Illinois Department of Transportation

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

FAP Route 886 (IL 83)
Lake County
From IL 120 to IL 137 & at Atkinson Road

The project, submitted to BDE by memo dated January 6, 2015, will reconstruct IL 83 from IL 120 to IL 137 to a cross-section of four lanes, and realign the roadway to the east. IL 83/Atkinson Road will be realigned at IL 137. The project is not subject to alternate bidding, and the LCCA did not favor either a flexible or a rigid design for IL 31 by greater than 10%. The Pavement Selection Committee was convened, and the district requested the use of HMA Pavement due to constructability, maintenance and traffic staging considerations. The PSC Committee concurred with the district's request.

The approved pavement design is as follows:

<u>IL 83/IL 137/Atkinson Road (Pavement Reconstruction)</u>

9.75 inches of Full Depth HMA Pavement with PCC C&G & HMA Shoulder
- 2 inches of Polymerized HMA Surface Course, Mix "F", N90
- 2.25 inches of Polymerized HMA Binder Course, IL-19.0, N90
- 5.5 inches of HMA Base Course, IL-19.0, N90

12 inches of Aggregate Subgrade Improvement

<u>Ivanhoe Road (Pavement Reconstruction)</u>

7.25 inches of Full Depth HMA Pavement with PCC C&G
- 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

IL 83/IL 137/Atkinson Road (Temporary Pavement)

Option 1
10 inches of Full Depth Temporary HMA Pavement
2 inches of HMA Surface Course, Mix "D", N50
8 inches of HMA Binder Course, IL-19.0, N50
4 inches of Subgrade Granular Material Type B

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

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: January 6, 2015

*Route: IL 83
Limits: IL 120 to IL 137 & at Atkinson Rd.
Section: 3Y-R
Current target: 06CY16

County: Lake
Contract No.: 60N11
Job No.: D-91-237-11

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 137 and IL 83/ IL 137 - Reconstruction of the roadway to provide two lanes in each direction and realignment of the roadway to the east. IL 83 will be realigned at the intersection of IL 83/Atkinson Road at IL 137 to provide a four legged intersection.

Ivanhoe Road – Reconstruction to cul de sac the existing roadway for the north segment and provide a new relocated intersection with IL 83 at the south segment.

A 20-year pavement analysis was performed for the above segments. The life-cycle cost analysis does not favor either PCC or HMA pavement for any segment by more than 10%. An alternate bid consideration with review by pavement selection committee will be required according to the flowchart in Figure 54-1.A of Chapter 54 of the BDE manual. However, our recommendation is to provide a mechanistic-flexible pavement design for all segments in order to maintain a more uniform pavement type for ease of construction and maintenance as follows:

IL 83
IL 137
Atkinson Road
Reconstruction
PCC Curb and Gutter and portions HMA Shoulder[5]
9 ¾" Full Depth HMA[1, 4]
2" Polymerized HMA Surface Course, Mix "F", N90
2 ¼" Polymerized HMA Binder Course, IL-19.0, N90
5 ½" HMA Base Course, IL-19.0, N90
12" Aggregate Subgrade Improvement[3]

Ivanhoe Road
Reconstruction
PCC Curb and Gutter
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]

Temporary Pavement

IL 83/IL 137/Atkinson Road

Option 1[6]
Temporary Pavement
10" Full Depth Temporary HMA Pavement[7]
2" HMA Surface Course, Mix "D", N50
8" HMA Binder Course, IL-19.0, N50
4" Subbase Granular Material Type B[8]

Option 2[6]
Temporary Pavement
8" Temporary PCC Pavement[7]
4" Subbase Granular Material Type B[8]

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

[7]Designer Note 7: Use pay item **Z0062456, TEMPORARY PAVEMENT**, paid in square yards.

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

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

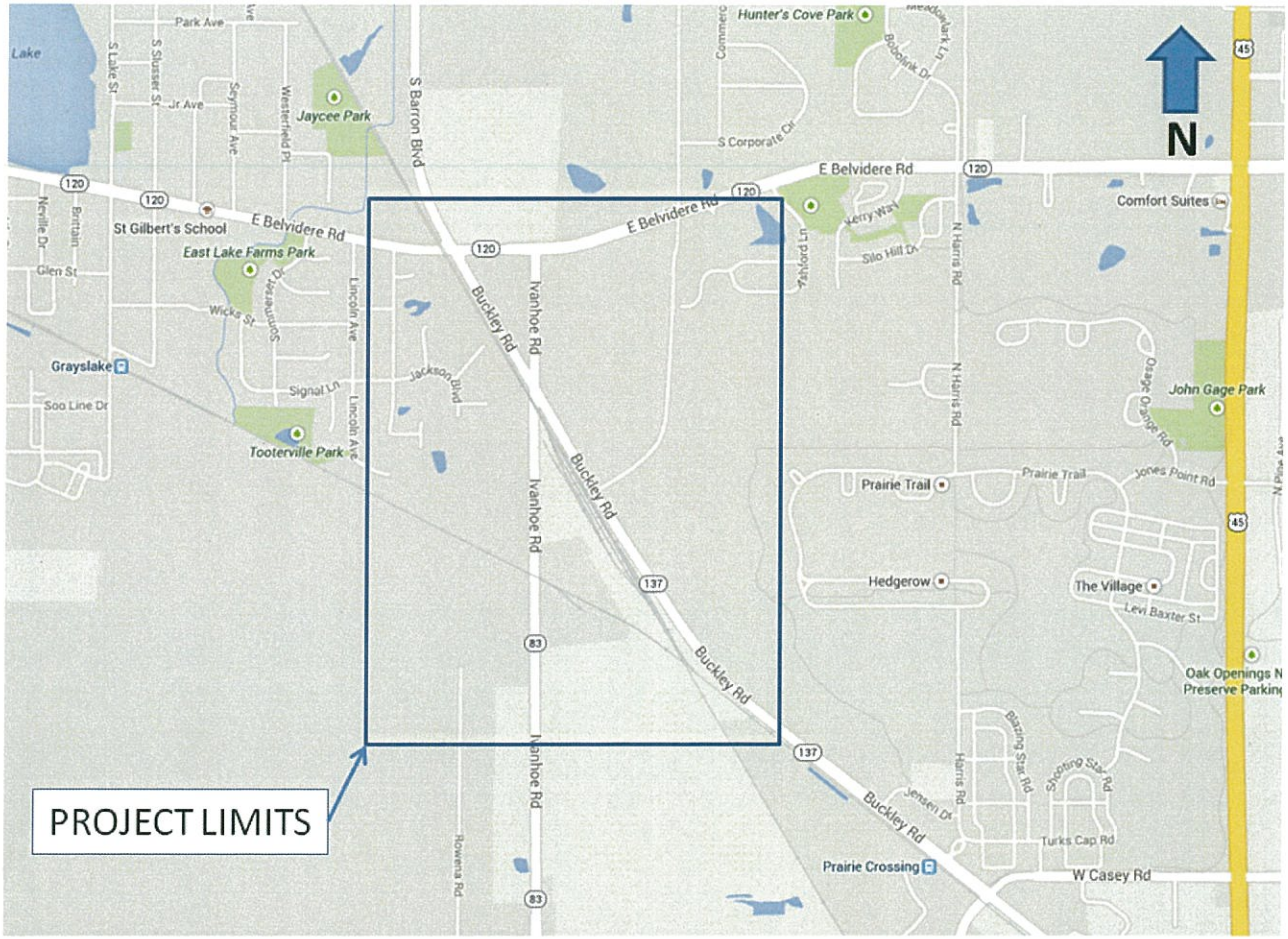
[8]Designer Note 8: Use pay item **31101200, SUBBASE GRANULAR MATERIAL, TYPE B 4"**, paid in square yards

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

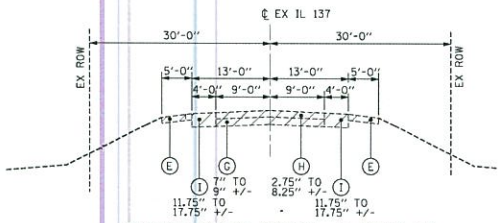
By: Jose A. Dominguez
Jose A. Dominguez, P.E.
Project Support Engineer

LOCATION MAP

Grayslake, IL



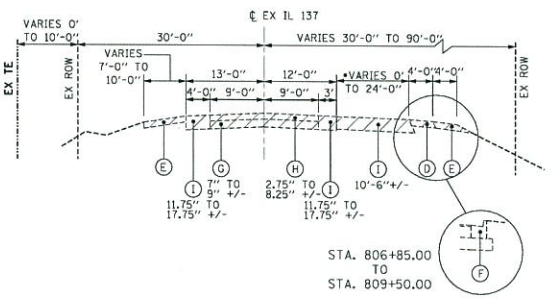
Map source: Google Maps, February 2014



EXISTING TYPICAL SECTION – IL ROUTE 137

STA. 781+44.58 TO STA. 791+00.00

A

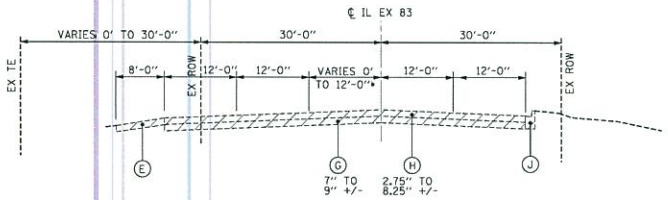


EXISTING TYPICAL SECTION – IL ROUTE 137

STA. 791+00.00 TO STA. 809+25.00

B

- 0' FROM STA. 791+00.00 TO STA. 792+15.00
- VARIES 0' TO 12' FROM STA. 792+15.00 TO STA. 798+17.13
- 12' FROM STA. 798+17.13 TO STA. 809+25.00

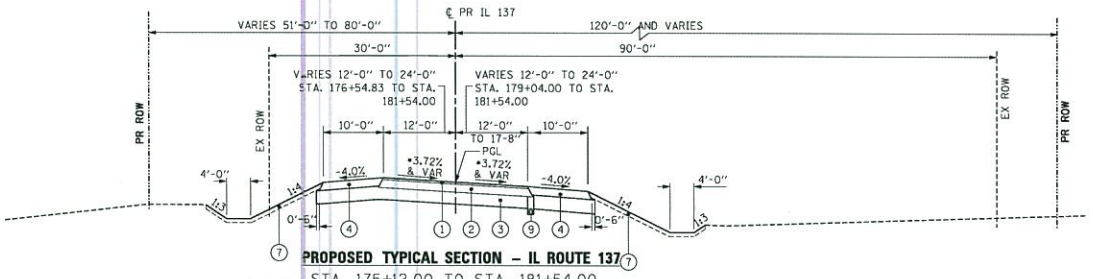


EXISTING TYPICAL SECTION – IL ROUTE 83

STA. 809+25.00 TO STA. 823+20.00

•VARIES 0' TO 12' STA. 817+63.00 TO STA. 823+20.00

C



PROPOSED TYPICAL SECTION – IL ROUTE 137

STA. 175+12.00 TO STA. 181+54.00

•SEE SUPERELEVATION CHART FOR DETAILS. TYPICAL SECTION SHEET 6

D

EXISTING LEGEND

- REMOVAL
- (A) EXISTING BITUMINOUS CONCRETE SURFACE COURSE, 2"
- (B) EXISTING BITUMINOUS CONCRETE BINDER COURSE, 7"
- (C) EXISTING AGGREGATE SUBGRADE, 12"
- (D) EXISTING PAVED SHOULDER, 6"
- (E) EXISTING AGGREGATE SHOULDER, 6"
- (F) EXISTING CURB AND GUTTER, TYPE B-6.24
- (G) EXISTING PORTLAND CEMENT CONCRETE PAVEMENT
- (H) EXISTING BITUMINOUS OVERLAY
- (I) EXISTING BITUMINOUS BASE COURSE WIDEN
- (J) EXISTING CURB AND GUTTER, TYPE B-6.12
- (K) (BLANK)
- (L) EXISTING CONCRETE SIDEWALK

PROPOSED LEGEND

- (1) HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70 - 2"
- (2) HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N70 - 8" (IN 3 LIFTS)
- (3) AGGREGATE SUBGRADE IMPROVEMENT 12"
- (4) HOT-MIX ASPHALT SHOULDERS, 8"
- (5) (BLANK)
- (6) COMBINATION CONCRETE CURB AND GUTTER TYPE B-6.24
- (7) TOPSOIL EXCAVATION AND PLACEMENT, 4"
- (8) PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH
- (9) PIPE UNDERDRAINS 6"
- (10) (BLANK)
- (11) CONCRETE MEDIAN SURFACE, 6 INCH
- (12) COMBINATION CONCRETE CURB AND GUTTER TYPE M-4.24
- (13) CONCRETE MEDIAN, TYPE SM (SPECIAL)
- (14) AGGREGATE BASE COURSE, TYPE B, 6"
- • GEOTECHNICAL FABRIC FOR GRADE STABILIZATION

IL ROUTE 137

STRUCTURAL DESIGN TRAFFIC: Year 2025

PV= 18,256 SU= 1,148 MU= 396

ROAD/STREET CLASSIFICATION: Class 1

PERCENT OF STRUCTURAL DESIGN TRAFFIC IN DESIGN LANE:

P= 32% S= 45% M = 45%

TRAFFIC FACTOR: Actual TF = 3.11 AC Type= 20

Minimum TF = 3.56

PG GRADE: Binder= PG64-22 Surface= PG64-28

SUBGRADE SUPPORT RATING:

SSR = POOR (Sta. 175+12.00 to 210+93.59)

SSR = _____ (Sta. _____ to _____)

exp U.S. Services Inc. Chicago, IL BUILDINGS-EARTH & ENVIRONMENT-ENERGY INDUSTRIAL-INFRASTRUCTURE-SUSTAINABILITY

FILE NAME = $FILE$	USER NAME = $USER$	DESIGNED - JB	REVISED -
		DRAWN - JB	REVISED -
	PLOT SCALE = $SCALE$	CHECKED - ACL	REVISED -
	PLOT DATE = $DATE$	DATE - 6/30/2014	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
FAP ROUTE 866 (IL 83)

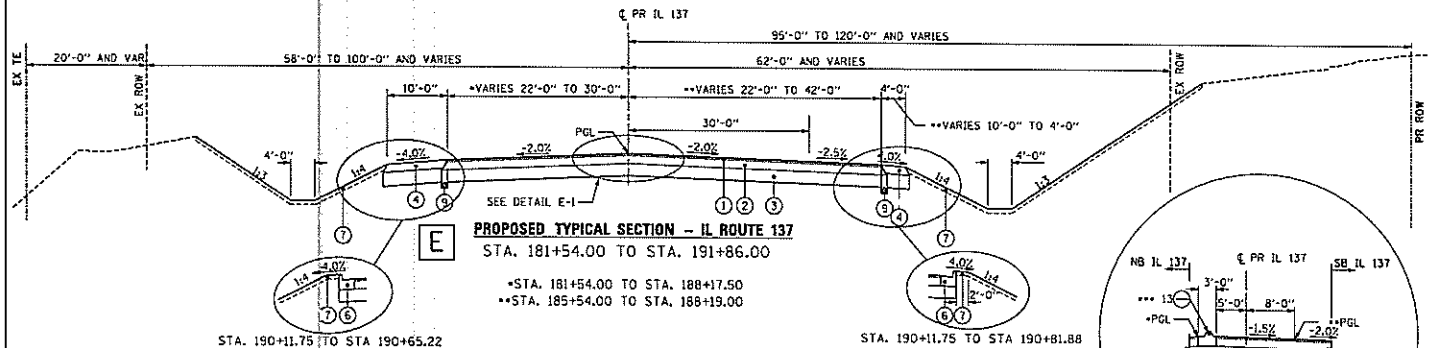
TYPICAL SECTIONS 1
IL ROUTE 137

SCALE: N.T.S. | SHEET OF SHEETS | STA. | TO STA.

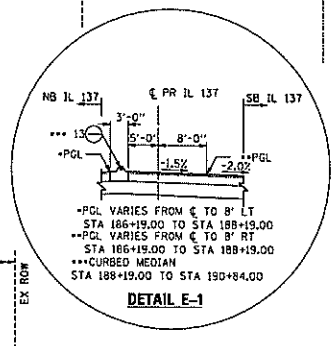
F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
866	3Y-R	LAKE	312	23

CONTRACT NO. 60N11

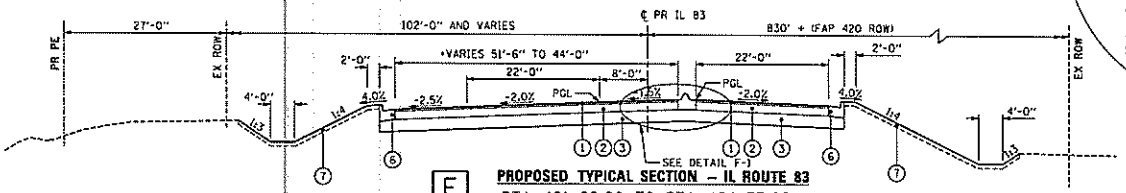
PRELIMINARY | ILLINOIS FED. AID PROJECT



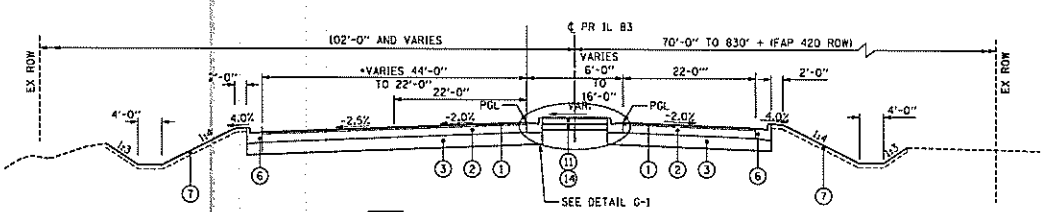
E **PROPOSED TYPICAL SECTION – IL ROUTE 137**
STA. 181+54.00 TO STA. 191+86.00
*STA. 181+54.00 TO STA. 188+17.50
**STA. 185+54.00 TO STA. 188+19.00



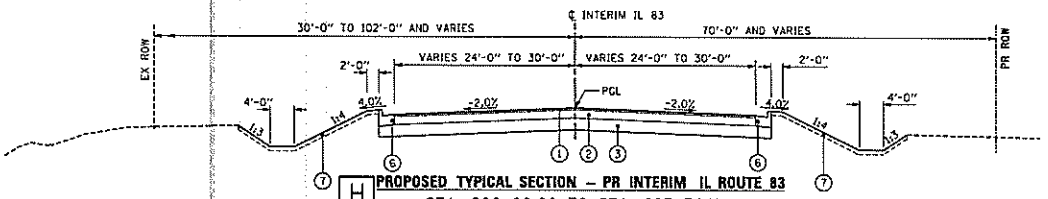
DETAIL E-1



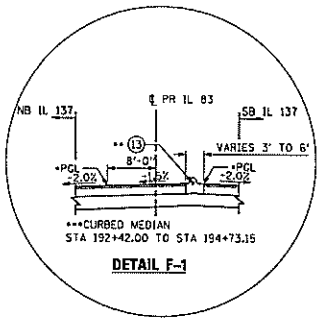
F **PROPOSED TYPICAL SECTION – IL ROUTE 83**
STA. 191+86.00 TO STA. 194+73.00
*STA. 193+38.12 TO STA. 194+73.00



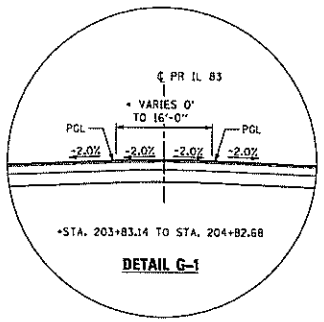
G **PROPOSED TYPICAL SECTION – IL ROUTE 83**
STA. 194+73.00 TO STA. 204+82.68



H **PROPOSED TYPICAL SECTION – PR INTERIM IL ROUTE 83**
STA. 600+00.00 TO STA. 605+74.11



DETAIL F-1



DETAIL G-1

EXISTING LEGEND

REMOVAL
- (A) EXISTING BITUMINOUS CONCRETE SURFACE COURSE, 2"
- (B) EXISTING BITUMINOUS CONCRETE BINDER COURSE, 7"
- (C) EXISTING AGGREGATE SUBGRADE, 12"
- (D) EXISTING PAVED SHOULDER, 6"
- (E) EXISTING AGGREGATE SHOULDER, 6"
- (F) EXISTING CURB AND GUTTER, TYPE B-6.24
- (G) EXISTING PORTLAND CEMENT CONCRETE PAVEMENT
- (H) EXISTING BITUMINOUS OVERLAY
- (I) EXISTING BITUMINOUS BASE COURSE WIDEN
- (J) EXISTING CURB AND GUTTER, TYPE B-6.12
- (K) (BLANK)
- (L) EXISTING CONCRETE SIDEWALK

PROPOSED LEGEND

- (1) HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70 - 2"
- (2) HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N70 - 8" (IN 3 LIFTS)
- (3) AGGREGATE SUBGRADE IMPROVEMENT 12"
- (4) HOT-MIX ASPHALT SHOULDERS, 8"
- (5) (BLANK)
- (6) COMBINATION CONCRETE CURB AND GUTTER TYPE B-6.24
- (7) TOPSOIL EXCAVATION AND PLACEMENT, 4"
- (8) PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH
- (9) PIPE UNDERDRAINS 6"
- (10) (BLANK)
- (11) CONCRETE MEDIAN SURFACE, 6 INCH
- (12) COMBINATION CONCRETE CURB AND GUTTER TYPE M-4.24
- (13) CONCRETE MEDIAN, TYPE SM (SPECIAL)
- (14) AGGREGATE BASE COURSE, TYPE B, 6"
- * GEOTECHNICAL FABRIC FOR GRADE STABILIZATION

NOTE:
THE IL 83/IL 137/ATKINSON ROAD INTERSECTION SPANS FROM STA 190+84.00 TO STA 192+42.00

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		DRAWN: JB	REVISED:
exp U.S. Services Inc.	PLOT SCALE: 1000.0000	CHECKED: ACL	REVISED:
	PLOT DATE: 6/30/2014	DATE: 6/30/2014	REVISED:

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
FAP ROUTE 866 (IL 83)

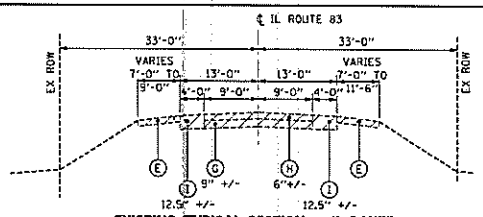
TYPICAL SECTIONS 2
IL ROUTE 137 /IL ROUTE 83

SCALE: N.T.S. | SHEET OF SHEETS | STA. | TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
866	3Y-R	LAKE	312	24

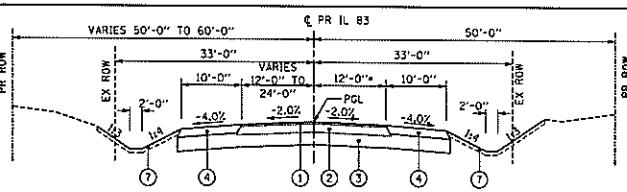
CONTRACT NO. 60N11

PRELIMINARY (ILLINOIS FED. AID PROJECT)



I **EXISTING TYPICAL SECTION – IL ROUTE 83**

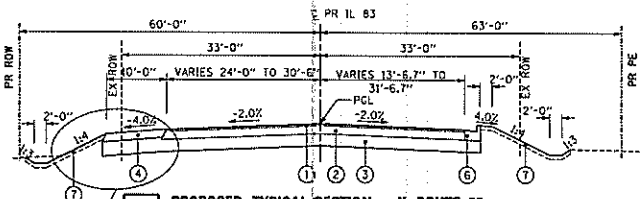
PR IL 83 STA. 411+23.00 TO STA. 425+00.00
PR IVANHOE ROAD STA. 284+00.00 TO STA. 297+01.00



J **PROPOSED TYPICAL SECTION – IL ROUTE 83**

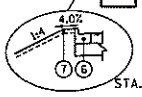
STA. 411+23.00 TO STA. 417+23.00

* STA. 416+45.00 TO STA. 417+23.00 TAPER FROM 12'-0" TO 13'-6.7"

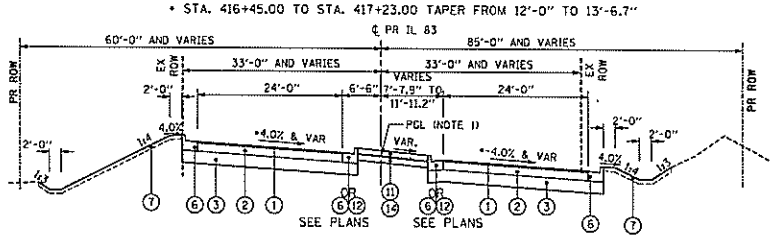


K **PROPOSED TYPICAL SECTION – IL ROUTE 83**

STA. 417+23.00 TO STA. 420+23.00



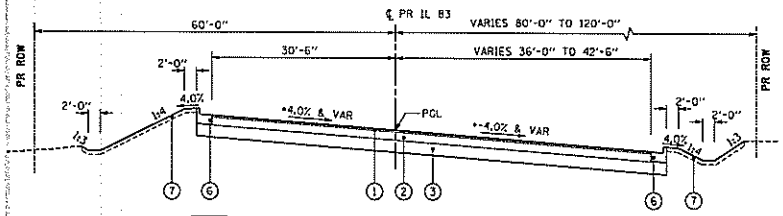
STA. 419+74.52
TO
STA. 420+23.00



L **PROPOSED TYPICAL SECTION – IL ROUTE 83**

STA. 420+23.00 TO STA. 422+52.00

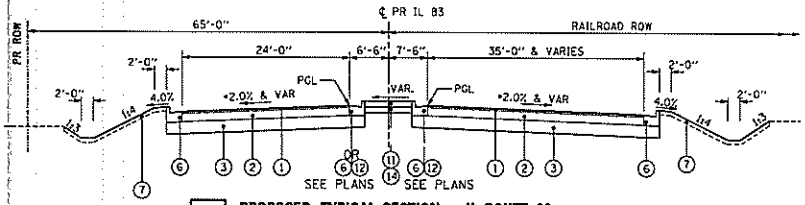
*SEE SUPERELEVATION CHART FOR DETAILS. TYPICAL SECTION SHEET 6
NOTE 1: THE PCL EQUALS THE AVERAGE ELEVATION BETWEEN THE EDGES OF PAVEMENT AT THE ℄



M **PROPOSED TYPICAL SECTION – IL ROUTE 83**

STA. 422+52.00 TO STA. 429+15.53

*SEE SUPERELEVATION CHART FOR DETAILS. TYPICAL SECTION SHEET 6



N **PROPOSED TYPICAL SECTION – IL ROUTE 83**

STA. 429+15.53 TO STA. 432+34.18

*SEE SUPERELEVATION CHART FOR DETAILS. TYPICAL SECTION SHEET 6

EXISTING LEGEND

- REMOVAL
- (A) EXISTING BITUMINOUS CONCRETE SURFACE COURSE, 2"
- (B) EXISTING BITUMINOUS CONCRETE BINDER COURSE, 7"
- (C) EXISTING AGGREGATE SUBGRADE, 12"
- (D) EXISTING PAVED SHOULDER, 6"
- (E) EXISTING AGGREGATE SHOULDER, 6"
- (F) EXISTING CURB AND GUTTER, TYPE B-6.24
- (G) EXISTING PORTLAND CEMENT CONCRETE PAVEMENT
- (H) EXISTING BITUMINOUS OVERLAY
- (I) EXISTING BITUMINOUS BASE COURSE WIDEN
- (J) EXISTING CURB AND GUTTER, TYPE B-6.12
- (K) (BLANK)
- (L) EXISTING CONCRETE SIDEWALK

PROPOSED LEGEND

- (1) HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70 - 2"
- (2) HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N70 - 8" (IN 3 LIFTS)
- (3) AGGREGATE SUBGRADE IMPROVEMENT 12"
- (4) HOT-MIX ASPHALT SHOULDERS, 8"
- (5) (BLANK)
- (6) COMBINATION CONCRETE CURB AND GUTTER TYPE B-6.24
- (7) TOPSOIL EXCAVATION AND PLACEMENT, 4"
- (8) PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH
- (9) PIPE UNDERDRAINS 6"
- (10) (BLANK)
- (11) CONCRETE MEDIAN SURFACE, 6 INCH
- (12) COMBINATION CONCRETE CURB AND GUTTER TYPE M-4.24
- (13) CONCRETE MEDIAN, TYPE SM (SPECIAL)
- (14) AGGREGATE BASE COURSE, TYPE B, 6"
- • GEOTECHNICAL FABRIC FOR GRADE STABILIZATION

IL ROUTE 83

STRUCTURAL DESIGN TRAFFIC: Year 2025
PV= 10,787 SU= 679 MU= 234
ROAD/STREET CLASSIFICATION: Class 1
PERCENT OF STRUCTURAL DESIGN TRAFFIC IN DESIGN LANE:
P= 32% S= 45% M = 45%
TRAFFIC FACTOR: Actual TF = 1.84 AC Type= 20
Minimum TF = 3.56
PG GRADE: Binder= PG64-22 Surface= PG64-28
SUBGRADE SUPPORT RATING:
SSR = POOR (Sta. 411+23.00 to 431+80.62)
SSR = _____ (Sta. _____ to _____)

FILE NAME =	USER NAME =	DESIGNED - JB	REVISED -
		DRAWN - JB	REVISED -
	PLOT SCALE =	CHECKED - ACL	REVISED -
	PLOT DATE =	DATE - 6/30/2014	REVISED -

exp. exp U.S. Services Inc

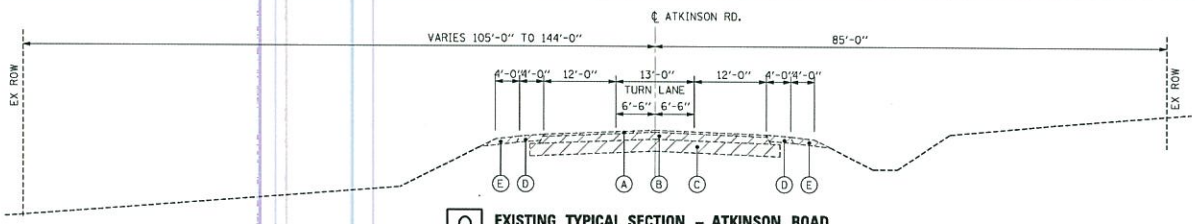
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
FAP ROUTE 866 (IL 83)

TYPICAL SECTIONS 3
IL ROUTE 83

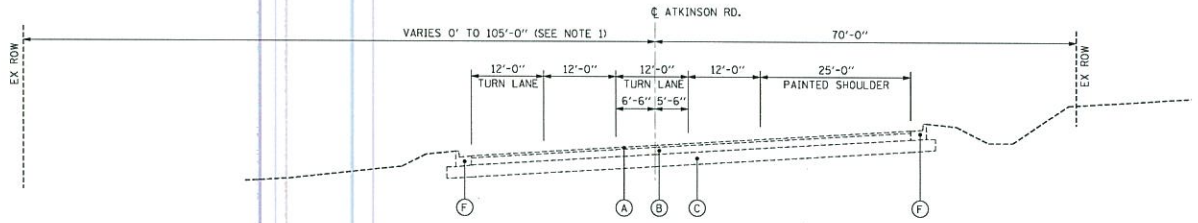
SCALE: N.T.S. | SHEET OF SHEETS | STA. TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
866	3Y-R	LAKE	312	25
		CONTRACT NO. 60N13		

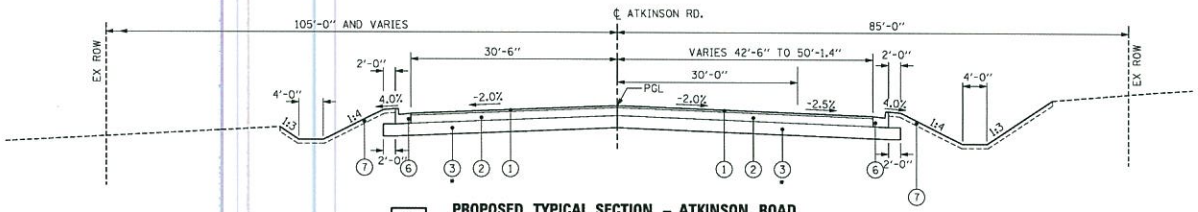
PRELIMINARY | ILLINOIS FED. AID PROJECT



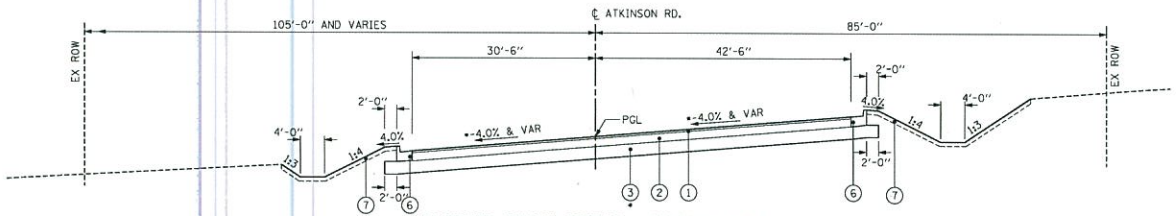
0 EXISTING TYPICAL SECTION – ATKINSON ROAD
STA. 431+62.32 TO STA. 437+01.00



P EXISTING TYPICAL SECTION – ATKINSON ROAD
STA. 437+01.00 TO STA. 442+82.00



Q PROPOSED TYPICAL SECTION – ATKINSON ROAD
STA. 432+34.18 TO STA. 434+54.00
•STA. 434+11.02 TO STA. 434+80.00



R PROPOSED TYPICAL SECTION – ATKINSON ROAD
STA. 434+54.00 TO STA. 437+01.00
•SEE SUPERELEVATION CHART FOR DETAILS. TYPICAL SECTION SHEET 6

EXISTING LEGEND

REMOVAL

- (A) EXISTING BITUMINOUS CONCRETE SURFACE COURSE, 2"
- (B) EXISTING BITUMINOUS CONCRETE BINDER COURSE, 7"
- (C) EXISTING AGGREGATE SUBGRADE, 12"
- (D) EXISTING PAVED SHOULDER, 6"
- (E) EXISTING AGGREGATE SHOULDER, 6"
- (F) EXISTING CURB AND GUTTER, TYPE B-6.24
- (G) EXISTING PORTLAND CEMENT CONCRETE PAVEMENT
- (H) EXISTING BITUMINOUS OVERLAY
- (I) EXISTING BITUMINOUS BASE COURSE WIDEN
- (J) EXISTING CURB AND GUTTER, TYPE B-6.12
- (K) (BLANK)
- (L) EXISTING CONCRETE SIDEWALK

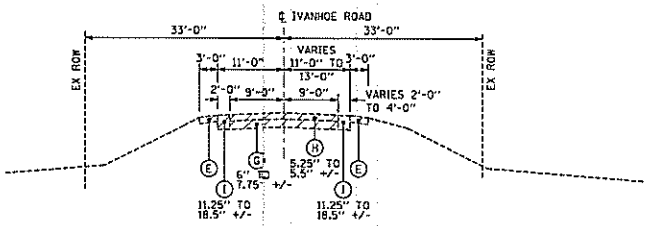
PROPOSED LEGEND

- (1) HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70 - 2"
- (2) HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N70 - 8" (IN 3 LIFTS)
- (3) AGGREGATE SUBGRADE IMPROVEMENT 12"
- (4) HOT-MIX ASPHALT SHOULDERS, 8"
- (5) (BLANK)
- (6) COMBINATION CONCRETE CURB AND GUTTER TYPE B-6.24
- (7) TOPSOIL EXCAVATION AND PLACEMENT, 4"
- (8) PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH
- (9) PIPE UNDERDRAINS 6"
- (10) (BLANK)
- (11) CONCRETE MEDIAN SURFACE, 6 INCH
- (12) COMBINATION CONCRETE CURB AND GUTTER TYPE M-4.24
- (13) CONCRETE MEDIAN, TYPE SM (SPECIAL)
- (14) AGGREGATE BASE COURSE, TYPE B, 6"
- • GEOTECHNICAL FABRIC FOR GRADE STABILIZATION

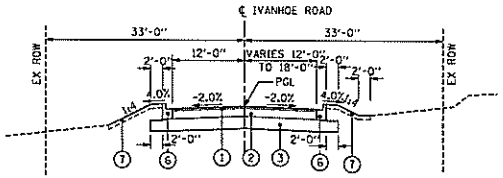
NOTE:
1. ATKINSON ROAD CROSSES OVER INTO FAP 420 ROW BETWEEN STA. 439+70.00 AND STA. 444+55.00

\\DGENI1-MOT-FRIL2CN...\DGENI1-ISPDER2LIS2CN...\DGENI1-XSECTIS2CN...\DGENI1-LEGEND2LIS2CN
6/27/2014, 1:35:51 PM
\\VS-2044\DMV\VAULT_2-THING_2\TYPICAL\CADD\DGENI1\SHEET\DGENI1-SH1-TYPICAL104.DGN
LEJAC

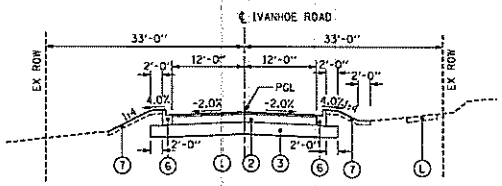
FILE NAME = #FILE1#	USER NAME = #USER#	DESIGNED - JB	REVISED -	**STATE OF ILLINOIS** **DEPARTMENT OF TRANSPORTATION** FAP ROUTE 866 (IL 83)	**TYPICAL SECTIONS 4** **ATKINSON ROAD**	F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
exp U.S. Services Inc. One Trees, IL BUILDINGS • EARTH & ENVIRONMENT • ENERGY INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY	PLOT SCALE = #SCALE#	DRAWN - JB	REVISED -			866	3Y-R	LAKE	312	26
	PLOT DATE = #DATE#	CHECKED - ACL	REVISED -					CONTRACT NO. 60N11		
		DATE - 6/30/2014	REVISED -		SCALE: N.T.S. SHEET OF SHEETS STA. TO STA.	PRELIMINARY	ILLINOIS FED. AID PROJECT			



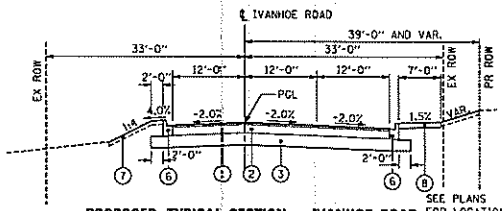
S **EXISTING TYPICAL SECTION – IVANHOE ROAD**
STA. 297+01.00 TO STA. 308+31.20



T **PROPOSED TYPICAL SECTION – IVANHOE ROAD**
STA. 284+68.40 TO STA. 294+91.46



U **PROPOSED TYPICAL SECTION – IVANHOE ROAD**
STA. 302+15.00 TO STA. 306+89.00*
*STA. 302+15.00 TO STA. 303+29.65 IS THE PROPOSED CUL-DE-SAC. SEE SHEET 207 FOR DETAILS



V **PROPOSED TYPICAL SECTION – IVANHOE ROAD**
STA. 306+89.00 TO STA. 310+08.70
RIGHT TURN LANE TAPER 306+89.00 TO 307+97.00
RIGHT TURN LANE 307+97.00 TO 309+25.96

EXISTING LEGEND

- REMOVAL
- (A) EXISTING BITUMINOUS CONCRETE SURFACE COURSE, 2"
- (B) EXISTING BITUMINOUS CONCRETE BINDER COURSE, 7"
- (C) EXISTING AGGREGATE SUBGRADE, 12"
- (D) EXISTING PAVED SHOULDER, 6"
- (E) EXISTING AGGREGATE SHOULDER, 6"
- (F) EXISTING CURB AND GUTTER, TYPE B-6.24
- (G) EXISTING PORTLAND CEMENT CONCRETE PAVEMENT
- (H) EXISTING BITUMINOUS OVERLAY
- (I) EXISTING BITUMINOUS BASE COURSE WIDEN
- (J) EXISTING CURB AND GUTTER, TYPE B-6.12
- (K) (BLANK)
- (L) EXISTING CONCRETE SIDEWALK

PROPOSED LEGEND

- (1) HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70 - 2"
- (2) HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N70 - 8" (IN 3 LIFTS)
- (3) AGGREGATE SUBGRADE IMPROVEMENT 12"
- (4) HOT-MIX ASPHALT SHOULDERS, 8"
- (5) (BLANK)
- (6) COMBINATION CONCRETE CURB AND GUTTER TYPE B-6.24
- (7) TOPSOIL EXCAVATION AND PLACEMENT, 4"
- (8) PORTLAND CEMENT CONCRETE SIDEWALK 5 INCH
- (9) PIPE UNDERDRAINS 6"
- (10) (BLANK)
- (11) CONCRETE MEDIAN SURFACE, 6 INCH
- (12) COMBINATION CONCRETE CURB AND GUTTER TYPE M-4.24
- (13) CONCRETE MEDIAN, TYPE SM (SPECIAL)
- (14) AGGREGATE BASE COURSE, TYPE B, 6"
- * GEOTECHNICAL FABRIC FOR GRADE STABILIZATION

HOT-MIX ASPHALT MIXTURE REQUIREMENTS		
MIXTURE TYPE	AIR VOIDS @ Ndes	QUALITY MANAGEMENT PROGRAM (QMP)
FULL DEPTH PAVEMENT		
HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70	4% @ 70 Gyr.	QCP
HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N70	4% @ 70 Gyr.	PFP
TEMPORARY ROAD		
TEMPORARY PAVEMENT	4% @ 50 Gyr.	QCP
SHOULDERS		
HOT-MIX ASPHALT SHOULDERS, 8"	4% @ 50 Gyr.	QCP
DRIVEWAYS		
HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N50	4% @ 50 Gyr.	QA/QC
HOT-MIX ASPHALT BASE COURSE, 6"	4% @ 50 Gyr.	QA/QC
HOT-MIX ASPHALT BASE COURSE, 8"	4% @ 50 Gyr.	QA/QC

NOTES:
- QMP OPTIONS: QUALITY CONTROL/QUALITY ASSURANCE, (QC/QA); QUALITY CONTROL FOR PERFORMANCE (QCP); PAY FOR PERFORMANCE (PFP)
- THE UNIT WEIGHT USED TO CALCULATE ALL HMA SURFACE MIXTURE QUANTITIES IS 112 LBS/SQ YD/IN.
- THE 'AC TYPE' FOR POLYMERIZED HMA MIXES SHALL BE "SBS/SBR PG 76-22" AND FOR NON POLYMERIZED
- HMA THE "AC TYPE" SHALL BE "PG 64-22" UNLESS MODIFIED BY DISTRICT ONE SPECIAL PROVISIONS.
- FOR HMA FULL DEPTH "AC TYPE" SEE SPECIAL PROVISIONS
- FOR USE OF RECYCLED MATERIALS SEE SPECIAL PROVISIONS
- QUALITY MANAGEMENT PROGRAM (QMP) IDENTIFIES THE PARTICULAR QUALITY CONTROL SPECIFICATION THAT APPLIES TO THE MIXTURE

IVANHOE ROAD

STRUCTURAL DESIGN TRAFFIC: Year 2025
PV= 1,958 SU= 22 MU= 2
ROAD/STREET CLASSIFICATION: Class III
PERCENT OF STRUCTURAL DESIGN TRAFFIC IN DESIGN LANE:
P= 50% S= 50% M = 50%
TRAFFIC FACTOR: Actual TF = 0.03 AC Type= 20
Minimum TF = 3.16
PG GRADE: Binder= PG64-22 Surface= PG64-28
SUBGRADE SUPPORT RATING:
SSR = POOR (Sta. 283+51.87 to 310+08.70)
SSR = _____ (Sta. _____ to _____)

FILE NAME:	USER NAME = MJSEIS	DESIGNED = JB	REVISED -
		DRAWN = JB	REVISED -
exp. AECOM U.S. Services Inc.	PLOT SCALE = SCALE=	CHECKED = ACL	REVISED -
	PLOT DATE = DATE=	DATE = 6/30/2014	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
FAP ROUTE 866 (IL 83)

TYPICAL SECTIONS 5
IVANHOE ROAD
SCALE: N.T.S. | SHEET OF SHEETS | STA. | TO STA.

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
866	3Y-R	LAKE	312	27

CONTRACT NO. 60N11
PRELIMINARY | ILLINOIS FED. AID PROJECT

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

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 02/09/2015

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: IL 83 & Atkinson Road
Section: 3Y-R
County: Lake
Location: Segments A & E

Comments: IL 83 (IL 120 to IL 137/Atkinson Rd)
Combining IL 83 & Atkinson due to nearly identical traffic numbers. (Atkinson is extension of IL 83)

Design Date: 09/18/2014 ONP <-- BY
Modify Date: <-- BY

	ADT	Year
Current:	7,000	2011
Future:	12,700	2025

Facility Type: Other Marked State Route
# of Lanes = 4
Road Class: I
Subgrade Support Rating (SSR): Poor
Construction Year: 2015
Design Period (DP) = 20 years

	Structural Design Traffic: Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	11,455	90.2%	P = 32%
SU =	250	889	7.0%	S = 45%
MU =	750	356	2.8%	M = 45%
Struct. Design ADT =		12,700	(2025)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv =	0.15	
Csu =	132.5	
Cmu =	482.53	
TF flexible (Actual) =	2.62	(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) =	3.39	(Actual ADT)
TF rigid (Min) =	5.02	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible =	3.56	
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)
Goto Map — HMA Mixture Temp. =	73.0	deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) =	760	ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) =	84	(Fig. 54-5.E)
Full Depth HMA Design Thickness =	9.75	in. (Fig. 54-5.F)
Goto Map — Limiting Strain Criterion Thickness =	14.25	in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness =	**9.75**	**inches**

JPC Pavement

Use TF rigid =	5.02	
Edge Support =	Tied	Shoulder or C.&G.
Rigid Pavt Thick. =	**9.00**	**in. (Fig. 54-4.E)**

CRC Pavement

Use TF rigid =	5.02	
IBR value =	3	
CRCP Thickness =	**8.00**	**in. (Fig. 54-4.M)**

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible =	3.56	
HMA Overlay Design Thickness =	7.25	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)

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	Rigid Cmu	Flexible (Fig. 54-5.B) Csu	Flexible 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	Rural S	Rural M	Urban P	Urban S	Urban 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: 02/09/2015

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE		IL 83	
SECTION		3Y-R	
COUNTY		Lake	
LOCATION		Segments A	
FACILITY TYPE		NON-INTERSTATE	
PROJECT LENGTH		2415 FT	= = > 0.46 Miles
# OF CENTERLINES		4 CL	
# OF LANES		4 LANES	
# OF EDGES		2 EP	
LANE WIDTH - AVERAGE		12 FT	
SHOULDER WIDTH	HMA Left	10 FT	
	HMA Right	10 FT	
	Total Width of Paved Shoulders	20 FT	
PAVEMENT THICKNESS (FLEXIBLE)		9.75 IN	14.25 IN MAX
SHOULDER THICKNESS		8.00 IN	Standard Design
POLICY OVERLAY THICKNESS		2.25 IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	3.56	2.62	3.56

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$89.91 / TON
HMA TOP BINDER	$78.04 / TON
HMA LOWER BINDER	$73.58 / TON
HMA BINDER (LEVELING)	$78.04 / TON
HMA SHOULDER	$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST	
HMA PAVEMENT (FULL-DEPTH)	(9.75")	12,880	SQ YD	*	$42.99	/ SQ YD	$553,711	~
HMA SURFACE COURSE	(2.00")	1,448	TONS		$89.91	/ TON	$0	
HMA TOP BINDER COURSE	(2.25")	1,640	TONS		$78.04	/ TON	$0	
HMA LOWER BINDER COURSE	(5.50")	4,063	TONS		$73.58	/ TON	$0	
HMA SHOULDER	(8.00")	883	TONS	*	$72.00	/ TON	$63,576	~
CURB & GUTTER		3,060	LIN FT	*	$30.00	/ LIN FT	$91,800	
SUBBASE GRAN MATL TY C (TONS)		0	TONS		$25.00	/ TON	$0	
IMPROVED SUBGRADE:	Modified Soil	18,951	SQ YD		$7.00	/ SQ YD	$132,657	
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0	
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0	
PAVEMENT REMOVAL		12,880	SQ YD		$15.00	/ SQ YD	$193,200	
SHOULDER REMOVAL		1,970	SQ YD	*	$10.00	/ SQ YD	$19,700	

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$1,054,644
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$94,043

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY				$0.00	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix	$10.10	/ SQ YD
HMA OVERLAY PVMT		(2.25")		$10.87	/ SQ YD
HMA SURFACE MIX		(1.50")	Surface Mix	$7.57	/ SQ YD
HMA BINDER MIX		(0.75")	eling Binder Mix	$3.30	/ SQ YD
HMA OVERLAY SHLD	(Year 30)	(2.25")	Shoulder Mix	$9.07	/ SQ YD
HMA OVERLAY SHLD		(2.00")	Shoulder Mix	$8.06	/ SQ YD
MILLING (2.00 IN)				$3.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)	Surface Mix	$80.07	/ 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	$78.74	/ 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	$1,416,293
FLEXIBLE TOTAL ANNUAL COST PER MILE	$126,291

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 02/09/15

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%	4,830	LIN FT	$2.00		$9,660	
	CNTR LINE JOINT R&S	100.00%	9,660	LIN FT	$2.00		$19,320	
	RNDM / THRM CRACK R&S	50.00%	5,313	LIN FT	$2.00		$10,626	
	PD PVMT PATCH M&F SURF	0.10%	13	SQ YD	$80.07		$1,041	
	PWFn =	0.8626		PW =	0.8626	X	$40,647	$35,062
YEAR 10								
	LONG SHLD JT R&S	100.00%	4,830	LIN FT	$2.00		$9,660	
	CNTR LINE JOINT R&S	100.00%	9,660	LIN FT	$2.00		$19,320	
	RNDM / THRM CRACK R&S	50.00%	5,313	LIN FT	$2.00		$10,626	
	PD PVMT PATCH M&F SURF	0.50%	64	SQ YD	$80.07		$5,124	
	PWFn =	0.7441		PW =	0.7441	X	$44,730	$33,283
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	14,851	SQ YD	$3.00		$44,553	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	129	SQ YD	$78.74		$10,158	
	HMA OVERLAY PVMT 2.00"	100.00%	12,880	SQ YD	$10.10		$130,151	
	HMA OVERLAY SHLD 2.00 "	100.00%	1,971	SQ YD	$8.06		$15,894	
	PWFn =	0.6419		PW =	0.6419	X	$200,756	$128,858
YEAR 20								
	LONG SHLD JT R&S	100.00%	4,830	LIN FT	$2.00		$9,660	
	CNTR LINE JOINT R&S	100.00%	9,660	LIN FT	$2.00		$19,320	
	RNDM / THRM CRACK R&S	50.00%	5,313	LIN FT	$2.00		$10,626	
	PD PVMT PATCH M&F SURF	0.10%	13	SQ YD	$80.07		$1,041	
	PWFn =	0.5537		PW =	0.5537	X	$40,647	$22,505
YEAR 25								
	LONG SHLD JT R&S	100.00%	4,830	LIN FT	$2.00		$9,660	
	CNTR LINE JOINT R&S	100.00%	9,660	LIN FT	$2.00		$19,320	
	RNDM / THRM CRACK R&S	50.00%	5,313	LIN FT	$2.00		$10,626	
	PD PVMT PATCH M&F SURF	0.50%	64	SQ YD	$80.07		$5,124	
	PWFn =	0.4776		PW =	0.4776	X	$44,730	$21,363
	HMA_SD							
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	14,851	SQ YD	$3.00		$44,553	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	258	SQ YD	$78.74		$20,315	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	20	SQ YD	$78.06		$1,561	
	HMA OVERLAY PVMT 2.25 "	100.00%	12,880	SQ YD	$10.87		$140,020	
	HMA OVERLAY SHLD 2.25 "	100.00%	1,971	SQ YD	$9.07		$17,881	
	PWFn =	0.4120		PW =	0.4120	X	$224,330	$92,421
YEAR 35								
	LONG SHLD JT R&S	100.00%	4,830	LIN FT	$2.00		$9,660	
	CNTR LINE JOINT R&S	100.00%	9,660	LIN FT	$2.00		$19,320	
	RNDM / THRM CRACK R&S	50.00%	5,313	LIN FT	$2.00		$10,626	
	PD PVMT PATCH M&F SURF	0.10%	13	SQ YD	$80.07		$1,041	
	PWFn =	0.3554		PW =	0.3554	X	$40,647	$14,445
YEAR 40								
	LONG SHLD JT R&S	100.00%	4,830	LIN FT	$2.00		$9,660	
	CNTR LINE JOINT R&S	100.00%	9,660	LIN FT	$2.00		$19,320	
	RNDM / THRM CRACK R&S	50.00%	5,313	LIN FT	$2.00		$10,626	
	PD PVMT PATCH M&F SURF	0.50%	64	SQ YD	$80.07		$5,124	
	PWFn =	0.3066		PW =	0.3066	X	$44,730	$13,712
								$361,649
	ROUTINE MAINTENANCE ACTIVITY		1.83	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$361,649
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$32,248

PCC PAVEMENT

JPCP

ROUTE			IL 83	
SECTION			3Y-R	
COUNTY			Lake	
LOCATION			Segments A	
FACILITY TYPE			NON-INTERSTATE	
PROJECT LENGTH			2415 FT	= = > 0.46 Miles
# OF CENTERLINES			4 CL	
# OF LANES			4 LANES	
# OF EDGES			2 EP	
LANE WIDTH - AVERAGE			12 FT	
SHOULDER WIDTH	PCC	Left	10 FT	
	PCC	Right	10 FT	
	Total Width of Paved Shoulders		20 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
		5.02	3.39	5.02
Worksheet Construction Type is	Reconstruction		The Pavement Type is	JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST
JPC PAVEMENT	(9.00")	12,880	SQ YD		$45.24	/ SQ YD	$582,691
PAVEMENT REINFORCEMENT		0	SQ YD		$22.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	4,720	SQ YD	*	$19.00	/ SQ YD	$89,680
PCC SHOULDERS	(9.00" to 9.00")	1,970	SQ YD	*	$40.00	/ SQ YD	$78,800
CURB & GUTTER		3,060	LIN FT	*	$30.00	/ LIN FT	$91,800
SUBBASE GRAN MATL TY C	(~ 1.66")	585	TONS		$25.00	/ TON	$14,625
IMPROVED SUBGRADE:	Modified Soil	18,515	SQ YD		$7.00	/ SQ YD	$129,605
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0
PAVEMENT REMOVAL		12,880	SQ YD		$15.00	/ SQ YD	$193,200
SHOULDER REMOVAL		1,970	SQ YD	*	$10.00	/ SQ YD	$19,700

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$1,200,101
RIGID CONSTRUCTION ANNUAL COST PER MILE	$107,013

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")		$11.97	/ SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	$7.57	/ SQ YD
HMA BINDER MIX	(1.00")	eling Binder Mix	$4.40	/ 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	$77.55	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	$82.59	/ 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	$1,412,267
RIGID TOTAL ANNUAL COST PER MILE	$125,932

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 02/09/15

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%	26	SQ YD	$150.00		$3,900	
	PWFn =	0.6419		PW =	0.6419	X	$3,900	$2,503
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	258	SQ YD	$150.00		$38,700	
	SHOULDER PATCH CLASS C	0.50%	10	SQ YD	$145.00		$1,450	
	LONGITUDINAL SHLD JT R&S	100.00%	4,830	LIN FT	$2.00		$9,660	
	CENTERLINE JT R&S	100.00%	9,660	LIN FT	$2.00		$19,320	
	PWFn =	0.5537		PW =	0.5537	X	$69,130	$38,276
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	386	SQ YD	$150.00		$57,900	
	SHOULDER PATCH CLASS C	1.00%	20	SQ YD	$145.00		$2,900	
	PWFn =	0.4776		PW =	0.4776	X	$60,800	$29,038
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	515	SQ YD	$150.00		$77,250	
	SHOULDER PATCH CLASS C	1.50%	30	SQ YD	$145.00		$4,350	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	12,880	SQ YD	$11.97		$154,208	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	1,971	SQ YD	$10.08		$19,867	
	PWFn =	0.4120		PW =	0.4120	X	$255,675	$105,335
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	4,830	LIN FT	$2.00		$9,660	
	CENTERLINE JT R&S	100.00%	9,660	LIN FT	$2.00		$19,320	
	RANDOM CRACK R&S	50.00%	4,830	LIN FT	$2.00		$9,660	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	3,091	LIN FT	$2.00		$6,182	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	13	SQ YD	$82.59		$1,074	
	PWFn =	0.3554		PW =	0.3554	X	$45,896	$16,311
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	64	SQ YD	$150.00		$9,600	
	LONGITUDINAL SHLD JT R&S	100.00%	4,830	LIN FT	$2.00		$9,660	
	CENTERLINE JT R&S	100.00%	9,660	LIN FT	$2.00		$19,320	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	4,637	LIN FT	$2.00		$9,274	
	RANDOM CRACK R&S	50.00%	4,830	LIN FT	$2.00		$9,660	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	64	SQ YD	$82.59		$5,286	
	PWFn =	0.3066		PW =	0.3066	X	$62,800	$19,252
								$212,166
	ROUTINE MAINTENANCE ACTIVITY		1.83	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$212,166
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$18,919

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 12/23/14 11:21 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$1,200,101	$1,054,644
		ANNUAL COST PER MILE	$107,013	$94,043
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$212,166	$361,649
		ANNUAL COST PER MILE	$18,919	$32,248
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$1,412,267	$1,416,293
		ANNUAL COST PER MILE	$125,932	$126,291

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**JPCP**	**$125,932**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**HMA**	**$126,291**	0.3%

P:\Pavement Design Stuff\D-1\IL 83 from IL 120 to IL 137 & at Atkinson Road\[IL 83 from IL 120 to IL 137 & at Atkinson Road Mechanistic LCCA for IL 83 at Atkinsor

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

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 02/09/2015

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: IL 137 & IL 83/IL 137
Section: 3Y-R
County: Lake
Location: Segments B & C

Comments: IL 137 (IL 120 to South project limits)
Combining Segments B & C into one pavement design (Used Segment B traffic for analysis)

Design Date: 09/18/2014 ONP <-- BY
Modify Date: <-- BY

	ADT	Year
Current:	15,300	2011
Future:	24,000	2025

Facility Type: Other Marked State Route
# of Lanes = 4
Road Class: I
Subgrade Support Rating (SSR): Poor
Construction Year: 2015
Design Period (DP) = 20 years

	Structural Design Traffic: Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	22,560	94.0%	P = 32%
SU =	250	840	3.5%	S = 45%
MU =	750	600	2.5%	M = 45%

Struct. Design ADT = 24,000 (2025)

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT			RIGID PAVEMENT		
Cpv =	0.15		Cpv =	0.15	
Csu =	132.5		Csu =	143.81	
Cmu =	482.53		Cmu =	696.42	
TF flexible (Actual) =	3.63	(Actual ADT)	TF rigid (Actual) =	4.87	(Actual ADT)
TF flexible (Min) =	3.56	(Min ADT Fig. 54-2.C)	TF rigid (Min) =	5.02	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 3.63
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)
Goto Map
HMA Mixture Temp. = 73.0 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 760 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 83 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 9.75 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 14.25 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 9.75 inches

JPC Pavement

Use TF rigid = 5.02
Edge Support = Tied Shoulder or C.&G.

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

CRC Pavement

Use TF rigid = 5.02
IBR value = 3

CRCP Thickness = 8.00 in. (Fig. 54-4.M)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible = 3.63
HMA Overlay Design Thickness = 7.25 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)

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: 02/09/2015

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE		IL 137 & IL 83/IL 137	
SECTION		3Y-R	
COUNTY		Lake	
LOCATION		Segments B & C	
FACILITY TYPE		NON-INTERSTATE	
PROJECT LENGTH		3600 FT = = >	0.68 Miles
# OF CENTERLINES		4 CL	
# OF LANES		4 LANES	
# OF EDGES		2 EP	
LANE WIDTH - AVERAGE		12 FT	
SHOULDER WIDTH	HMA Left	10 FT	
	HMA Right	10 FT	
	Total Width of Paved Shoulders	20 FT	
PAVEMENT THICKNESS (FLEXIBLE)		9.75 IN	14.25 IN MAX
SHOULDER THICKNESS		8.00 IN	Standard Design
POLICY OVERLAY THICKNESS		2.25 IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	3.56	3.63	3.63

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$89.81 / TON
HMA TOP BINDER	$78.04 / TON
HMA LOWER BINDER	$73.58 / TON
HMA BINDER (LEVELING)	$73.84 / TON
HMA SHOULDER	$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST	
HMA PAVEMENT (FULL-DEPTH)	(9.75")	19,200	SQ YD	*	$42.99	/ SQ YD	$825,408	~
HMA SURFACE COURSE	(2.00")	2,158	TONS		$89.81	/ TON	$0	
HMA TOP BINDER COURSE	(2.25")	2,445	TONS		$78.04	/ TON	$0	
HMA LOWER BINDER COURSE	(5.50")	6,057	TONS		$73.58	/ TON	$0	
HMA SHOULDER	(8.00")	1,478	TONS	*	$72.00	/ TON	$106,416	~
CURB & GUTTER		4,200	LIN FT	*	$30.00	/ LIN FT	$126,000	
SUBBASE GRAN MATL TY C (TONS)		0	TONS		$25.00	/ TON	$0	
IMPROVED SUBGRADE:	Modified Soil	28,250	SQ YD		$7.00	/ SQ YD	$197,750	
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0	
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0	
PAVEMENT REMOVAL		19,200	SQ YD		$15.00	/ SQ YD	$288,000	
SHOULDER REMOVAL		3,300	SQ YD	*	$10.00	/ SQ YD	$33,000	

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$1,576,574
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$94,308

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL		UNIT COST	
ROUTINE MAINTENANCE ACTIVITY					$0.00	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix		$10.09	/ SQ YD
HMA OVERLAY PVMT		(2.25")			$10.69	/ SQ YD
HMA SURFACE MIX		(1.50")	Surface Mix		$7.56	/ SQ YD
HMA BINDER MIX		(0.75")	eling Binder Mix		$3.12	/ 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		$80.06	/ 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		$78.27	/ 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	$2,118,382
FLEXIBLE TOTAL ANNUAL COST PER MILE	$126,718

HMA_SD

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 02/09/15

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%	7,200	LIN FT	$2.00		$14,400	
	CNTR LINE JOINT R&S	100.00%	14,400	LIN FT	$2.00		$28,800	
	RNDM / THRM CRACK R&S	50.00%	7,920	LIN FT	$2.00		$15,840	
	PD PVMT PATCH M&F SURF	0.10%	19	SQ YD	$80.06		$1,521	
	PWFn =	0.8626		PW =	0.8626	X	$60,561	$52,240
YEAR 10								
	LONG SHLD JT R&S	100.00%	7,200	LIN FT	$2.00		$14,400	
	CNTR LINE JOINT R&S	100.00%	14,400	LIN FT	$2.00		$28,800	
	RNDM / THRM CRACK R&S	50.00%	7,920	LIN FT	$2.00		$15,840	
	PD PVMT PATCH M&F SURF	0.50%	96	SQ YD	$80.06		$7,686	
	PWFn =	0.7441		PW =	0.7441	X	$66,726	$49,650
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	22,499	SQ YD	$3.00		$67,497	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	192	SQ YD	$78.27		$15,028	
	HMA OVERLAY PVMT 2.00"	100.00%	19,200	SQ YD	$10.09		$193,798	
	HMA OVERLAY SHLD 2.00 "	100.00%	3,299	SQ YD	$8.06		$26,604	
	PWFn =	0.6419		PW =	0.6419	X	$302,927	$194,437
YEAR 20								
	LONG SHLD JT R&S	100.00%	7,200	LIN FT	$2.00		$14,400	
	CNTR LINE JOINT R&S	100.00%	14,400	LIN FT	$2.00		$28,800	
	RNDM / THRM CRACK R&S	50.00%	7,920	LIN FT	$2.00		$15,840	
	PD PVMT PATCH M&F SURF	0.10%	19	SQ YD	$80.06		$1,521	
	PWFn =	0.5537		PW =	0.5537	X	$60,561	$33,531
YEAR 25								
	LONG SHLD JT R&S	100.00%	7,200	LIN FT	$2.00		$14,400	
	CNTR LINE JOINT R&S	100.00%	14,400	LIN FT	$2.00		$28,800	
	RNDM / THRM CRACK R&S	50.00%	7,920	LIN FT	$2.00		$15,840	
	PD PVMT PATCH M&F SURF	0.50%	96	SQ YD	$80.06		$7,686	
	PWFn =	0.4776		PW =	0.4776	X	$66,726	$31,869
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	22,499	SQ YD	$3.00		$67,497	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	384	SQ YD	$78.27		$30,056	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	33	SQ YD	$78.06		$2,576	
	HMA OVERLAY PVMT 2.25 "	100.00%	19,200	SQ YD	$10.69		$205,155	
	HMA OVERLAY SHLD 2.25 "	100.00%	3,299	SQ YD	$9.07		$29,930	
	PWFn =	0.4120		PW =	0.4120	X	$335,214	$138,104
YEAR 35								
	LONG SHLD JT R&S	100.00%	7,200	LIN FT	$2.00		$14,400	
	CNTR LINE JOINT R&S	100.00%	14,400	LIN FT	$2.00		$28,800	
	RNDM / THRM CRACK R&S	50.00%	7,920	LIN FT	$2.00		$15,840	
	PD PVMT PATCH M&F SURF	0.10%	19	SQ YD	$80.06		$1,521	
	PWFn =	0.3554		PW =	0.3554	X	$60,561	$21,522
YEAR 40								
	LONG SHLD JT R&S	100.00%	7,200	LIN FT	$2.00		$14,400	
	CNTR LINE JOINT R&S	100.00%	14,400	LIN FT	$2.00		$28,800	
	RNDM / THRM CRACK R&S	50.00%	7,920	LIN FT	$2.00		$15,840	
	PD PVMT PATCH M&F SURF	0.50%	96	SQ YD	$80.06		$7,686	
	PWFn =	0.3066		PW =	0.3066	X	$66,726	$20,455
								$541,808
	ROUTINE MAINTENANCE ACTIVITY		2.70	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$541,808
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$32,410

PCC PAVEMENT — JPCP

ROUTE			IL 137 & IL 83/IL 137	
SECTION			3Y-R	
COUNTY			Lake	
LOCATION			Segments B & C	
FACILITY TYPE			NON-INTERSTATE	
PROJECT LENGTH			3600 FT	= = > 0.68 Miles
# OF CENTERLINES			4 CL	
# OF LANES			4 LANES	
# OF EDGES			2 EP	
LANE WIDTH - AVERAGE			12 FT	
SHOULDER WIDTH	PCC	Left	10 FT	
	PCC	Right	10 FT	
	Total Width of Paved Shoulders		20 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
		5.02	4.87	5.02
Worksheet Construction Type is	Reconstruction		The Pavement Type is	JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST
JPC PAVEMENT	(9.00")	19,200	SQ YD		$45.23	/ SQ YD	$868,416
PAVEMENT REINFORCEMENT		0	SQ YD		$22.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	8,000	SQ YD	*	$19.00	/ SQ YD	$152,000
PCC SHOULDERS	(9.00" to 9.00")	3,300	SQ YD	*	$40.00	/ SQ YD	$132,000
CURB & GUTTER		4,200	LIN FT	*	$30.00	/ LIN FT	$126,000
SUBBASE GRAN MATL TY C	(~ 1.66")	872	TONS		$25.00	/ TON	$21,800
IMPROVED SUBGRADE:	Modified Soil	27,600	SQ YD		$7.00	/ SQ YD	$193,200
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0
PAVEMENT REMOVAL		19,200	SQ YD		$15.00	/ SQ YD	$288,000
SHOULDER REMOVAL		3,300	SQ YD	*	$10.00	/ SQ YD	$33,000

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$1,814,416
RIGID CONSTRUCTION ANNUAL COST PER MILE	$108,535

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	T	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY				$0.00	/ LANE-MILE / YEAR
HMA POLICY OVERLAY	(2.50")		2.50		
HMA POLICY OVERLAY PVMT	(2.50")		2.50	$11.73	/ SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	1.50	$7.56	/ SQ YD
HMA BINDER MIX	(1.00")	eling Binder Mix	1.00	$4.16	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")	Shoulder Mix	2.50	$10.08	/ SQ YD
CLASS A PAVEMENT PATCHING				$195.00	/ SQ YD
CLASS B PAVEMENT PATCHING				$150.00	/ SQ YD
CLASS C SHOULDER PATCHING				$145.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	1.50	$77.54	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	2.50	$82.57	/ 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	$2,130,878
RIGID TOTAL ANNUAL COST PER MILE	$127,465

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 02/09/15

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%	19	SQ YD	$150.00		$2,850	
	PWFn =	0.7441		PW =	0.7441	X	$2,850	$2,121
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	38	SQ YD	$150.00		$5,700	
	PWFn =	0.6419		PW =	0.6419	X	$5,700	$3,659
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	384	SQ YD	$150.00		$57,600	
	SHOULDER PATCH CLASS C	0.50%	17	SQ YD	$145.00		$2,465	
	LONGITUDINAL SHLD JT R&S	100.00%	7,200	LIN FT	$2.00		$14,400	
	CENTERLINE JT R&S	100.00%	14,400	LIN FT	$2.00		$28,800	
	PWFn =	0.5537		PW =	0.5537	X	$103,265	$57,175
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	576	SQ YD	$150.00		$86,400	
	SHOULDER PATCH CLASS C	1.00%	33	SQ YD	$145.00		$4,785	
	PWFn =	0.4776		PW =	0.4776	X	$91,185	$43,550
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	768	SQ YD	$150.00		$115,200	
	SHOULDER PATCH CLASS C	1.50%	50	SQ YD	$145.00		$7,250	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	19,200	SQ YD	$11.73		$225,167	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	3,299	SQ YD	$10.08		$33,255	
	PWFn =	0.4120		PW =	0.4120	X	$380,872	$156,914
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	7,200	LIN FT	$2.00		$14,400	
	CENTERLINE JT R&S	100.00%	14,400	LIN FT	$2.00		$28,800	
	RANDOM CRACK R&S	50.00%	7,200	LIN FT	$2.00		$14,400	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	4,608	LIN FT	$2.00		$9,216	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	19	SQ YD	$82.57		$1,569	
	PWFn =	0.3554		PW =	0.3554	X	$68,385	$24,303
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	96	SQ YD	$150.00		$14,400	
	LONGITUDINAL SHLD JT R&S	100.00%	7,200	LIN FT	$2.00		$14,400	
	CENTERLINE JT R&S	100.00%	14,400	LIN FT	$2.00		$28,800	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	6,912	LIN FT	$2.00		$13,824	
	RANDOM CRACK R&S	50.00%	7,200	LIN FT	$2.00		$14,400	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	96	SQ YD	$82.57		$7,927	
	PWFn =	0.3066		PW =	0.3066	X	$93,751	$28,740
								$316,462
	ROUTINE MAINTENANCE ACTIVITY		2.73	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$316,462
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$18,930

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 12/23/14 1:18 PM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$1,814,416	$1,576,574
		ANNUAL COST PER MILE	$108,535	$94,308
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$316,462	$541,808
		ANNUAL COST PER MILE	$18,930	$32,410
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$2,130,878	$2,118,382
		ANNUAL COST PER MILE	$127,465	$126,718

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**HMA**	**$126,718**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**JPCP**	**$127,465**	0.6%

P:\Pavement Design Stuff\D-1\IL 83 from IL 120 to IL 137 & at Atkinson Road\[IL 83 from IL 120 to IL 137 & at Atkinson Road Mechanistic LCCA for IL 137 09-05-13

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

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 02/09/2015

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: Ivanhoe Road
Section: 3Y-R
County: Lake
Location: Segment D
Comments: Ivanhoe Road (North and South Portions)
Design Date: 09/18/2014 ONP
Modify Date:

	ADT	Year
<-- BY		
<-- BY	ADT	Year
Current:	5,750	2011
Future:	2,000	2025

Facility Type: Unmarked State Route
# of Lanes = 2 or 3
Part of future 4 lanes or more ? No
One Way Street ? No
Road Class: III

Subgrade Support Rating (SSR): Poor
Construction Year: 2015
Design Period (DP) = 20 years

	Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	No Min	1,760	88.0%	P = 50%
SU =	No Min	100	5.0%	S = 50%
MU =	No Min	140	7.0%	M = 50%
Struct. Design ADT =		2,000	(2025)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT			RIGID PAVEMENT		
Cpv =	0.15		Cpv =	0.15	
Csu =	109.14		Csu =	129.58	
Cmu =	384.35		Cmu =	562.47	
TF flexible (Actual) =	0.65	(Actual ADT)	TF rigid (Actual) =	0.92	(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 = 0.65
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)
Goto Map
HMA Mixture Temp. = 73.0 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 760 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 136 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 7.25 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 14.25 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 7.25 inches

JPC Pavement

Use TF rigid = 0.92
Edge Support = Tied Shoulder or C.&G.

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

CRC Pavement

Use TF rigid = 0.92
IBR value = 3

CRCP Thickness = 6.00 in. (Fig. 54-4.N)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible = 0.65
Goto Map
HMA Overlay Design Thickness = 5.00 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: 02/09/2015

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE	Ivanhoe Road
SECTION	3Y-R
COUNTY	Lake
LOCATION	Segment D
FACILITY TYPE	NON-INTERSTATE

PROJECT LENGTH			1678 FT	= = > 0.32 Miles
# OF CENTERLINES			1 CL	
# OF LANES			2 LANES	
# OF EDGES			2 EP	
LANE WIDTH - AVERAGE			12 FT	
SHOULDER WIDTH	HMA	Left	0 FT	
	HMA	Right	0 FT	
	Total Width of Paved Shoulders		0 FT	

PAVEMENT THICKNESS (FLEXIBLE)	7.25 IN	14.25 IN MAX
SHOULDER THICKNESS	8.00 IN	Standard Design
POLICY OVERLAY THICKNESS	2.25 IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	No Min	0.65	0.65

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$109.79 / TON
HMA TOP BINDER	$87.09 / TON
HMA LOWER BINDER	$87.09 / TON
HMA BINDER (LEVELING)	$98.44 / TON
HMA SHOULDER	$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST	
HMA PAVEMENT (FULL-DEPTH)	(7.25")	4,475	SQ YD	*	$38.21	/ SQ YD	$170,977	~
HMA SURFACE COURSE	(2.00")	505	TONS		$109.79	/ TON	$0	
HMA TOP BINDER COURSE	(2.25")	576	TONS		$87.09	/ TON	$0	
HMA LOWER BINDER COURSE	(3.00")	782	TONS		$87.09	/ TON	$0	
HMA SHOULDER	(8.00")	0	TONS		$72.00	/ TON	$0	~
CURB & GUTTER		3,356	LIN FT	*	$30.00	/ LIN FT	$100,680	
SUBBASE GRAN MATL TY C (TONS)		0	TONS		$25.00	/ TON	$0	
IMPROVED SUBGRADE:	Modified Soil	4,886	SQ YD		$7.00	/ SQ YD	$34,202	
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0	
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0	
PAVEMENT REMOVAL		4,475	SQ YD		$15.00	/ SQ YD	$67,125	
SHOULDER REMOVAL		0	SQ YD		$0.00	/ SQ YD	$0	

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$372,984
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$47,867

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL		UNIT COST	
ROUTINE MAINTENANCE ACTIVITY					$0.00	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix	2.00	$12.38	/ SQ YD
HMA OVERLAY PVMT		(2.25")		2.25	$13.46	/ SQ YD
HMA SURFACE MIX		(1.50")	Surface Mix	1.50	$9.27	/ SQ YD
HMA BINDER MIX		(0.75")	eling Binder Mix	0.75	$4.19	/ SQ YD
HMA OVERLAY SHLD	(Year 30)	(2.25")	Shoulder Mix	2.25	$9.07	/ SQ YD
HMA OVERLAY SHLD		(2.00")	Shoulder Mix	2.00	$8.06	/ SQ YD
MILLING (2.00 IN)				2.00	$3.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)	Surface Mix	2.00	$82.30	/ 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 ")	Leveling Binder Mix	2.00	$81.03	/ 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	$501,574
FLEXIBLE TOTAL ANNUAL COST PER MILE	$64,369

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 02/09/15

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%	3,356	LIN FT	$2.00		$6,712	
	CNTR LINE JOINT R&S	100.00%	1,678	LIN FT	$2.00		$3,356	
	RNDM / THRM CRACK R&S	50.00%	1,846	LIN FT	$2.00		$3,692	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$82.30		$329	
	PWFn =	0.8626		PW =	0.8626	X	$14,089	$12,153
YEAR 10								
	LONG SHLD JT R&S	100.00%	3,356	LIN FT	$2.00		$6,712	
	CNTR LINE JOINT R&S	100.00%	1,678	LIN FT	$2.00		$3,356	
	RNDM / THRM CRACK R&S	50.00%	1,846	LIN FT	$2.00		$3,692	
	PD PVMT PATCH M&F SURF	0.50%	22	SQ YD	$82.30		$1,811	
	PWFn =	0.7441		PW =	0.7441	X	$15,571	$11,586
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	4,475	SQ YD	$3.00		$13,425	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	45	SQ YD	$81.03		$3,646	
	HMA OVERLAY PVMT 2.00"	100.00%	4,475	SQ YD	$12.38		$55,405	
	HMA OVERLAY SHLD 2.00 "	100.00%	0	SQ YD	$8.06		$0	
	PWFn =	0.6419		PW =	0.6419	X	$72,476	$46,520
YEAR 20								
	LONG SHLD JT R&S	100.00%	3,356	LIN FT	$2.00		$6,712	
	CNTR LINE JOINT R&S	100.00%	1,678	LIN FT	$2.00		$3,356	
	RNDM / THRM CRACK R&S	50.00%	1,846	LIN FT	$2.00		$3,692	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$82.30		$329	
	PWFn =	0.5537		PW =	0.5537	X	$14,089	$7,801
YEAR 25								
	LONG SHLD JT R&S	100.00%	3,356	LIN FT	$2.00		$6,712	
	CNTR LINE JOINT R&S	100.00%	1,678	LIN FT	$2.00		$3,356	
	RNDM / THRM CRACK R&S	50.00%	1,846	LIN FT	$2.00		$3,692	
	PD PVMT PATCH M&F SURF	0.50%	22	SQ YD	$82.30		$1,811	
	PWFn =	0.4776		PW =	0.4776	X	$15,571	$7,437
	HMA_SD							
YEAR 30	NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	4,475	SQ YD	$3.00		$13,425	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	89	SQ YD	$81.03		$7,211	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	0	SQ YD	$78.06		$0	
	HMA OVERLAY PVMT 2.25 "	100.00%	4,475	SQ YD	$13.46		$60,223	
	HMA OVERLAY SHLD 2.25 "	100.00%	0	SQ YD	$9.07		$0	
	PWFn =	0.4120		PW =	0.4120	X	$80,859	$33,313
YEAR 35								
	LONG SHLD JT R&S	100.00%	3,356	LIN FT	$2.00		$6,712	
	CNTR LINE JOINT R&S	100.00%	1,678	LIN FT	$2.00		$3,356	
	RNDM / THRM CRACK R&S	50.00%	1,846	LIN FT	$2.00		$3,692	
	PD PVMT PATCH M&F SURF	0.10%	4	SQ YD	$82.30		$329	
	PWFn =	0.3554		PW =	0.3554	X	$14,089	$5,007
YEAR 40								
	LONG SHLD JT R&S	100.00%	3,356	LIN FT	$2.00		$6,712	
	CNTR LINE JOINT R&S	100.00%	1,678	LIN FT	$2.00		$3,356	
	RNDM / THRM CRACK R&S	50.00%	1,846	LIN FT	$2.00		$3,692	
	PD PVMT PATCH M&F SURF	0.50%	22	SQ YD	$82.30		$1,811	
	PWFn =	0.3066		PW =	0.3066	X	$15,571	$4,773
								$128,590
	ROUTINE MAINTENANCE ACTIVITY		0.64	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$128,590
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$16,503

PCC PAVEMENT

JPCP

ROUTE			Ivanhoe Road		
SECTION			3Y-R		
COUNTY			Lake		
LOCATION			Segment D		
FACILITY TYPE			NON-INTERSTATE		
PROJECT LENGTH			1678 FT	= = >	0.32 Miles
# OF CENTERLINES			1 CL		
# OF LANES			2 LANES		
# OF EDGES			2 EP		
LANE WIDTH - AVERAGE			12 FT		
SHOULDER WIDTH	PCC	Left	0 FT		
	PCC	Right	0 FT		
	Total Width of Paved Shoulders		0 FT		
PAVEMENT THICKNESS (RIGID)	JPCP		7.75 IN	TIED SHLD	
SHOULDER THICKNESS			7.75 IN		
POLICY OVERLAY THICKNESS			2.50 IN		

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	No Min	0.92	0.92
Worksheet Construction Type is Reconstruction		The Pavement Type is	JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST
JPC PAVEMENT	(7.75")	4,475	SQ YD		$47.97	/ SQ YD	$214,666
PAVEMENT REINFORCEMENT		0	SQ YD		$22.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	0	SQ YD	*	$19.00	/ SQ YD	$0
PCC SHOULDERS	(7.75" to 7.75")	0	SQ YD		$40.00	/ SQ YD	$0
CURB & GUTTER		3,356	LIN FT	*	$30.00	/ LIN FT	$100,680
SUBBASE GRAN MATL TY C	(~ 0.00")	0	TONS		$25.00	/ TON	$0
IMPROVED SUBGRADE:	Modified Soil (Width = 25.0'	4,661	SQ YD		$7.00	/ SQ YD	$32,627
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0
PAVEMENT REMOVAL		4,475	SQ YD		$15.00	/ SQ YD	$67,125
SHOULDER REMOVAL		0	SQ YD		$0.00	/ SQ YD	$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$415,098
RIGID CONSTRUCTION ANNUAL COST PER MILE	$53,272

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	T	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY				$0.00	/ LANE-MILE / YEAR
HMA POLICY OVERLAY	(2.50")		2.50		
HMA POLICY OVERLAY PVMT	(2.50")	1.0000	2.50	$14.86	/ SQ YD
HMA SURFACE MIX	(1.50")	1.0000	Surface Mix 1.50	$9.27	/ SQ YD
HMA BINDER MIX	(1.00")	1.0000	eling Binder Mix 1.00	$5.59	/ SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		Shoulder Mix 2.50	$10.08	/ SQ YD
CLASS A PAVEMENT PATCHING				$195.00	/ SQ YD
CLASS B PAVEMENT PATCHING				$150.00	/ SQ YD
CLASS C SHOULDER PATCHING				$145.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	1.50	$79.22	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	2.50	$85.37	/ 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	$489,864
RIGID TOTAL ANNUAL COST PER MILE	$62,867

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 02/09/15

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%	4	SQ YD	$150.00		$600	
	PWFn =	0.7441		PW =	0.7441	X	$600	$446
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	9	SQ YD	$150.00		$1,350	
	PWFn =	0.6419		PW =	0.6419	X	$1,350	$867
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	90	SQ YD	$150.00		$13,500	
	SHOULDER PATCH CLASS C	0.50%	0	SQ YD	$145.00		$0	
	LONGITUDINAL SHLD JT R&S	100.00%	3,356	LIN FT	$2.00		$6,712	
	CENTERLINE JT R&S	100.00%	1,678	LIN FT	$2.00		$3,356	
	PWFn =	0.5537		PW =	0.5537	X	$23,568	$13,049
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	134	SQ YD	$150.00		$20,100	
	SHOULDER PATCH CLASS C	1.00%	0	SQ YD	$145.00		$0	
	PWFn =	0.4776		PW =	0.4776	X	$20,100	$9,600
YEAR 30	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	179	SQ YD	$150.00		$26,850	
	SHOULDER PATCH CLASS C	1.50%	0	SQ YD	$145.00		$0	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	4,475	SQ YD	$14.86		$66,492	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	0	SQ YD	$10.08		$0	
	PWFn =	0.4120		PW =	0.4120	X	$93,342	$38,456
YEAR 35	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	3,356	LIN FT	$2.00		$6,712	
	CENTERLINE JT R&S	100.00%	1,678	LIN FT	$2.00		$3,356	
	RANDOM CRACK R&S	50.00%	1,678	LIN FT	$2.00		$3,356	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	1,075	LIN FT	$2.00		$2,150	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	4	SQ YD	$85.37		$341	
	PWFn =	0.3554		PW =	0.3554	X	$15,915	$5,656
YEAR 40	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	22	SQ YD	$150.00		$3,300	
	LONGITUDINAL SHLD JT R&S	100.00%	3,356	LIN FT	$2.00		$6,712	
	CENTERLINE JT R&S	100.00%	1,678	LIN FT	$2.00		$3,356	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	1,613	LIN FT	$2.00		$3,226	
	RANDOM CRACK R&S	50.00%	1,678	LIN FT	$2.00		$3,356	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	22	SQ YD	$85.37		$1,878	
	PWFn =	0.3066		PW =	0.3066	X	$21,828	$6,692
								$74,766
	ROUTINE MAINTENANCE ACTIVITY		0.64	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$74,766
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$9,595

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : **12/23/14 1:35 PM**

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$415,098	$372,984
		ANNUAL COST PER MILE	$53,272	$47,867
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$74,766	$128,590
		ANNUAL COST PER MILE	$9,595	$16,503
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$489,864	$501,574
		ANNUAL COST PER MILE	$62,867	$64,369

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	==========>	**JPCP**	**$62,867**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**HMA**	**$64,369**	2.4%

P:\Pavement Design Stuff\D-1\IL 83 from IL 120 to IL 137 & at Atkinson Road\[IL 83 from IL 120 to IL 137 & at Atkinson Road Mechanistic LCCA for Ivanhoe Road 0