



# Illinois Department of Transportation

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To: Kevin Marchek                      Attn: District Three  
From: Maureen M. Addis              *MA*  
Subject: Pavement Design  
Date: August 29, 2016

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FAI Route 55 (I-55)  
Section (53-4)RS-1&I  
Livingston County  
From 0.6 miles to 4.2 miles north of IL 23

We have reviewed the proposed pavement design for the above captioned section, which was submitted with by memo dated August 16, 2016. Based on life-cycle costs, rubblization of the existing pavement with a HMA overlay is significantly less expensive than a full-depth HMA overlay or a rigid pavement design. Alternative bidding is not required, as the difference between the lowest designs exceeds the 10% threshold.

The approved pavement design is:

I-55 [Pavement Rubblization]

11 inches Full Depth HMA Pavement with HMA Shoulders  
    2 inches of HMA Polymerized Surface Course, SMA, N80  
    2 inches of HMA Polymerized Binder Course, SMA, N80  
    7 inches of HMA Binder Course, N90, IL-19.0  
On Rubblized Pavement

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



The proposed project scope involves milling all of the existing HMA overlay, rubblizing the existing PCC pavement, installing underdrains, and overlaying with 11" of HMA. Concrete patches will be constructed under the overpass to maintain a minimum 16' vertical clearance. The design is for four lanes and the estimated quantity of pavement is 100,822 square yards. The pavement was designed using Chapter 54 of the Bureau of Design and Environment Manual, current as of July 2016. The following facts and assumptions were used in the design:

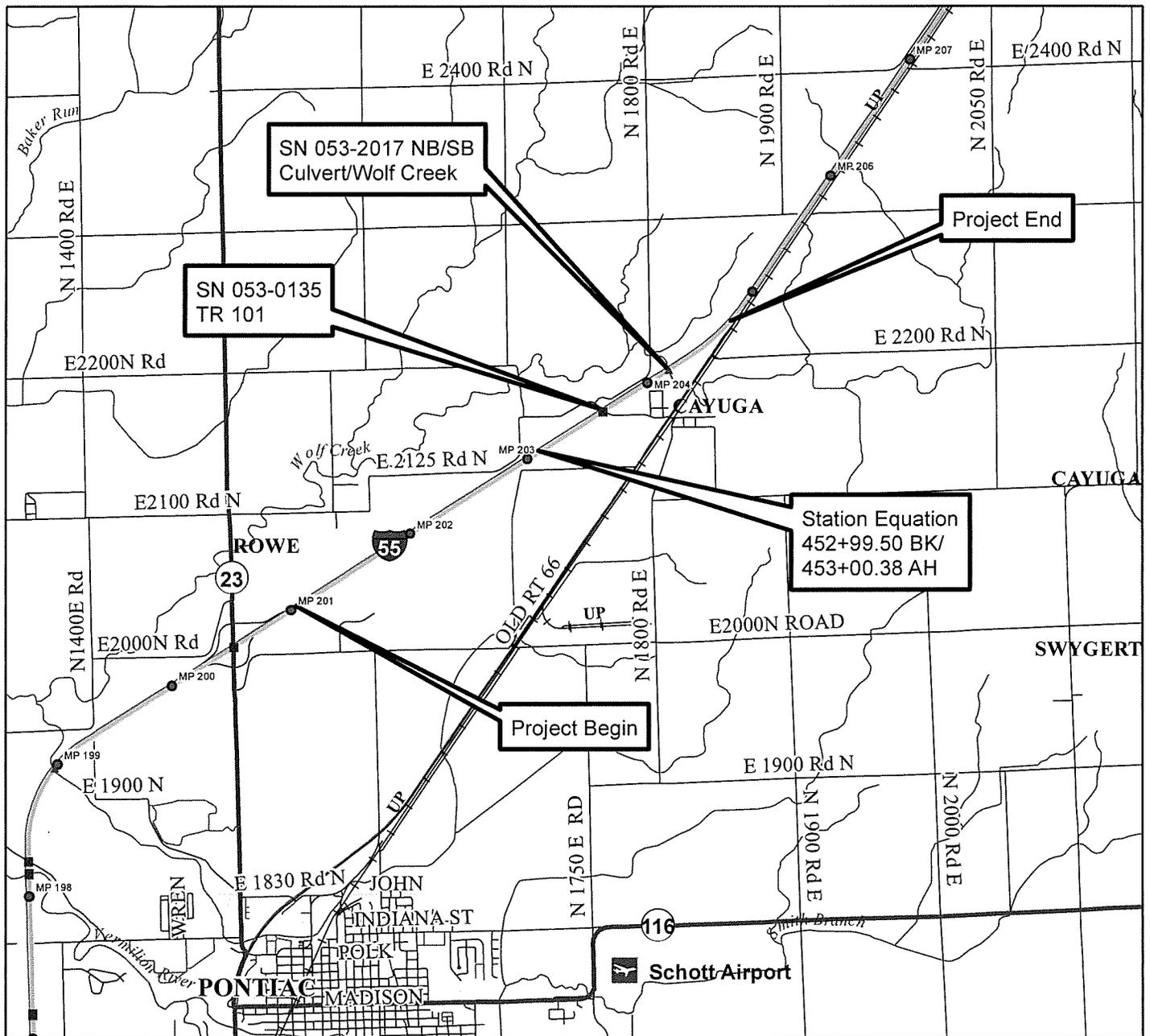
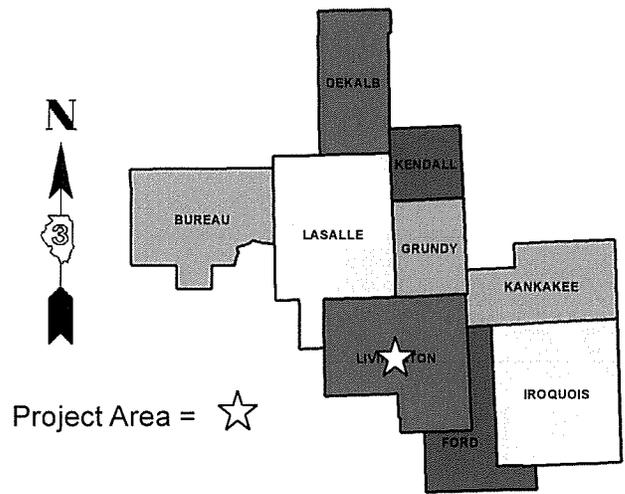
- Jointed Plain Concrete Pavement with tied concrete shoulders.
- Design Traffic was based on 2028 projections
- Design Period of 20 years
- Poor Sub-grade
- Roadway Geotechnical Report Pavement Rubblization Study supports Rubblization Method I.
- Unbonded overlay was not considered due to the age and condition of the existing hot-mix asphalt overlay and the existence of D-Cracking in the existing PCC pavement.

If you have any questions, please contact Mr. Ted Fultz at 815-434-8469.

JO:lp

# Project Location Map

FAI 55 (I-55)  
 Section (53-4)RS-1&I  
 Livingston County  
 Rubblization & Structure Repairs  
 0.6 mile north of IL 23 to  
 4.2 miles north of IL 23  
 Phase I Job No.: P-93-017-16  
 Contract No. 66F23



D3# 3253

PROJECT AND TRAFFIC INPUTS		(Enter Data in Gray Shaded Cells)	
Route: FAI 55 (I-55)	Comments:		
Section: (53-4)RS-1&I			
County: LIVINGSTON	Design Date: 05/04/2016	J. Oyler	<-- BY
Location: 0.6 miles N. of IL 23 to 4.2 miles N. of IL	Modify Date:	<-- BY	
Facility Type: Interstate or Freeway	# of Lanes = 4	ADT	Year
		Current: 21,900	2018
		Future: 26,500	2038
Road Class: I		Structural Design Traffic	
Subgrade Support Rating (SSR): Poor		Minimum ADT	Actual ADT
Construction Year: 2018			Actual % of Total ADT
Design Period (DP) = 20 years			% of ADT in Design Lane
		PV = 0	16,471 68.1% P = 32%
		SU = 500	1,360 5.6% S = 45%
		MU = 1500	6,369 26.3% M = 45%
		Struct. Design ADT = 24,200	(2028)
TRAFFIC FACTOR CALCULATION			
FLEXIBLE PAVEMENT		RIGID PAVEMENT	
Cpv = -		Cpv = -	
Csu = -		Csu = -	
Cmu = -		Cmu = -	
TF flexible (Actual) = -	(Actual ADT)	TF rigid (Actual) = -	(Actual ADT)
TF flexible (Min) = -	(Min ADT Fig. 54-2.C)	TF rigid (Min) = -	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS			
Full-Depth HMA Pavement		JPC Pavement	
Use TF flexible = 29.27		Use TF rigid = 41.66	
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)		Edge Support = Tied	Shoulder or C.&G.
HMA Mixture Temp. = 76.5 deg. F (Fig. 54-5.C)		<b>Rigid Pavt Thick. = 11.00 in. (Fig. 54-4.E)</b>	
Design HMA Mixture Modulus (E <sub>HMA</sub> ) = 650 ksi (Fig. 54-5.D)		CRC Pavement	
Design HMA Strain (ε <sub>HMA</sub> ) = 46 (Fig. 54-5.E)		Use TF rigid = 41.66	
Full Depth HMA Design Thickness = 15.25 in. (Fig. 54-5.F)		IBR value = 3	
Limiting Strain Criterion Thickness = 15.25 in. (Fig. 54-5.I)		<b>CRCP Thickness = 11.00 in. (Fig. 54-4.M)</b>	
<b>Use Full-Depth HMA Thickness = 15.25 inches</b>		<b>TF MUST BE &gt; 60 FOR CRCP</b>	

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS			
HMA Overlay of Rubblized PCC		Unbonded Concrete Overlay	
Use TF flexible = 29.27		Review 54-4.03 for limitations and special considerations.	
HMA Overlay Design Thickness = 12.50 in. (Fig. 54-5.U)		<b>JPCP Thickness = NA inches</b>	
Limiting Strain Criterion Thickness = 11.00 in. (Fig. 54-5.V)		<b>CONTACT BMPR FOR ASSISTANCE</b>	
<b>Use HMA Overlay Thickness = 11.00 inches</b>			

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN							
Class I Roads 4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500		Class II Roads 2 lanes with ADT > 2000 One way Street with ADT <= 3500		Class III Roads 2 Lanes (ADT 750 -2000)		Class IV Roads 2 Lanes (ADT < 750)	
		Min. Str. Design Traffic (Fig 54-2.C)			Class Table for One-Way Streets		
Facility Type		PV	SU	MU	ADT	Class	
Interstate or Freeway		0	500	1500	0 - 3500	II	
Other Marked State Route		0	250	750	>3501	I	
Unmarked State Route		No Min	No Min	No Min			
		Traffic Factor ESAL Coefficients				Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
		Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)		ADT	
Class		Csu	Cmu	Csu	Cmu	Class	
I		143.81	696.42	132.50	482.53	0 - 749	IV
II		135.78	567.21	112.06	385.44	750 - 2000	III
III		129.58	562.47	109.14	384.35	>2000	II
IV		129.58	562.47	109.14	384.35		
		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%

# LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

## FULL-DEPTH HMA PAVEMENT

LSC Design

ROUTE FAI 55 (I-55)  
 SECTION (53-4)RS-1&I  
 COUNTY LIVINGSTON  
 LOCATION 0.6 miles N. of IL 23 to 4.2 miles N. of IL 23

FACILITY TYPE INTERSTATE

PROJECT LENGTH 18904.12 FT == > 3.58 Miles  
 # OF CENTERLINES 2 CL  
 # OF LANES 4 LANES  
 # OF EDGES 4 EP  
 LANE WIDTH - AVERAGE 12 FT  
 SHOULDER WIDTH 6 FT  
     HMA Inside  
     HMA Outside 10 FT  
 Total Width of Paved Shoulders 32 FT

PAVEMENT THICKNESS (FLEXIBLE) 15.25 IN 15.25 IN MAX  
 SHOULDER THICKNESS 12.00 IN LSC Design  
 POLICY OVERLAY THICKNESS 2.00 IN

FLEX PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		7.11	29.27	29.27

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	\$105.97 / TON
HMA TOP BINDER	\$86.98 / TON
HMA LOWER BINDER	\$89.06 / TON
HMA BINDER (LEVELING)	\$89.06 / TON
HMA SHOULDER	\$78.00 / TON

<u>INITIAL COSTS</u>				
ITEM	THICKNESS	100% QUANTITY UNIT	UNIT PRICE	COST
HMA PAVEMENT ( FULL-DEPTH )	( 15.25" )	100,822 SQ YD	\$81.72 / SQ YD	\$0
HMA SURFACE COURSE	( 2.00" )	11,370 TONS	\$105.97 / TON	\$1,204,930 ~
HMA TOP BINDER COURSE	( 2.25" )	12,979 TONS	\$86.98 / TON	\$1,128,935 ~
HMA LOWER BINDER COURSE	( 11.00" )	66,311 TONS	\$89.06 / TON	\$5,905,698 ~
HMA SHOULDER	( 12.00" )	45,168 TONS	\$78.00 / TON	\$3,523,123 ~
CURB & GUTTER		0 LIN FT	\$30.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C (TONS)		6,027 TONS	\$20.00 / TON	\$120,540
IMPROVED SUBGRADE:	Aggregate	182,915 SQ YD	\$13.00 / SQ YD	\$2,377,895
Reserved For User Supplied Item		0 UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item		0 UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL		100,822 SQ YD	\$10.00 / SQ YD	\$1,008,220
SHOULDER REMOVAL		67,215 SQ YD	\$7.00 / SQ YD	\$470,505

Note: \* Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	\$15,739,846
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	\$179,300

### MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			\$0.00 LANE-MILE / YEAR

HMA OVERLAY PVMT SURF	(2.00")	Surface Mix		<b>\$11.95</b> /SQ YD
HMA OVERLAY PVMT	(2.00")	Surface Mix		<b>\$11.95</b> /SQ YD
HMA SURFACE MIX	(2.00")	Surface Mix		<b>\$11.95</b> /SQ YD
HMA BINDER MIX	(0.00")	Leveling Binder Mix		<b>\$0.00</b> /SQ YD
HMA OVERLAY SHLD (Year 30)	(2.00")	Shoulder Mix		<b>\$8.74</b> /SQ YD
HMA OVERLAY SHLD	(2.00")	Shoulder Mix		<b>\$8.74</b> /SQ YD
MILLING (2.00 IN)				<b>\$2.50</b> /SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill Surf)	Surface Mix		<b>\$81.37</b> /SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	Shoulder Mix		<b>\$78.24</b> /SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00")	Leveling Binder Mix		<b>\$79.47</b> /SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00")	Shoulder Mix		<b>\$78.24</b> /SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				<b>\$1.85</b> /LIN FT
CENTERLINE JOINT ROUT & SEAL				<b>\$1.85</b> /LIN FT
RANDOM / THERMAL CRACK ROUT & SEAL	(100% Rehab = 110.00' / Station / Lane)			<b>\$1.85</b> /LIN FT

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FLEXIBLE TOTAL LIFE-CYCLE COST	<b>\$19,233,840</b>
FLEXIBLE TOTAL ANNUAL COST PER MILE	<b>\$219,102</b>

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE

08/24/16

FULL-DEPTH HMA PAVEMENT  
HMA OVERLAY OF RUBBLIZED PCC PAVEMENT  
Figure 54-7.C  
LIMITING STRAIN CRITERION DESIGN

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
<b>YEAR 5</b>							
	LONG SHLD JT R&S	100.00%	75,616	LIN FT	\$1.85	\$139,890	
	CNTR LINE JOINT R&S	100.00%	37,808	LIN FT	\$1.85	\$69,945	
	RNDM / THRM CRACK R&S	50.00%	41,589	LIN FT	\$1.85	\$76,940	
	PD PVMT PATCH M&F SURF	0.10%	101	SQ YD	\$81.37	\$8,218	
	PWF <sub>n</sub> =	0.8626		PW =	0.8626 X	\$294,993	\$254,464
<b>YEAR 10</b>							
	LONG SHLD JT R&S	100.00%	75,616	LIN FT	\$1.85	\$139,890	
	CNTR LINE JOINT R&S	100.00%	37,808	LIN FT	\$1.85	\$69,945	
	RNDM / THRM CRACK R&S	50.00%	41,589	LIN FT	\$1.85	\$76,940	
	PD PVMT PATCH M&F SURF	0.50%	504	SQ YD	\$81.37	\$41,010	
	PWF <sub>n</sub> =	0.7441		PW =	0.7441 X	\$327,785	\$243,903
<b>YEAR 15</b>							
	MILL PVMT & SHLD 2.00"	100.00%	168,037	SQ YD	\$2.50	\$420,093	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	1,008	SQ YD	\$79.47	\$80,111	
	HMA OVERLAY PVMT 2.00"	100.00%	100,822	SQ YD	\$11.95	\$1,204,930	
	HMA OVERLAY SHLD 2.00 "	100.00%	67,215	SQ YD	\$8.74	\$587,187	
	PWF <sub>n</sub> =	0.6419		PW =	0.6419 X	\$2,292,321	\$1,471,354
<b>YEAR 20</b>							
	LONG SHLD JT R&S	100.00%	75,616	LIN FT	\$1.85	\$139,890	
	CNTR LINE JOINT R&S	100.00%	37,808	LIN FT	\$1.85	\$69,945	
	RNDM / THRM CRACK R&S	50.00%	41,589	LIN FT	\$1.85	\$76,940	
	PD PVMT PATCH M&F SURF	0.10%	101	SQ YD	\$81.37	\$8,218	
	PWF <sub>n</sub> =	0.5537		PW =	0.5537 X	\$294,993	\$163,330
<b>YEAR 25</b>							
	LONG SHLD JT R&S	100.00%	75,616	LIN FT	\$1.85	\$139,890	
	CNTR LINE JOINT R&S	100.00%	37,808	LIN FT	\$1.85	\$69,945	
	RNDM / THRM CRACK R&S	50.00%	41,589	LIN FT	\$1.85	\$76,940	
	PD PVMT PATCH M&F SURF	0.50%	504	SQ YD	\$81.37	\$41,010	
	PWF <sub>n</sub> =	0.4776		PW =	0.4776 X	\$327,785	\$156,552
<b>HMA_LSCD</b>							
<b>YEAR 30 INTERSTATE</b>							
	MILL PVMT & SHLD 2.00"	100.00%	168,037	SQ YD	\$2.50	\$420,093	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	2,016	SQ YD	\$79.47	\$160,221	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	672	SQ YD	\$78.24	\$52,575	
	HMA OVERLAY PVMT 2.00"	100.00%	100,822	SQ YD	\$11.95	\$1,204,930	
	HMA OVERLAY SHLD 2.00 "	100.00%	67,215	SQ YD	\$8.74	\$587,187	
	PWF <sub>n</sub> =	0.4120		PW =	0.4120 X	\$2,425,006	\$999,070
<b>YEAR 35</b>							
	LONG SHLD JT R&S	100.00%	75,616	LIN FT	\$1.85	\$139,890	
	CNTR LINE JOINT R&S	100.00%	37,808	LIN FT	\$1.85	\$69,945	
	RNDM / THRM CRACK R&S	50.00%	41,589	LIN FT	\$1.85	\$76,940	
	PD PVMT PATCH M&F SURF	0.10%	101	SQ YD	\$81.37	\$8,218	
	PWF <sub>n</sub> =	0.3554		PW =	0.3554 X	\$294,993	\$104,836
<b>YEAR 40</b>							
	LONG SHLD JT R&S	100.00%	75,616	LIN FT	\$1.85	\$139,890	
	CNTR LINE JOINT R&S	100.00%	37,808	LIN FT	\$1.85	\$69,945	
	RNDM / THRM CRACK R&S	50.00%	41,589	LIN FT	\$1.85	\$76,940	
	PD PVMT PATCH M&F SURF	0.50%	504	SQ YD	\$81.37	\$41,010	
	PWF <sub>n</sub> =	0.3066		PW =	0.3066 X	\$327,785	\$100,485
							\$3,493,994
<b>ROUTINE MAINTENANCE ACTIVITY</b>				14.32 Lane Miles	0.00	0	\$0
							\$3,493,994
<b>45</b>	<b>YEAR LIFE CYCLE</b>	CRF <sub>n</sub> = 0.0407852			<b>MAINTENANCE LIFE-CYCLE COST</b>		<b>\$39,802</b>
							<b>MAINTENANCE ANNUAL COST PER MILE</b>

**PCC PAVEMENT**

**JPCP**

ROUTE **FAI 55 (I-55)**  
 SECTION **(53-4)RS-1&I**  
 COUNTY **LIVINGSTON**  
 LOCATION **0.6 miles N. of IL 23 to 4.2 miles N. of IL 23**

FACILITY TYPE **INTERSTATE**

PROJECT LENGTH **18904.12 FT == > 3.58 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 11.00 IN TIED SHLD**  
 SHOULDER THICKNESS **11.00 IN**

POLICY OVERLAY THICKNESS **3.75 IN**

RIGID PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
Worksheet Construction Type is	Reconstruction	10.05	41.66	41.66
			<b>The Pavement Type is</b>	<b>JPCP</b>

**INITIAL COSTS**

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
JPC PAVEMENT	( 11.00" )	100,822	SQ YD	\$51.34 / SQ YD	\$5,176,201
PAVEMENT REINFORCEMENT		0	SQ YD	\$22.00 / SQ YD	\$0
STABILIZED SUBBASE	( 4.00" )	113,425	SQ YD	\$18.00 / SQ YD	\$2,041,650
PCC SHOULDERS		67,215	SQ YD	\$44.00 / SQ YD	\$2,957,460
CURB & GUTTER		0	LIN FT	\$30.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C		7,909	TONS	\$20.00 / TON	\$158,180
IMPROVED SUBGRADE:	Aggregate	172,238	SQ YD	\$13.00 / SQ YD	\$2,239,094
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL		100,822	SQ YD	\$10.00 / SQ YD	\$1,008,220
SHOULDER REMOVAL		67,215	SQ YD	\$7.00 / SQ YD	\$470,505

Note: \* Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	\$14,051,310
RIGID CONSTRUCTION ANNUAL COST PER MILE	\$160,065

**MAINTENANCE COSTS:**

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			\$0.00 / LANE-MILE / YEAR
HMA POLICY OVERLAY	( 3.75" )		
HMA POLICY OVERLAY PVMT	( 3.75" )		\$20.11 / SQ YD
HMA SURFACE MIX	( 1.50" )	Surface Mix	\$8.95 / SQ YD
HMA BINDER MIX	( 2.25" )	Top Binder Mix	\$11.16 / SQ YD
HMA POLICY OVERLAY SHLD	( 3.75" )	Shoulder Mix	\$16.38 / SQ YD
CLASS A PAVEMENT PATCHING			\$195.00 / SQ YD
CLASS B PAVEMENT PATCHING			\$135.00 / SQ YD
CLASS C SHOULDER PATCHING			\$145.00 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	\$78.40 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 1.50")		Surface Mix	\$78.40 / SQ YD

LONGITUDINAL SHOULDER JOINT ROUT & SEAL	\$1.85 /LIN FT
CENTERLINE JOINT ROUT & SEAL	\$1.85 /LIN FT
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL	\$1.85 /LIN FT
RANDOM CRACK ROUT & SEAL (100% Rehab = 100.00' / Station / Lane)	\$1.85 /LIN FT

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RIGID TOTAL LIFE-CYCLE COST	\$16,445,160
RIGID TOTAL ANNUAL COST PER MILE	\$187,335

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE

08/24/16

JOINTED PLAIN CONCRETE PAVEMENT  
UNBONDED JOINTED PLAIN CONCRETE OVERLAY  
Figure 54-7.A

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
<b>YEAR 10</b>							
	PAVEMENT PATCH CLASS B	0.10%	101	SQ YD	\$135.00	\$13,635	
		PWF <sub>n</sub> = 0.7441			PW = 0.7441 X	\$13,635	\$10,146
<b>YEAR 15</b>							
	PAVEMENT PATCH CLASS B	0.20%	202	SQ YD	\$135.00	\$27,270	
		PWF <sub>n</sub> = 0.6419			PW = 0.6419 X	\$27,270	\$17,504
<b>YEAR 20</b>							
	PAVEMENT PATCH CLASS B	2.00%	2,016	SQ YD	\$135.00	\$272,160	
	SHOULDER PATCH CLASS C	0.50%	336	SQ YD	\$145.00	\$48,720	
	LONGITUDINAL SHLD JT R&S	100.00%	75,616	LIN FT	\$1.85	\$139,890	
	CENTERLINE JT R&S	100.00%	37,808	LIN FT	\$1.85	\$69,945	
		PWF <sub>n</sub> = 0.5537			PW = 0.5537 X	\$530,715	\$293,844
<b>YEAR 25</b>							
	PAVEMENT PATCH CLASS B	3.00%	3,025	SQ YD	\$135.00	\$408,375	
	SHOULDER PATCH CLASS C	1.00%	672	SQ YD	\$145.00	\$97,440	
		PWF <sub>n</sub> = 0.4776			PW = 0.4776 X	\$505,815	\$241,580
<b>YEAR 30</b>							
	INTERSTATE						
	PAVEMENT PATCH CLASS B	4.00%	4,033	SQ YD	\$135.00	\$544,455	
	SHOULDER PATCH CLASS C	1.50%	1,008	SQ YD	\$145.00	\$146,160	
	HMA POLICY OVERLAY 3.75" (PVMT)	100.00%	100,822	SQ YD	\$20.11	\$2,027,238	
	HMA POLICY OVERLAY 3.75" (SHLD)	100.00%	67,215	SQ YD	\$16.38	\$1,100,976	
		PWF <sub>n</sub> = 0.4120			PW = 0.4120 X	\$3,818,829	\$1,573,307
<b>YEAR 35</b>							
	INTERSTATE						
	LONGITUDINAL SHLD JT R&S	100.00%	75,616	LIN FT	\$1.85	\$139,890	
	CENTERLINE JT R&S	100.00%	37,808	LIN FT	\$1.85	\$69,945	
	RANDOM CRACK R&S	50.00%	37,808	LIN FT	\$1.85	\$69,945	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	24,192	LIN FT	\$1.85	\$44,755	
	PD PVMT PATCH M&F HMA SURF 1.50"	0.10%	101	SQ YD	\$78.40	\$7,919	
		PWF <sub>n</sub> = 0.3554			PW = 0.3554 X	\$332,454	\$118,149
<b>YEAR 40</b>							
	INTERSTATE						
	PAVEMENT PATCH CLASS B	0.50%	504	SQ YD	\$135.00	\$68,040	
	LONGITUDINAL SHLD JT R&S	100.00%	75,616	LIN FT	\$1.85	\$139,890	
	CENTERLINE JT R&S	100.00%	37,808	LIN FT	\$1.85	\$69,945	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	36,288	LIN FT	\$1.85	\$67,133	
	RANDOM CRACK R&S	50.00%	37,808	LIN FT	\$1.85	\$69,945	
	PD PVMT PATCH M&F HMA SURF 1.50"	0.50%	504	SQ YD	\$78.40	\$39,514	
		PWF <sub>n</sub> = 0.3066			PW = 0.3066 X	\$454,467	\$139,320
							\$2,393,850
	ROUTINE MAINTENANCE ACTIVITY		14.32	Lane Miles	\$0.00	\$0	\$0
							MAINTENANCE LIFE-CYCLE COST \$2,393,850
45	YEAR LIFE CYCLE	CRF <sub>n</sub> = 0.0407852					MAINTENANCE ANNUAL COST PER MILE \$27,269

## RECONSTRUCTION - HMA OVER RUBBLIZED PAVEMENT

PAVEMENT OVERLAY THICKNESS (FLEXIBLE)  
SHOULDER OVERLAY THICKNESS

11.00 IN  
7.75 IN

11.00 IN MAX

HMA\_LSCD

Maintenance Schedule

### INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA OVERLAY REMOVAL	3.25	100,822	SQ YD	\$3.00 /SQ YD	\$302,466
RUBBLIZING PCC PAVEMENT		100,822	SQ YD	\$2.25 /SQ YD	\$226,850
HMA OVERLAY (TOTAL)	11.00	100,822	SQ YD	\$58.60 /SQ YD	\$0
HMA SURFACE COURSE	2.00	100,822	SQ YD	\$11.95 /SQ YD	\$1,204,930 ~
HMA TOP BINDER COURSE	2.25	100,822	SQ YD	\$11.20 /SQ YD	\$1,128,935 ~
HMA LOWER BINDER COURSE	6.75	100,822	SQ YD	\$35.45 /SQ YD	\$3,573,864 ~
HMA SHOULDER	7.75	29,171	TONS	\$78.00 /TON	\$2,275,350 ~
Reserved For User Supplied Item		0	UNITS	\$0.00 /UNITS	\$0
Reserved For User Supplied Item		0	UNITS	\$0.00 /UNITS	\$0
EARTHWORK		17,211	CU YD *	\$16.80 /CU YD	\$289,145

Note: \* Denotes User Supplied Quantity

RUBBLIZED CONSTRUCTION INITIAL COST \$9,001,540  
RUBBLIZED CONSTRUCTION ANNUAL COST PER MILE \$102,541

RUBBLIZED MAINTENANCE LIFE-CYCLE COST \$3,493,994  
RUBBLIZED MAINTENANCE ANNUAL COST PER MILE \$39,802

RUBBLIZED TOTAL LIFE-CYCLE COST \$12,495,534  
RUBBLIZED TOTAL ANNUAL COST PER MILE \$142,343

## RECONSTRUCTION - PCC UNBONDED OVERLAY

## LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 5/10/16 8:05 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$14,051,310	\$15,739,846
		ANNUAL COST PER MILE	\$160,065	\$179,300
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$2,393,850	\$3,493,994
		ANNUAL COST PER MILE	\$27,269	\$39,802
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$16,445,160	\$19,233,840
		ANNUAL COST PER MILE	\$187,335	\$219,102

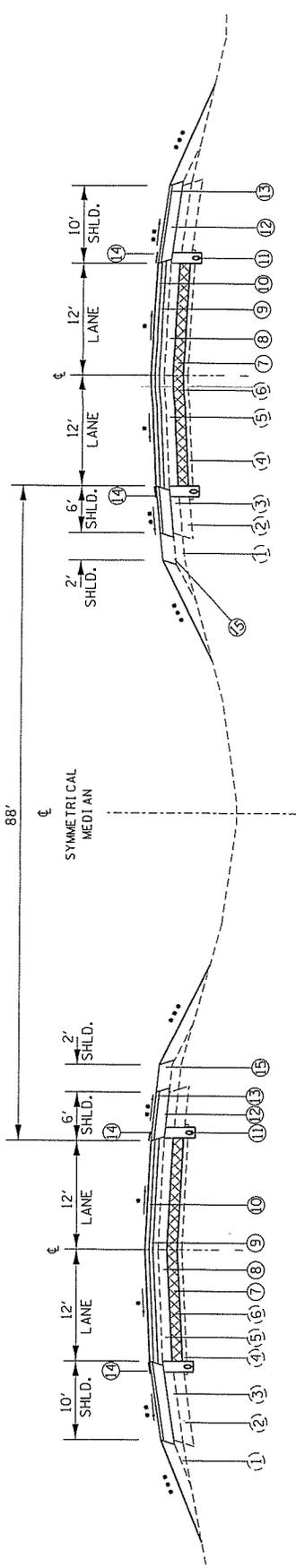
## LIFE-CYCLE COST ANALYSIS: SUPPLEMENTAL DESIGNS

			PCC Unbonded	Rubblized
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$0	\$9,001,540
		ANNUAL COST PER MILE	\$0	\$102,541
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$2,393,850	\$3,493,994
		ANNUAL COST PER MILE	\$27,269	\$39,802
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$2,393,850	\$12,495,534
		ANNUAL COST PER MILE	\$99,999,999	\$142,343

## LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	=====>	<b>Rubblized</b>	<b>\$142,343</b>	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	<b>JPCP</b>	<b>\$187,335</b>	<b>31.6%</b>
	TYPE / PERCENTAGE	<b>HMA</b>	<b>\$219,102</b>	<b>53.9%</b>

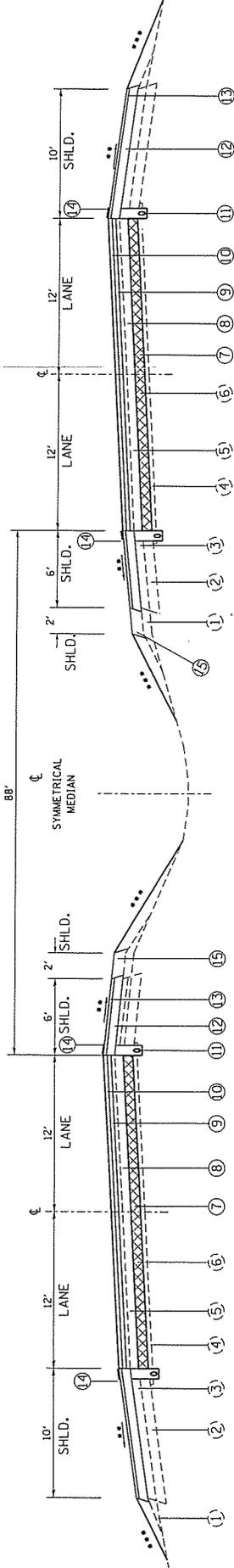
P:\Pavement Design Stuff\D-3\I-55 from 0.6 miles N of IL 23 to 4.2 miles N of IL 23 rubblization\I-55 from 0.4 miles to 4.2 miles N of IL 23 LCCA Mechanistic Pav



**SOUTH BOUND**

**EXISTING /PROPOSED TYPICAL SECTION**

STA. 344+45.18 TO STA. 514+16.19

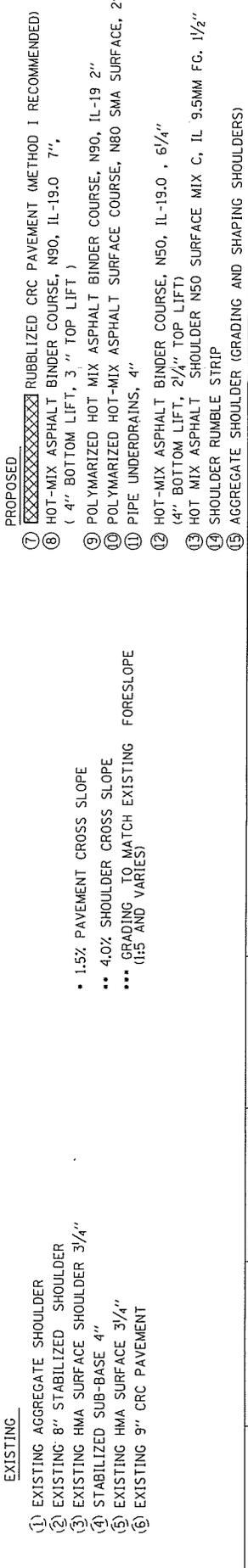


**SOUTH BOUND**

**EXISTING /PROPOSED SUPERELEVATION TYPICAL SECTION**

STA. 514+16.19 TO STA. 533+50

**NORTH BOUND**



**EXISTING**

- ① EXISTING AGGREGATE SHOULDER
- ② EXISTING 8" STABILIZED SHOULDER
- ③ EXISTING HMA SURFACE SHOULDER 3/4"
- ④ STABILIZED SUB-BASE 4"
- ⑤ EXISTING HMA SURFACE 3/4"
- ⑥ EXISTING 9" CRC PAVEMENT

**PROPOSED**

- ⑦ RUBBLIZED CRC PAVEMENT (METHOD I RECOMMENDED)
- ⑧ HOT-MIX ASPHALT BINDER COURSE, N90, IL-19.0 7", (4" BOTTOM LIFT, 3" TOP LIFT)
- ⑨ POLYMERIZED HOT MIX ASPHALT BINDER COURSE, N90, IL-19 2"
- ⑩ POLYMERIZED HOT-MIX ASPHALT SURFACE COURSE, N80 SMA SURFACE, 2"
- ⑪ PIPE UNDERDRAINS, 4"
- ⑫ HOT-MIX ASPHALT BINDER COURSE, N50, IL-19.0, 6 1/4" (4" BOTTOM LIFT, 2 1/4" TOP LIFT)
- ⑬ HOT MIX ASPHALT SHOULDER N50 SURFACE MIX C, IL 9.5MM F.G. 1 1/2"
- ⑭ SHOULDER RUMBLE STRIP
- ⑮ AGGREGATE SHOULDER (GRADING AND SHAPING SHOULDERS)

- 1.5% PAVEMENT CROSS SLOPE
- 4.0% SHOULDER CROSS SLOPE
- GRADING TO MATCH EXISTING FORESLOPE (1:5 AND VARIES)

FILE NAME	DESIGNED	REVISIONS	SECTION	COUNTY	TOTAL SHEETS
PROJECT NO.	DATE	BY	NO.	LIVINGSTON	NO.
SCALE	DATE	BY	NO.	CONTRACT NO.	NO.
SCALE	DATE	BY	NO.	CONTRACT NO.	NO.