.19	/ SQ YD	5333	
HMA OVERLAY SHOULDER	(3.75")		Shoulder Mix	3.75	$15.12	/ SQ YD	3556	
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

JPCP MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 06/02/20

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 OVERLAY 3.75" (PVMT)	100.00%	5,333	SQ YD	$20.21		$107,785	
HMA 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

RECONSTRUCTION - HMA OVER RUBBLIZED PAVEMENT

RECONSTRUCTION - PCC UNBONDED OVERLAY

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 10/31/19 11:36 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%

S:\GEN\WPDOCS\Pavement Designs\D-1\IL 72 at State St-Getzelman Rd - 62G11\[State St_Getzelman - BDE 5401.xlsm]LifeCycleCost