Illinois Department of Transportation

Memorandum

To:	Carrie Nelsen	Attn:	Susan Poe
From:	LaDonna R. Rowden	By:	Charles Wienrank
Subject:	Pavement Design Approval		
Date:	June 3, 2022		

Route: FAP 873 (IL 149)
Contract No.: 78814
County: Franklin
Location: I-57 Interchange, from just east of Factory Outlet Boulevard to just west of Sophia Street in West Frankfort

The Pavement Selection Committee met on June 2, 2022, to review the pavement design for the above referenced project. The scope of the project is to replace the pavement along a portion of IL 149 and replace the existing signalized diamond type ramp terminals with “teardrop type” roundabouts.

The life-cycle cost analysis did not favor full-depth hot-mix asphalt (HMA) pavement or jointed plain concrete pavement (JPCP) by more than 10%. However, the district prefers JPCP for the new IL 149 pavement due to the irregular shape of the “teardrop” type roundabouts, staging with interchanges, and turning movements. Also, projects currently being constructed directly to the east and west of this project are JPCP. The use of JPCP would maintain consistent pavement type and help with ease of maintenance.

JPCP is also the preferred pavement type for the I-57 ramps. Reconstruction on the ramps is relatively short. To assist with construction and staging, the thickness of the I-57 ramp pavement will match the IL 149 pavement. The Committee agreed with the district’s recommendations.

The approved pavement design for IL 149 and the I-57 Ramps is as follows:

9” JPCP
4” HMA Stabilized Subbase
12” Aggregate Subgrade Improvement

If you have any questions, please contact Charles Wienrank at (217) 782-0570.

cc: Charles Stein
Christopher Russell
John Senger

Illinois Department of Transportation

Memorandum

To:	LaDonna Rowden	Attn:	Charles Wienrank
From:	Carrie Nelsen	By:	Susan Poe
Subject:	Pavement Design		
Date:	May 11, 2022		

Route: FAP 873 (IL 149)
Section: (28-5)K-1
County: Franklin
Contract: 78814

This project is located on IL 149 in Franklin at the I-57 interchange. This project extends from just east of Factory Outlet Boulevard to just west of Sophia Street in West Frankfort. The pavement along IL 149 will be replaced and the existing signalized diamond type ramp terminals will be replaced with “teardrop type” roundabouts.

While the initial cost indicates that HMA is the lowest cost option, the JPCP cost is within 10% of the HMA. We would like to request approval to use JPCP.

Due to the irregular shape of the “Teardrop” type roundabouts, staging of the interchange ramp terminals while maintaining traffic and the turning movements of the final configuration JPCP is preferred over HMA. Projects are currently being constructed directly to the east and west of this project are JPCP pavement. The use of JPCP would maintain consistent pavement type and help with ease of maintenance.

JPCP is also the preferred pavement type for the I-57 ramps. Reconstruction on the ramps is relatively short. To assist with construction and staging the thickness of the I-57 ramp pavement will be increased to match IL 149 pavement.

PAVEMENT DESIGN:
IL 149 INTERCHANGE RECONSTRUCTION

ROUTE: IL 149(FAP 873)
SECTION: (28-5) K-1
COUNTY: FRANKLIN

Contents

1.0. PROJECT INFORMATION:

This project is located on IL 149 in Franklin at the I-57 interchange. This project extends from just east of Factory Outlet Boulevard to just west of Sophia Street in West Frankfort. See **Exhibit 1: Location Map**

1.1. EXISTING CONDITION:

The length of improvement is 0.40 miles. The published average daily traffic volume in 2019 was 11,400 vehicles. The existing typical cross section of IL 149 consists of 2-12' PCC pavement lanes in each direction with both HMA shoulders and curbed sections. The intersections of I-57 NB and I-57 SB with IL 149 are signalized. An existing structure (SN 028-0039) crosses I-57 between the two intersections. The existing drainage is an open ditch system with culverts.

1.2. PROPOSED IMPROVEMENTS:

Throughout the limits of the improvement the PCC pavement on IL 149 will be replaced. Curb and gutter will exist between the bridge to the roundabouts. A 10' shared used path will be placed on the north side of IL 149 and a 5' sidewalk will be placed on the south side. Bike and pedestrian accommodations will be provided across structure number 028-0039 as follows: north side - shared use path separated from the through traffic by a concrete parapet, south side - 7' sidewalk separated by a 3' wide, 8" tall concrete median. "Teardrop" type roundabouts will be constructed at the ramp terminal of I-57 northbound and southbound. Substandard guardrail will be updated. Highway lighting and pavement markings will be placed. See **Exhibit 4: Proposed Work**

2.0. IL 149 PAVEMENT DESIGN AND LIFE CYCLE COST ANALYSIS:

The IL 149 Reconstruction Pavement Design was completed in accordance with BDE Chapter 54. The IDOT Mechanistic Pavement Design and Life Cycle Cost Analysis (LCCA) spreadsheet was utilized to determine the proposed material, thickness, and costs included. See **Exhibit 2: IL 149 Pavement Design and LCCA** for detailed calculations.

IL 149 Pavement Design and LCCA

	TRAFFIC FACTOR	DEPTH (in)	INITIAL COST	LIFE CYCLE COST	
HMA	3.56	11.50	$1,380,594	$238,718	9.9%
JPCP	5.06	9.00	$1,660,231	$262,461	

2.1. RAMPS PAVEMENT DESIGN

The I-57 ramps are proposed to be single 14’ lanes with 6’ paved shoulders on the left and 10’ paved shoulders on the right of the pavement. The ramp with the highest traffic volume (Ramp D) was used to summarize a comprehensive pavement design. See **Exhibit 3: Ramps Pavement Design**

I-57 Ramps Pavement Design

	TRAFFIC FACTOR	DEPTH (in)
HMA	2.85	11.00
JPCP	4.13	8.75

3.0. CONCLUSION:

The initial cost indicates that HMA is the lowest cost option compared to JPCP.

However, JPCP is the preferred pavement type for the new IL 149 pavement. Due to the irregular shape of the "Teardrop" type roundabouts, staging with interchanges, and turning movements JPCP is preferred over HMA. Also, projects currently being constructed directly to the east and west of this project are JPCP pavement. The use of JPCP would maintain consistent pavement type and help with ease of maintenance.

JPCP is also the preferred pavement type for the I-57 ramps. Reconstruction on the ramps is relatively short. To assist with construction and staging the thickness of the I-57 ramp pavement will be increased to match IL 149 pavement.

IL 149 and I-57 Ramp Pavement
- JPCP Pavement (Full-Depth), 9"
- Stabilized Sub-Base, 4"

I-57 Ramp Shoulders
- JPCP Pavement (Full-Depth), 9"
- Stabilized Sub-Base, 4"

EXHIBIT 1-LOCATION MAP

LOCATION MAP WEST FRANKFORT, IL

IL 149 AT I-57, FRANKLIN COUNTY

EXHIBIT 2-IL 149 PAVEMENT DESIGN AND LCCA

BDE 5401 Template (Rev. 11/22/2019) **IDOT MECHANISTIC PAVEMENT DESIGN** Printed: 02/08/2022

PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells)

Route: IL 149 Comments:
Section: (28-5)K-1
County: Franklin Design Date:
Location: West Frankfort - IL 149 at Ramps Modify Date:

	<-- BY	<-- BY ADT	Year
Current:		-	-
Future:		-	-

Facility Type: Other Marked State Route
# of Lanes = 4
Road Class: I
Subgrade Support Rating (SSR): Poor
Construction Year: 2022
Design Period (DP) = 20 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	12,460	95.5%	P = 32%
SU =	250	390	3.0%	S = 45%
MU =	750	200	1.5%	M = 45%
Struct. Design ADT =		13,050	(2032)	

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) =	1.35	(Actual ADT)	TF rigid (Actual) =	1.77	(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 = 3.56
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.O)
Goto Map
HMA Mixture Temp. = 80.5 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 540 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 84 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 11.50 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 16.75 in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness = 11.50 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 Pavement Over Rubblized PCC

Use TF flexible = 3.56
HMA Overlay Design Thickness = 8.25 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 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)

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. 11/22/2019) Printed: 02/08/2022
LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT Standard Design

ROUTE	IL 149					
SECTION	(28-5)K-1					
COUNTY	Franklin					
LOCATION	West Frankfort - IL 149 at Ramps					
FACILITY TYPE		NON-INTERSTATE				
PROJECT LENGTH			1500	FT = = >	0.28	Miles
# OF CENTERLINES			2	CL		
# OF LANES			4	LANES		
# OF EDGES			4	EP		
LANE WIDTH - AVERAGE			12	FT		
SHOULDER WIDTH	HMA	Inside	0	FT		
	HMA	Outside	0	FT		
	Total Width of Paved Shoulders		0	FT		
PAVEMENT THICKNESS (FLEXIBLE)			11.50	IN	16.75	IN MAX
SHOULDER THICKNESS			8.00	IN	HMA_SD	Standard Design
HMA OVERLAY THICKNESS			2.00	IN		

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	3.56	1.35	3.56

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$134.93 / TON
HMA TOP BINDER	$118.93 / TON
HMA LOWER BINDER	$102.81 / TON
HMA BINDER (IL-9.5FG or IL-4.75)	$102.81 / TON
HMA SHOULDER	$111.91 / TON

INITIAL COSTS

ITEM	THICKNESS		100% QUAI	UNIT		UNIT PRICE		COST	
HMA PAVEMENT (FULL-DEPTH)	(11.50")	9400	9,400	SQ YD	*	$68.00	/ SQ YD	$639,200	~
HMA SURFACE COURSE	(2.00")	1.0069	790	TONS	*	$134.93	/ TON	$0	
HMA TOP BINDER COURSE	(2.25")	1.0217	658	TONS	*	$118.93	/ TON	$0	
HMA LOWER BINDER COURSE	(7.25")	1.0547	4,606	TONS	*	$102.81	/ TON	$0	
HMA SHOULDER	(8.00")	112	50	TONS	*	$111.91	/ TON	$5,596	~
CURB & GUTTER			5,000	LIN FT	*	$40.14	/ LIN FT	$200,700	
SUBBASE GRAN MATL TY C (TONS)			0	TONS	*	$0.00	/ TON	$0	
IMPROVED SUBGRADE:	Aggregate	Width = 120.	20,000	SQ YD	*	$18.81	/ SQ YD	$376,200	
Reserved For User Supplied Item			0	UNITS		$0.00	/ UNITS	$0	
Reserved For User Supplied Item			0	UNITS		$0.00	/ UNITS	$0	
PAVEMENT REMOVAL			9,800	SQ YD	*	$15.43	/ SQ YD	$151,214	
SHOULDER REMOVAL			550	SQ YD	*	$13.97	/ SQ YD	$7,684	
Note: * Denotes User Supplied Quantity							FLEXIBLE CONSTRUC	$1,380,594	
							FLEXIBLE CONSTRUC	$198,203	

MAINTENANCE COSTS:

ITEM	THICKNESS		MATERIAL	T	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY					$0.00	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	1.0069	Surface M	2.00	$15.22	/ SQ YD
HMA OVERLAY PVMT	(2.00")	1.0069		2.00	$15.22	/ SQ YD
HMA SURFACE MIX	(2.00")	1.0069	Surface M	2.00	$15.22	/ SQ YD
HMA BINDER MIX	(0.00")	1.0139	IL-9.5FG or I	0.00	$0.00	/ SQ YD
HMA OVERLAY SHLD (Year 30)	(2.00")		Shoulder	2.00	$12.53	/ SQ YD
HMA OVERLAY SHLD	(2.00")		Shoulder	2.00	$12.53	/ SQ YD
MILLING (2.00 IN)				2.00	$3.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill Surf)		Surface M	2.00	$85.11	/ SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)		Shoulder	2.00	$82.53	/ SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00 ")		Binder Mix	2.00	$81.51	/ SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")		Shoulder	2.00	$82.53	/ 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% Reh	$2.00	/ LIN FT

FLEXIBLE TOTAL LIFE-	$1,662,801
FLEXIBLE TOTAL ANNI	$238,718

PCC PAVEMENT JPCP

ROUTE			IL 149			
SECTION			(28-5)K-1			
COUNTY			Franklin			
LOCATION			West Frankfort - IL 149 at Ramps			
FACILITY TYPE			NON-INTERSTATE			
PROJECT LENGTH			1500	FT = = >	0.28	Miles
# OF CENTERLINES			2	CL		
# OF LANES			4	LANES		
# OF EDGES			4	EP		
LANE WIDTH - AVERAGE			12	FT		
SHOULDER WIDTH	PCC	Inside	0	FT		
	PCC	Outside	0	FT		
	Total Width of Paved Shoulders		0	FT		
PAVEMENT THICKNESS (RIGID)		JPCP	9.00	IN	TIED SHLD	
SHOULDER THICKNESS			9.00	IN		
HMA OVERLAY THICKNESS			2.75	IN		

RIGID PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	5.02	1.77	5.02

Worksheet Construction Type is Reconstruction The Pavement Type is JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUA	UNIT		UNIT PRICE		COST
JPC PAVEMENT	(9.00")	9,400	SQ YD	*	$63.18	/ SQ YD	$593,892
PAVEMENT REINFORCEMENT		0	SQ YD			/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	10,500	SQ YD	*	$30.94	/ SQ YD	$324,870
PCC SHOULDERS	(9.00" to 9.00")	75	SQ YD	*	$75.61	/ SQ YD	$5,671
CURB & GUTTER		5,000	LIN FT	*	$40.14	/ LIN FT	$200,700
SUBBASE GRAN MATL TY C	(~ 0.00")	0	TONS	*		/ TON	$0
IMPROVED SUBGRADE:	Aggregate Width = 120.	20,000	SQ YD	*	$18.81	/ SQ YD	$376,200
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0
PAVEMENT REMOVAL		9,800	SQ YD	*	$15.43	/ SQ YD	$151,214
SHOULDER REMOVAL		550	SQ YD	*	$13.97	/ SQ YD	$7,684

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION	$1,660,231
RIGID CONSTRUCTION	$238,349

MAINTENANCE COSTS:

ITEM	THICKNESS		MATERIAL	T	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY					$0.00	/ LANE-MILE / YEAR
HMA OVERLAY	(2.75")			2.75		
HMA OVERLAY PAVEMENT	(2.75")	1.0095		2.75	$18.70	/ SQ YD
HMA SURFACE MIX	(1.50")	1.0052	Surface M	1.50	$11.39	/ SQ YD
HMA BINDER MIX	(1.25")	1.0148	IL-9.5FG or I	1.25	$7.30	/ SQ YD
HMA OVERLAY SHOULDER	(2.75")		Shoulder	2.75	$17.23	/ 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 M	1.50	$81.33	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.75")			Surface M	2.75	$90.78	/ 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' /		$2.00	/ LIN FT

RIGID TOTAL LIFE-C	$1,828,185
RIGID TOTAL ANNUAL	$262,461

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Re ######

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT '	$1,660,231	$1,380,594
		ANNUAL C	$238,349	$198,203
MAINTENANCE	LIFE-CYCLE COST	PRESENT '	$167,954	$282,207
		ANNUAL C	$24,112	$40,515
TOTAL	LIFE-CYCLE COST	PRESENT '	$1,828,185	$1,662,801
		ANNUAL C	$262,461	$238,718

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	=========	HMA	$238,718	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PE	JPCP	$262,461	9.9%

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EXHIBIT 3-RAMP PAVEMENT DESIGN

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

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 02/08/2022

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: IL 149
Section: (28-5)K-1
County: Franklin
Location: West Frankfort Ramps
Comments: Ramp IL 149 to I-57 SB
Design Date:
Modify Date:

	<-- BY	ADT	Year
Current:	<-- BY	-	-
Future:		-	-

Facility Type: Interstate or Freeway
** Ramp Design Fig. 54-1.B **
# of Lanes = 1 Lane Ramp
Crossroad? Other Marked State Route
# of Lanes = 4
Road Class: I
Subgrade Support Rating (SSR): Poor
Construction Year: 2022
Design Period (DP) = 20 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	2,405	89.7%	P = 100%
SU =	250	110	4.1%	S = 100%
MU =	750	165	6.2%	M = 100%
Struct. Design ADT =		2,680	(2032)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT		RAMP DESIGN MIN		RIGID PAVEMENT		RAMP DESIGN MIN	
Cpv =	0.15	0.15	32%	Cpv =	0.15	0.15	32%
Csu =	132.5	112.06	45%	Csu =	143.81	135.78	45%
Cmu =	482.53	385.44	45%	Cmu =	696.42	567.21	45%
TF flexible (Actual) =	1.89	(Actual ADT)	2.85	TF rigid (Actual) =	2.62	(Actual ADT)	4.13
TF flexible (Min) =	2.85	(Min ADT Fig. 54-2.C)		TF rigid (Min) =	4.13	(Min ADT Fig. 54-2.C)	

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 2.85
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.O)
Goto Map
HMA Mixture Temp. = 80.5 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 540 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 89 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 11.00 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 16.75 in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 11.00 inches

JPC Pavement

Use TF rigid = 4.13
Edge Support = Tied Shoulder or C&G

Rigid Pavt Thick. = 8.75 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 4.13
IBR value = 3

CRCP Thickness = 7.75 in. (Fig. 54-4.M)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Pavement Over Rubblized PCC

Use TF flexible = 2.85
HMA Overlay Design Thickness = 7.75 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 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	0	250	750

* Use marked route minimums for unmarked routes (Fig. 54-1.B)

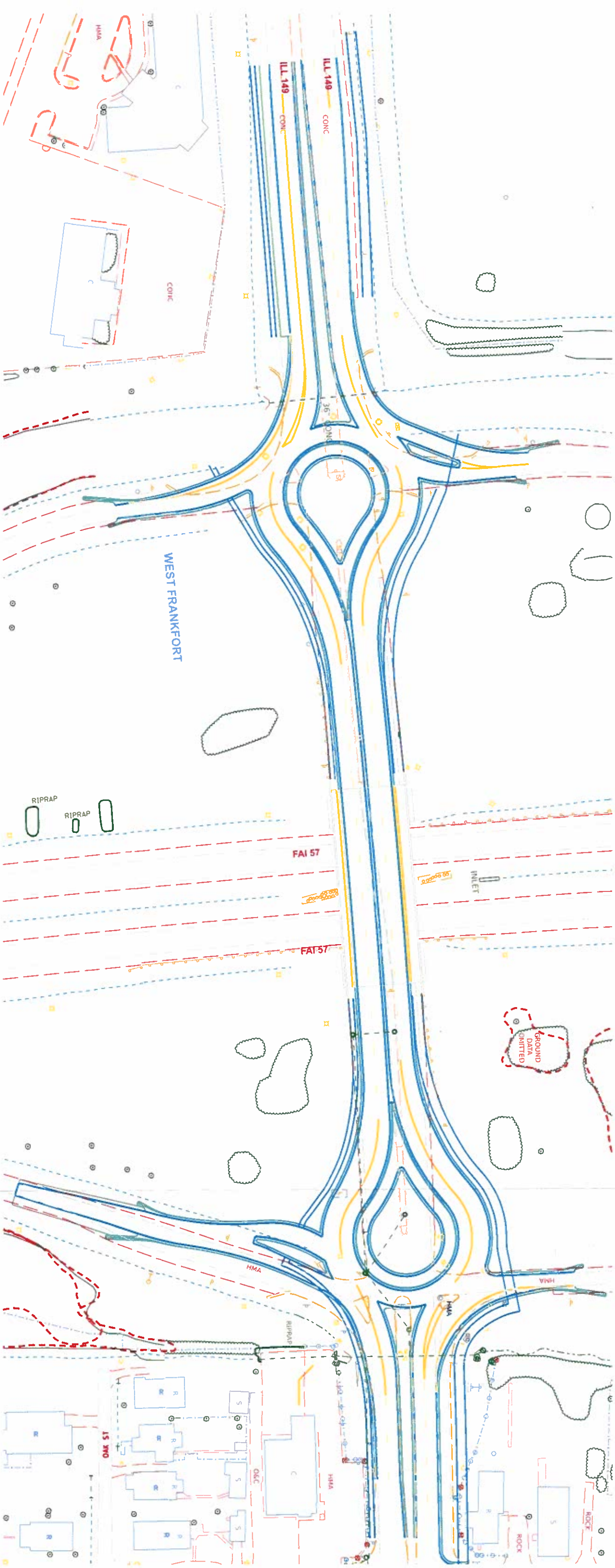
Class Table for One-Way Streets	
ADT	Class
0 - 3500	II
>3501	I

	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%

EXHIBIT 4-PROPOSED WORK


ILL 149
CONC
ILL 149
CONC
CONC
WEST FRANKFORT
RIPRAP
RIPRAP
FAI 57
FAI 57
INLET
GROUND DATA OMITTED
HMA
RIPRAP
HMA
HMA
OAK ST
OSC
HMA
ROCK
ROCK