Illinois Department of Transportation

To:	Kensil A. Garnett	Attn: Karen Dvorsky	
From:	Priscilla A. Tobias	By: Michael Brand	MOB
Subject:	Pavement Design Approval		
Date:	December 19, 2017		

Route:	I-74	Job No.:	P-94-011-12
Section:	(X3-16,17;90-15)RS-5;(57-17)RS	Contract No.:	68A79
County:	Tazewell, Woodford, and McLean	Target Letting:	FY 2018
Limits:	from the Tazewell County line near Dear Creek to just East of the Carlock interchange		

We have reviewed the pavement design for the above referenced project which was submitted on December 5, 2017. The scope of the project involves approximately 8.5 miles of rubblization with an HMA overlay and 2.5 miles of pavement replacement to account for existing mainline and overhead structures. The cross-section of I-74 will be two 12' lanes in each direction with 10' outside paved shoulders and 4' inside paved shoulders.

Rubblization: This part of the design resulted in three pavement options: 10.75" PCC, 14.25" Full-Depth HMA, and rubblization with an 11.25" HMA overlay. The life-cycle cost analysis of these options resulted in the rubblization being 35.7% less expensive than the next cheapest option ($135,365 per mile compared to Full-Depth HMA at $183,698 per mile) and thus the preferred option.

Pavement Replacement: This part of the design resulted in two pavement options: 10.75" PCC and 14.25" Full-Depth HMA. The life-cycle cost analysis of these options resulted in the PCC being 0.5% less expensive than the HMA ($157,362 per mile compared to HMA at $158,152 per mile) and so the selection was referred to the Pavement Selection Committee. The committee selected the HMA option for the reasons cited by the District.

In summary, the approved pavement designs are as follows:

Rubblization	Pavement Replacement
11.25" HMA	14.25" Full-Depth HMA
8" HMA Shoulders	8" HMA Shoulders
Rubblized Base	12" Improved Subgrade

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

Illinois Department of Transportation

Memorandum

To:	Engineer of Bureau of Design & Environment
From:	Kensil A. Garnett
Subject:	**Pavement Design (I-74/P-94-011-12)**
Date:	December 5, 2017

BUREAU OF PROGRAM DEVELOPMENT
STUDIES & PLANS – PHASE I
FAI 74 (I-74)
Section: (X3-16,17;90-15)RS-5;(57-17)RS
Location: Reconstruction of I-74 from the Tazewell County line near Deer Creek to just east of the Carlock interchange.
Tazewell, Woodford, and McLean Counties
Job No. P-94-011-12
Catalog No. 034753-00P

Attached for approval are the pavement designs for I-74 from just west of the Tazewell County line near Deer Creek to just east of the Carlock interchange in Tazewell, Woodford, and McLean Counties. The project encompasses approximately 8.5 miles of HMA overlay on rubblized base and 2.5 miles of pavement removal and replacement. The rubblized segments will receive 11.25" of HMA on existing rubblized base after the existing HMA overlay has been removed. The recommendation for new pavement construction segments where matching into existing structures or reprofiling beneath existing structures to maintain a minimum of 16.0' clearance is 14.25" of full-depth HMA to maintain consistency in construction sequence and future maintenance treatments. Letting of this project is in FY 2018.

Rubblization Segments:

An 11.25" HMA overlay of the rubblized pavement after removal of the existing HMA overlays has an annual life cycle cost of $135,365 per mile based on the attached mechanistic pavement design analysis. The next closest option based on cost is 14.25" of full-depth HMA pavement on a 12" improved subbase which is 35.7% more expensive than the rubblization option at $183,698 per mile. Due to the condition of the existing PCC pavement which is D cracked and the number of untied HMA and PCC patches, an unbonded PCC overlay was not considered. The existing HMA overlays are also highly susceptible to rutting and contain aggregate not acceptable for RAP so these materials were not considered for recycling.

New Construction Segments:

The 10.75" Jointed PCC pavement on improved subbase option has a life cycle cost of $157,362 per mile while the 14.25" full-depth HMA option has a cost of $158,152 per mile. The cost difference is 0.5% in favor of Jointed PCC. However, due to these pavement removal and replacement segments being located intermittently within the rubblization project and the length of the replacement segments being as short as 475', the district recommends constructing the pavement replacement segments with 14.25" Full-Depth HMA Pavement. Utilizing the same type of construction methods will aid in the timing and completion of the project, as well as, the long-term cost effectiveness of the maintenance of the 11-mile section of roadway. Having different maintenance strategies and schedules for small segments of dissimilar pavement and those costs would not be reflected in the costs shown in the summary. For these reasons, in areas where rubblization is not possible, such as under and adjacent to existing structures, the Full-Depth HMA Pavement 14.25" is recommended by the District.

Calculations to determine the pavement thicknesses and life cycle costs are attached with the pavement design, as well as, the Rubblization Geotechnical Study.

Please review and approve the design which recommends 11.25" HMA overlay of the rubblized pavement and 14.25" Full-Depth HMA on improved subgrade for the full removal and replacement segments.

If there are any questions regarding this information, please contact Mr. Rich Dotson of the District Four office at (309) 671-3455.

Kensil A Garnett (KSD)

Kensil A. Garnett, P.E.
Region Three Engineer

RJD:tdp

Attachment(s)

cc: Project File (M. Jacobs)
Project Engineer (R. Dotson)

rjd001_fai 74_i-74_p-94-011-12_bde_pavement design committee.docx

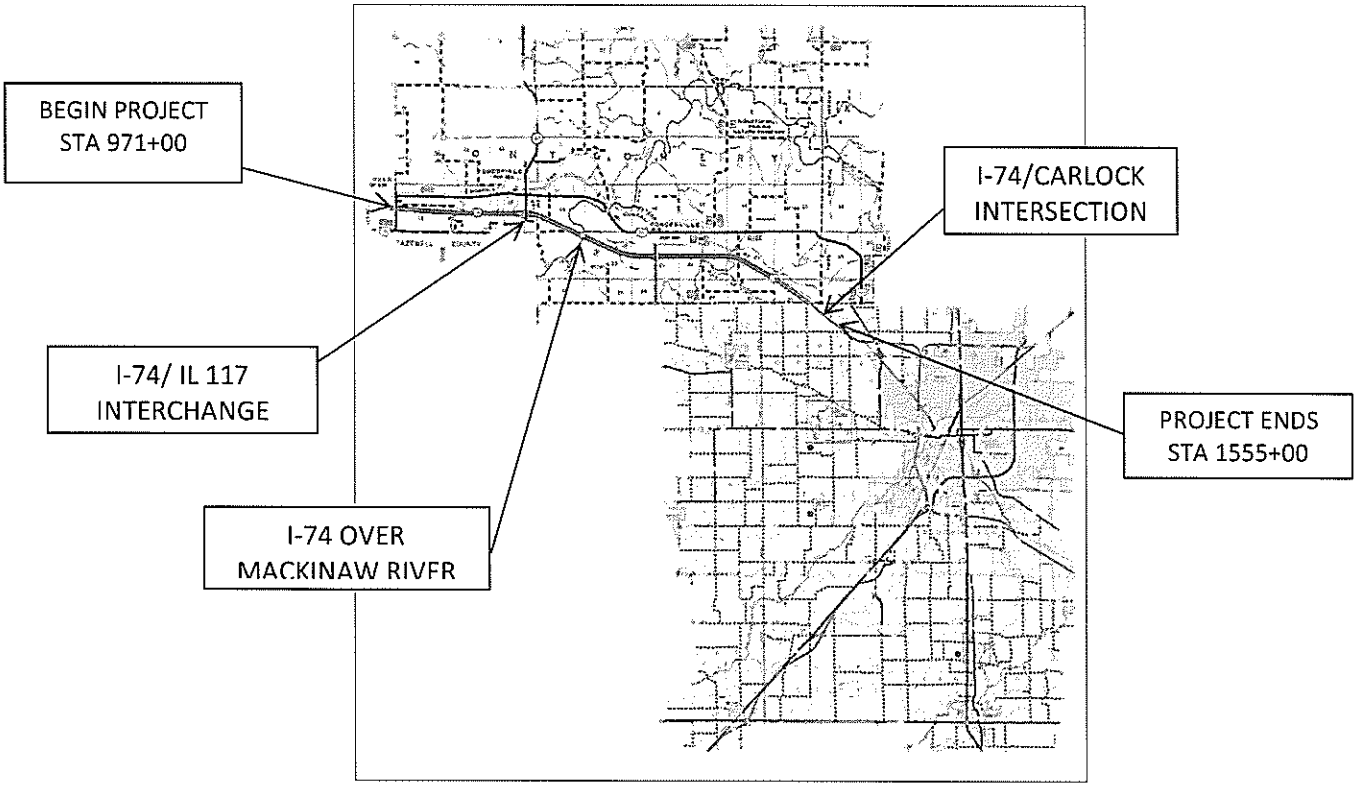
State of Illinois
Department of Transportation
Division of Highways

Location Map

FAI 74 (I-74)
SECTION (X3-16,17;90-15)RS-5;(57-17)RS-4
TAZEWELL/WOODFORD/MCCLEAN COUNTY

RUBBLIZING AND RESURFACING
I-74 FROM TAZEWELL CO TO EAST OF CARLOCK

CONTRACT 68A79
P-94-011-12



SCALE: N/A

TOTAL LENGTH OF SECTION AND PROJECT= 57919.33 FT=10.97 MI
NET LENGTH OF SECTION AND PROJECT: 51264.86 FT=9.71 MI

Rubblization Segments

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

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 11/27/2017

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: I-74 (FAI 74) Comments:
Section: (X3-16,X3-17)R
County: Woodford/McLean Design Date: 07/27/2017 RJD <-- BY
Location: I-74 from Tazewell Co. line to east of Carl Modify Date: <-- BY

	ADT	Year
Current:	26,600	2015
Future:	33,691	2038

Facility Type: Interstate or Freeway
# of Lanes = 4
Road Class: I
Subgrade Support Rating (SSR): Poor
Construction Year: 2018
Design Period (DP) = 20 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	25,397	82.7%	P = 32%
SU =	500	945	3.1%	S = 45%
MU =	1500	4,353	14.2%	M = 45%
Struct. Design ADT =		30,695	(2028)	

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) =	20.05	(Actual ADT)	TF rigid (Actual) =	28.53	(Actual ADT)
TF flexible (Min) =	7.11	(Min ADT Fig. 54-2.C)	TF rigid (Min) =	10.05	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 20.05
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)
Goto Map
HMA Mixture Temp. = 76.5 deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) = 650 ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) = 51 (Fig. 54-5.E)
Goto Map
Full Depth HMA Design Thickness = 14.25 in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness = 15.50 in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness = 14.25 inches

JPC Pavement

Use TF rigid = 28.53
Edge Support = Tied Shoulder or C.&G.
Rigid Pavt Thick. = 10.75 in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 28.53
IBR value = 3
CRCP Thickness = 10.50 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 = 20.05
HMA Overlay Design Thickness = 11.50 in. (Fig. 54-5.U)
Goto Map
Limiting Strain Criterion Thickness = 11.25 in. (Fig. 54-5.V)
Use HMA Overlay Thickness = 11.25 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%

Appendix D

BDE 5401 Template (Rev. 09/05/2013) Printed: 11/28/2017

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

LSC Design

ROUTE		I-74 (FAI 74)	
SECTION		(X3-16,X3-17)R	
COUNTY		Woodford/McLean	
LOCATION		I-74 from Tazewell Co. line to east of Carlock	
FACILITY TYPE		INTERSTATE	
PROJECT LENGTH		45285 FT = = >	8.58 Miles
# OF CENTERLINES		2 CL	
# OF LANES		4 LANES	
# OF EDGES		4 EP	
LANE WIDTH - AVERAGE		12 FT	
SHOULDER WIDTH	HMA Inside	4 FT	
	HMA Outside	10 FT	
	Total Width of Paved Shoulders	28 FT	
PAVEMENT THICKNESS (FLEXIBLE)		14.25 IN	14.25 IN MAX
SHOULDER THICKNESS		8.00 IN	LSC Design
POLICY OVERLAY THICKNESS		2.00 IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	7.11	1.00	7.11

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$99.14 / TON
HMA TOP BINDER	$87.54 / TON
HMA LOWER BINDER	$77.62 / TON
HMA BINDER (LEVELING)	/ TON
HMA SHOULDER	$77.72 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE		COST	
HMA PAVEMENT (FULL-DEPTH)	(14.25")	241,520	SQ YD	$68.71	/ SQ YD	$0	
HMA SURFACE COURSE	(2.00")	27,238	TONS	$99.14	/ TON	$2,700,384	~
HMA TOP BINDER COURSE	(2.25")	31,092	TONS	$87.54	/ TON	$2,721,787	~
HMA LOWER BINDER COURSE	(10.00")	143,939	TONS	$77.62	/ TON	$11,172,562	~
HMA SHOULDER	(8.00")	63,117	TONS	$77.72	/ TON	$4,905,471	~
CURB & GUTTER		0	LIN FT	$30.00	/ LIN FT	$0	
SUBBASE GRAN MATL TY C (TONS)		39,107	TONS	$24.74	/ TON	$967,507	
IMPROVED SUBGRADE:	Modified Soil	416,370	SQ YD	$4.73	/ SQ YD	$1,969,430	
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0	
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0	
PAVEMENT REMOVAL		241,520	SQ YD	$16.36	/ SQ YD	$3,951,267	
SHOULDER REMOVAL		140,887	SQ YD	$13.95	/ SQ YD	$1,965,374	

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST $30,353,782

FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE $144,343

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY				$0.00	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix	$11.18	/ SQ YD
HMA OVERLAY PVMT		(2.00")		$11.18	/ SQ YD
HMA SURFACE MIX		(2.00")	Surface Mix	$11.18	/ SQ YD
HMA BINDER MIX		(0.00")	lling Binder Mix	$0.00	/ SQ YD
HMA OVERLAY SHLD	(Year 30)	(2.00")	Shoulder Mix	$8.70	/ SQ YD
HMA OVERLAY SHLD		(2.00")	Shoulder Mix	$8.70	/ SQ YD
MILLING (2.00 IN)				$3.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)	Surface Mix	$81.10	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill Surf)	Shoulder Mix	$78.70	/ SQ YD

PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00 ")	Leveling Binder Mix	**$70.00**	/ SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00 ")	Shoulder Mix	**$78.70**	/ 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	$38,629,738
FLEXIBLE TOTAL ANNUAL COST PER MILE	$183,698

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 11/28/17

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
YEAR 5								
	LONG SHLD JT R&S	100.00%	181,140	LIN FT	$2.00		$362,280	
	CNTR LINE JOINT R&S	100.00%	90,570	LIN FT	$2.00		$181,140	
	RNDM / THRM CRACK R&S	50.00%	99,627	LIN FT	$2.00		$199,254	
	PD PVMT PATCH M&F SURF	0.10%	242	SQ YD	$81.10		$19,627	
	PWFn =	0.8626		PW =	0.8626	X	$762,301	$657,568
YEAR 10								
	LONG SHLD JT R&S	100.00%	181,140	LIN FT	$2.00		$362,280	
	CNTR LINE JOINT R&S	100.00%	90,570	LIN FT	$2.00		$181,140	
	RNDM / THRM CRACK R&S	50.00%	99,627	LIN FT	$2.00		$199,254	
	PD PVMT PATCH M&F SURF	0.50%	1,208	SQ YD	$81.10		$97,973	
	PWFn =	0.7441		PW =	0.7441	X	$840,647	$625,520
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	382,407	SQ YD	$3.00		$1,147,221	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	2,415	SQ YD	$70.00		$169,050	
	HMA OVERLAY PVMT 2.00"	100.00%	241,520	SQ YD	$11.18		$2,700,384	
	HMA OVERLAY SHLD 2.00 "	100.00%	140,887	SQ YD	$8.70		$1,226,368	
	PWFn =	0.6419		PW =	0.6419	X	$5,243,023	$3,365,297
YEAR 20								
	LONG SHLD JT R&S	100.00%	181,140	LIN FT	$2.00		$362,280	
	CNTR LINE JOINT R&S	100.00%	90,570	LIN FT	$2.00		$181,140	
	RNDM / THRM CRACK R&S	50.00%	99,627	LIN FT	$2.00		$199,254	
	PD PVMT PATCH M&F SURF	0.10%	242	SQ YD	$81.10		$19,627	
	PWFn =	0.5537		PW =	0.5537	X	$762,301	$422,068
YEAR 25								
	LONG SHLD JT R&S	100.00%	181,140	LIN FT	$2.00		$362,280	
	CNTR LINE JOINT R&S	100.00%	90,570	LIN FT	$2.00		$181,140	
	RNDM / THRM CRACK R&S	50.00%	99,627	LIN FT	$2.00		$199,254	
	PD PVMT PATCH M&F SURF	0.50%	1,208	SQ YD	$81.10		$97,973	
	PWFn =	0.4776		PW =	0.4776	X	$840,647	$401,498
	HMA_LSCD							
YEAR 30	INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	382,407	SQ YD	$3.00		$1,147,221	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	4,830	SQ YD	$70.00		$338,100	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	1,409	SQ YD	$78.70		$110,895	
	HMA OVERLAY PVMT 2.00"	100.00%	241,520	SQ YD	$11.18		$2,700,384	
	HMA OVERLAY SHLD 2.00 "	100.00%	140,887	SQ YD	$8.70		$1,226,368	
	PWFn =	0.4120		PW =	0.4120	X	$5,522,968	$2,275,390
YEAR 35								
	LONG SHLD JT R&S	100.00%	181,140	LIN FT	$2.00		$362,280	
	CNTR LINE JOINT R&S	100.00%	90,570	LIN FT	$2.00		$181,140	
	RNDM / THRM CRACK R&S	50.00%	99,627	LIN FT	$2.00		$199,254	
	PD PVMT PATCH M&F SURF	0.10%	242	SQ YD	$81.10		$19,627	
	PWFn =	0.3554		PW =	0.3554	X	$762,301	$270,909
YEAR 40								
	LONG SHLD JT R&S	100.00%	181,140	LIN FT	$2.00		$362,280	
	CNTR LINE JOINT R&S	100.00%	90,570	LIN FT	$2.00		$181,140	
	RNDM / THRM CRACK R&S	50.00%	99,627	LIN FT	$2.00		$199,254	
	PD PVMT PATCH M&F SURF	0.50%	1,208	SQ YD	$81.10		$97,973	
	PWFn =	0.3066		PW =	0.3066	X	$840,647	$257,706
								$8,275,956
	ROUTINE MAINTENANCE ACTIVITY		34.31	Lane Miles	0.00		0	$0
					MAINTENANCE LIFE-CYCLE COST			$8,275,956
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$39,355

PCC PAVEMENT

JPCP

ROUTE			I-74 (FAI 74)	
SECTION			(X3-16,X3-17)R	
COUNTY			Woodford/McLean	
LOCATION			I-74 from Tazewell Co. line to east of Carlock	
FACILITY TYPE			INTERSTATE	
PROJECT LENGTH			45285 FT = = >	8.58 Miles
# OF CENTERLINES			2 CL	
# OF LANES			4 LANES	
# OF EDGES			4 EP	
LANE WIDTH - AVERAGE			12 FT	
SHOULDER WIDTH	PCC	Inside	4 FT	
	PCC	Outside	10 FT	
	Total Width of Paved Shoulders		28 FT	

PAVEMENT THICKNESS (RIGID)	JPCP	10.75 IN	TIED SHLD
SHOULDER THICKNESS		10.75 IN	
POLICY OVERLAY THICKNESS		3.75 IN	

RIGID PAVEMENT TRAFFIC FACTORS		MINIMUM	ACTUAL	USE
		10.05	1.00	10.05
Worksheet Construction Type is	Reconstruction		The Pavement Type is	JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE		COST
JPC PAVEMENT	(10.75")	241,520	SQ YD	$56.89	/ SQ YD	$13,740,073
PAVEMENT REINFORCEMENT		0	SQ YD	$22.00	/ SQ YD	$0
STABILIZED SUBBASE	(4.00")	271,710	SQ YD	$18.69	/ SQ YD	$5,078,260
PCC SHOULDERS		140,887	SQ YD	$44.60	/ SQ YD	$6,283,560
CURB & GUTTER		0	LIN FT	$30.00	/ LIN FT	$0
SUBBASE GRAN MATL TY C	(3.07")	16,400	TONS	$24.83	/ TON	$407,212
IMPROVED SUBGRADE:	Modified Soil	392,470	SQ YD	$4.73	/ SQ YD	$1,856,383
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
Reserved For User Supplied Item		0	UNITS	$0.00	/ UNITS	$0
PAVEMENT REMOVAL		241,520	SQ YD	$16.36	/ SQ YD	$3,951,267
SHOULDER REMOVAL		140,887	SQ YD	$13.95	/ SQ YD	$1,965,374

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$33,282,129
RIGID CONSTRUCTION ANNUAL COST PER MILE	$158,268

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")		$19.60	/ SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	$8.37	/ SQ YD
HMA BINDER MIX	(2.25")	Top Binder Mix	$11.23	/ SQ YD
HMA POLICY OVERLAY SHLD	(3.75")	Shoulder Mix	$16.32	/ SQ YD
CLASS A PAVEMENT PATCHING			$195.00	/ SQ YD
CLASS B PAVEMENT PATCHING			$150.00	/ SQ YD
CLASS C SHOULDER PATCHING			$145.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	$78.33	/ SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 1.50")		Surface Mix	$78.33	/ 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	$39,017,359
RIGID TOTAL ANNUAL COST PER MILE	$185,541

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 11/28/17

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%	242	SQ YD	$150.00		$36,300	
	PWFn =	0.7441		PW =	0.7441	X	$36,300	$27,011
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	483	SQ YD	$150.00		$72,450	
	PWFn =	0.6419		PW =	0.6419	X	$72,450	$46,503
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	4,830	SQ YD	$150.00		$724,500	
	SHOULDER PATCH CLASS C	0.50%	704	SQ YD	$145.00		$102,080	
	LONGITUDINAL SHLD JT R&S	100.00%	181,140	LIN FT	$2.00		$362,280	
	CENTERLINE JT R&S	100.00%	90,570	LIN FT	$2.00		$181,140	
	PWFn =	0.5537		PW =	0.5537	X	$1,370,000	$758,536
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	7,246	SQ YD	$150.00		$1,086,900	
	SHOULDER PATCH CLASS C	1.00%	1,409	SQ YD	$145.00		$204,305	
	PWFn =	0.4776		PW =	0.4776	X	$1,291,205	$616,687
YEAR 30	INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	9,661	SQ YD	$150.00		$1,449,150	
	SHOULDER PATCH CLASS C	1.50%	2,113	SQ YD	$145.00		$306,385	
	HMA POLICY OVERLAY 3.75" (PVMT)	100.00%	241,520	SQ YD	$19.60		$4,734,334	
	HMA POLICY OVERLAY 3.75" (SHLD)	100.00%	140,887	SQ YD	$16.32		$2,299,440	
	PWFn =	0.4120		PW =	0.4120	X	$8,789,309	$3,621,079
YEAR 35	INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	181,140	LIN FT	$2.00		$362,280	
	CENTERLINE JT R&S	100.00%	90,570	LIN FT	$2.00		$181,140	
	RANDOM CRACK R&S	50.00%	90,570	LIN FT	$2.00		$181,140	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	57,965	LIN FT	$2.00		$115,930	
	PD PVMT PATCH M&F HMA SURF 1.50"	0.10%	242	SQ YD	$78.33		$18,955	
	PWFn =	0.3554		PW =	0.3554	X	$859,445	$305,432
YEAR 40	INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	1,208	SQ YD	$150.00		$181,200	
	LONGITUDINAL SHLD JT R&S	100.00%	181,140	LIN FT	$2.00		$362,280	
	CENTERLINE JT R&S	100.00%	90,570	LIN FT	$2.00		$181,140	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	86,947	LIN FT	$2.00		$173,894	
	RANDOM CRACK R&S	50.00%	90,570	LIN FT	$2.00		$181,140	
	PD PVMT PATCH M&F HMA SURF 1.50"	0.50%	1,208	SQ YD	$78.33		$94,620	
	PWFn =	0.3066		PW =	0.3066	X	$1,174,274	$359,982
								$5,735,230
	ROUTINE MAINTENANCE ACTIVITY		34.31	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$5,735,230
45	YEAR LIFE CYCLE CRFn = 0.0407852				MAINTENANCE ANNUAL COST PER MILE			$27,273

Full-Depth Segments

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

IDOT MECHANISTIC PAVEMENT DESIGN

Printed: 11/18/2017

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: I-74 (FAI 74)
Section: (X3-16,X3-17)R
County: Woodford/McLean
Location: I-74 from Tazewell Co. line to east of Car

Comments:

Design Date: 07/27/2017 RJD <-- BY
Modify Date: <-- BY

	ADT	Year
Current:	26,800	2015
Future:	33,691	2038

Facility Type: Interstate or Freeway
# of Lanes = 4

Road Class: I

Subgrade Support Rating (SSR): Poor
Construction Year: 2018
Design Period (DP) = 20 years

	Minimum ADT	Structural Design Traffic: Actual ADT	Actual %of Total ADT	% of ADT in Design Lane
PV =	0	25,397	82.7%	P = 32%
SU =	500	945	3.1%	S = 45%
MU =	1500	4,353	14.2%	M = 45%
		Struct. Design ADT =	30,695	(2028)

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) =	20.05	(Actual ADT)	TF rigid (Actual) =	28.53	(Actual ADT)
TF flexible (Min) =	7.11	(Min ADT Fig. 54-2.C)	TF rigid (Min) =	10.05	(Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Goto Map

Use TF flexible =	20.05	
PG Grade Lower Binder Lifts =	PG 64-22	(Fig. 53-4.R)
HMA Mixture Temp. =	76.5	deg. F (Fig. 54-5.C)
Design HMA Mixture Modulus (E_{HMA}) =	650	ksi (Fig. 54-5.D)
Design HMA Strain (ε_{HMA}) =	51	(Fig. 54-5.E)

Goto Map

Full Depth HMA Design Thickness =	14.25	in. (Fig. 54-5.F)
Limiting Strain Criterion Thickness =	15.50	in. (Fig. 54-5.I)
Use Full-Depth HMA Thickness =	**14.25**	**inches**

JPC Pavement

Use TF rigid =	28.53	
Edge Support =	Tied	Shoulder or C.&G.
Rigid Pavt Thick. =	**10.75**	**in. (Fig. 54-4.E)**

CRC Pavement

Use TF rigid =	28.53	
IBR value =	3	
CRCP Thickness =	**10.50**	**in. (Fig. 54-4.M)**

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Goto Map

Use TF flexible =	20.05	
HMA Overlay Design Thickness =	11.50	in. (Fig. 54-5.U)
Limiting Strain Criterion Thickness =	11.25	in. (Fig. 54-5.V)
Use HMA Overlay Thickness =	**11.25**	**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%

Appendix E

BDE 5401 Template (Rev. 09/05/2013) Printed: 11/28/2017

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE		I-74 (FAI 74)	
SECTION		(X3-16,X3-17)R	
COUNTY		Woodford/McLean	
LOCATION		I-74 from Tazewell Co. line to east of Carlock	
FACILITY TYPE		INTERSTATE	
PROJECT LENGTH		13115 FT	= = > 2.48 Miles
# OF CENTERLINES		2 CL	
# OF LANES		4 LANES	
# OF EDGES		4 EP	
LANE WIDTH - AVERAGE		12 FT	
SHOULDER WIDTH	HMA Inside	4 FT	
	HMA Outside	10 FT	
	Total Width of Paved Shoulders	28 FT	
PAVEMENT THICKNESS (FLEXIBLE)		14.25 IN	15.50 IN MAX
SHOULDER THICKNESS		8.00 IN	Standard Design
POLICY OVERLAY THICKNESS		3.75 IN	

FLEX PAVEMENT TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
	7.11	20.05	20.05

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	$98.79 / TON
HMA TOP BINDER	$87.05 / TON
HMA LOWER BINDER	$77.51 / TON
HMA BINDER (LEVELING)	$0.00 / TON
HMA SHOULDER	$77.72 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT		UNIT PRICE		COST	
HMA PAVEMENT (FULL-DEPTH)	(14.25")	69,947	SQ YD		$68.54	/ SQ YD	$0	
HMA SURFACE COURSE	(2.00")	7,888	TONS	*	$98.79	/ TON	$779,256	~
HMA TOP BINDER COURSE	(2.25")	9,005	TONS	*	$87.05	/ TON	$783,885	~
HMA LOWER BINDER COURSE	(10.00")	41,686	TONS	*	$77.51	/ TON	$3,231,082	~
HMA SHOULDER	(8.00")	18,279	TONS	*	$77.72	/ TON	$1,420,675	~
CURB & GUTTER		0	LIN FT		$30.00	/ LIN FT	$0	
SUBBASE GRAN MATL TY C (TONS)		11,326	TONS		$24.74	/ TON	$280,205	
IMPROVED SUBGRADE:	Modified Soil	120,585	SQ YD		$4.73	/ SQ YD	$570,367	
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0	
Reserved For User Supplied Item		0	UNITS		$0.00	/ UNITS	$0	
PAVEMENT REMOVAL		69,947	SQ YD		$0.00	/ SQ YD	$0	
SHOULDER REMOVAL		40,802	SQ YD		$0.00	/ SQ YD	$0	

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST	$7,065,470
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE	$116,014

MAINTENANCE COSTS:

ITEM		THICKNESS	MATERIAL	UNIT COST	
ROUTINE MAINTENANCE ACTIVITY				$0.00	LANE-MILE / YEAR
HMA OVERLAY PVMT SURF		(2.00")	Surface Mix	$11.14	/ SQ YD
HMA OVERLAY PVMT		(3.75")		$19.51	/ SQ YD
HMA SURFACE MIX		(1.50")	Surface Mix	$8.34	/ SQ YD
HMA BINDER MIX		(2.25")	Top Binder Mix	$11.17	/ SQ YD
HMA OVERLAY SHLD	(Year 30)	(1.75")	Shoulder Mix	$7.62	/ SQ YD
HMA OVERLAY SHLD		(2.00")	Shoulder Mix	$8.70	/ SQ YD
MILLING (2.00 IN)				$3.00	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill Surf)	Surface Mix	$81.06	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill Surf)	Shoulder Mix	$78.70	/ SQ YD
PARTIAL DEPTH PVMT PATCH		(Mill & Fill +2.00 ")	Leveling Binder Mix	$70.00	/ SQ YD
PARTIAL DEPTH SHLD PATCH		(Mill & Fill +2.00 ")	Shoulder Mix	$78.70	/ 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	$9,631,764
FLEXIBLE TOTAL ANNUAL COST PER MILE	$158,152

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 11/28/17

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%	52,460	LIN FT	$2.00		$104,920	
	CNTR LINE JOINT R&S	100.00%	26,230	LIN FT	$2.00		$52,460	
	RNDM / THRM CRACK R&S	50.00%	28,853	LIN FT	$2.00		$57,706	
	PD PVMT PATCH M&F SURF	0.10%	70	SQ YD	$81.06		$5,675	
	PWFn =	0.8626		PW =	0.8626	X	$220,761	$190,430
YEAR 10								
	LONG SHLD JT R&S	100.00%	52,460	LIN FT	$2.00		$104,920	
	CNTR LINE JOINT R&S	100.00%	26,230	LIN FT	$2.00		$52,460	
	RNDM / THRM CRACK R&S	50.00%	28,853	LIN FT	$2.00		$57,706	
	PD PVMT PATCH M&F SURF	0.50%	350	SQ YD	$81.06		$28,373	
	PWFn =	0.7441		PW =	0.7441	X	$243,459	$181,156
YEAR 15								
	MILL PVMT & SHLD 2.00"	100.00%	110,749	SQ YD	$3.00		$332,247	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	699	SQ YD	$70.00		$48,930	
	HMA OVERLAY PVMT 2.00"	100.00%	69,947	SQ YD	$11.14		$779,298	
	HMA OVERLAY SHLD 2.00 "	100.00%	40,802	SQ YD	$8.70		$355,169	
	PWFn =	0.6419		PW =	0.6419	X	$1,515,644	$972,834
YEAR 20								
	LONG SHLD JT R&S	100.00%	52,460	LIN FT	$2.00		$104,920	
	CNTR LINE JOINT R&S	100.00%	26,230	LIN FT	$2.00		$52,460	
	RNDM / THRM CRACK R&S	50.00%	28,853	LIN FT	$2.00		$57,706	
	PD PVMT PATCH M&F SURF	0.10%	70	SQ YD	$81.06		$5,675	
	PWFn =	0.5537		PW =	0.5537	X	$220,761	$122,230
YEAR 25								
	LONG SHLD JT R&S	100.00%	52,460	LIN FT	$2.00		$104,920	
	CNTR LINE JOINT R&S	100.00%	26,230	LIN FT	$2.00		$52,460	
	RNDM / THRM CRACK R&S	50.00%	28,853	LIN FT	$2.00		$57,706	
	PD PVMT PATCH M&F SURF	0.50%	350	SQ YD	$81.06		$28,373	
	PWFn =	0.4776		PW =	0.4776	X	$243,459	$116,277
	HMA_SD							
YEAR 30	INTERSTATE							
	MILL PVMT ONLY 2.00"	100.00%	69,947	SQ YD	$3.00		$209,841	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	1,399	SQ YD	$70.00		$97,930	
	PD SHLD PATCH M&F SURF 2.00"	1.00%	408	SQ YD	$78.70		$32,111	
	HMA OVERLAY PVMT 3.75 "	100.00%	69,947	SQ YD	$19.51		$1,364,647	
	HMA OVERLAY SHLD 1.75 "	100.00%	40,802	SQ YD	$7.62		$310,773	
	PWFn =	0.4120		PW =	0.4120	X	$2,015,302	$830,278
YEAR 35								
	LONG SHLD JT R&S	100.00%	52,460	LIN FT	$2.00		$104,920	
	CNTR LINE JOINT R&S	100.00%	26,230	LIN FT	$2.00		$52,460	
	RNDM / THRM CRACK R&S	50.00%	28,853	LIN FT	$2.00		$57,706	
	PD PVMT PATCH M&F SURF	0.10%	70	SQ YD	$81.06		$5,675	
	PWFn =	0.3554		PW =	0.3554	X	$220,761	$78,455
YEAR 40								
	LONG SHLD JT R&S	100.00%	52,460	LIN FT	$2.00		$104,920	
	CNTR LINE JOINT R&S	100.00%	26,230	LIN FT	$2.00		$52,460	
	RNDM / THRM CRACK R&S	50.00%	28,853	LIN FT	$2.00		$57,706	
	PD PVMT PATCH M&F SURF	0.50%	350	SQ YD	$81.06		$28,373	
	PWFn =	0.3066		PW =	0.3066	X	$243,459	$74,634
								$2,566,294
	ROUTINE MAINTENANCE ACTIVITY		9.94	Lane Miles	0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$2,566,294
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$42,138

PCC PAVEMENT

JPCP

ROUTE			I-74 (FAI 74)		
SECTION			(X3-16,X3-17)R		
COUNTY			Woodford/McLean		
LOCATION			I-74 from Tazewell Co. line to east of Carlock		
FACILITY TYPE			INTERSTATE		
PROJECT LENGTH			13115 FT	= = >	2.48 Miles
# OF CENTERLINES			2 CL		
# OF LANES			4 LANES		
# OF EDGES			4 EP		
LANE WIDTH - AVERAGE			12 FT		
SHOULDER WIDTH	PCC	Inside	4 FT		
	PCC	Outside	10 FT		
	Total Width of Paved Shoulders		28 FT		
PAVEMENT THICKNESS (RIGID)		JPCP	10.75 IN		TIED SHLD
SHOULDER THICKNESS			10.75 IN		
POLICY OVERLAY THICKNESS			3.75 IN		

RIGID PAVEMENT TRAFFIC FACTORS		MINIMUM	ACTUAL	USE
		10.05	28.53	28.53
Worksheet Construction Type is	Reconstruction		**The Pavement Type is**	**JPCP**

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
JPC PAVEMENT	(10.75")	69,947	SQ YD	**$56.89** / SQ YD	$3,979,285
PAVEMENT REINFORCEMENT		0	SQ YD	**$22.00** / SQ YD	$0
STABILIZED SUBBASE	(4.00")	78,690	SQ YD	**$18.69** / SQ YD	$1,470,716
PCC SHOULDERS		40,802	SQ YD	**$44.60** / SQ YD	$1,819,769
CURB & GUTTER		0	LIN FT	**$30.00** / LIN FT	$0
SUBBASE GRAN MATL TY C	(3.37")	4,750	TONS	**$24.83** / TON	$117,943
IMPROVED SUBGRADE:	Modified Soil	113,663	SQ YD	**$4.73** / SQ YD	$537,626
Reserved For User Supplied Item		0	**UNITS**	**$0.00** / UNITS	$0
Reserved For User Supplied Item		0	**UNITS**	**$0.00** / UNITS	$0
PAVEMENT REMOVAL		69,947	SQ YD	**$0.00** / SQ YD	$0
SHOULDER REMOVAL		40,802	SQ YD	**$0.00** / SQ YD	$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST	$7,925,339
RIGID CONSTRUCTION ANNUAL COST PER MILE	$130,133

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")		**$19.51** / SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	**$8.34** / SQ YD
HMA BINDER MIX	(2.25")	Top Binder Mix	**$11.17** / SQ YD
HMA POLICY OVERLAY SHLD	(3.75")	Shoulder Mix	**$16.32** / SQ YD
CLASS A PAVEMENT PATCHING			**$195.00** / SQ YD
CLASS B PAVEMENT PATCHING			**$150.00** / SQ YD
CLASS C SHOULDER PATCHING			**$145.00** / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	**$78.30** / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 1.50")		Surface Mix	**$78.30** / 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	$9,583,644
RIGID TOTAL ANNUAL COST PER MILE	$157,362

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE 11/28/17

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%	70	SQ YD	$150.00		$10,500	
	PWFn =	0.7441		PW =	0.7441	X	$10,500	$7,813
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	140	SQ YD	$150.00		$21,000	
	PWFn =	0.6419		PW =	0.6419	X	$21,000	$13,479
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	1,399	SQ YD	$150.00		$209,850	
	SHOULDER PATCH CLASS C	0.50%	204	SQ YD	$145.00		$29,580	
	LONGITUDINAL SHLD JT R&S	100.00%	52,460	LIN FT	$2.00		$104,920	
	CENTERLINE JT R&S	100.00%	26,230	LIN FT	$2.00		$52,460	
	PWFn =	0.5537		PW =	0.5537	X	$396,810	$219,704
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	2,098	SQ YD	$150.00		$314,700	
	SHOULDER PATCH CLASS C	1.00%	408	SQ YD	$145.00		$59,160	
	PWFn =	0.4776		PW =	0.4776	X	$373,860	$178,558
YEAR 30	INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	2,798	SQ YD	$150.00		$419,700	
	SHOULDER PATCH CLASS C	1.50%	612	SQ YD	$145.00		$88,740	
	HMA POLICY OVERLAY 3.75" (PVMT)	100.00%	69,947	SQ YD	$19.51		$1,364,647	
	HMA POLICY OVERLAY 3.75" (SHLD)	100.00%	40,802	SQ YD	$16.32		$665,941	
	PWFn =	0.4120		PW =	0.4120	X	$2,539,028	$1,046,046
YEAR 35	INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	52,460	LIN FT	$2.00		$104,920	
	CENTERLINE JT R&S	100.00%	26,230	LIN FT	$2.00		$52,460	
	RANDOM CRACK R&S	50.00%	26,230	LIN FT	$2.00		$52,460	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	16,781	LIN FT	$2.00		$33,562	
	PD PVMT PATCH M&F HMA SURF 1.50"	0.10%	70	SQ YD	$78.30		$5,481	
	PWFn =	0.3554		PW =	0.3554	X	$248,883	$88,449
YEAR 40	INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	350	SQ YD	$150.00		$52,500	
	LONGITUDINAL SHLD JT R&S	100.00%	52,460	LIN FT	$2.00		$104,920	
	CENTERLINE JT R&S	100.00%	26,230	LIN FT	$2.00		$52,460	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	25,171	LIN FT	$2.00		$50,342	
	RANDOM CRACK R&S	50.00%	26,230	LIN FT	$2.00		$52,460	
	PD PVMT PATCH M&F HMA SURF 1.50"	0.50%	350	SQ YD	$78.30		$27,404	
	PWFn =	0.3066		PW =	0.3066	X	$340,086	$104,256
								$1,658,305
	ROUTINE MAINTENANCE ACTIVITY		9.94	Lane Miles	$0.00		$0	$0
					MAINTENANCE LIFE-CYCLE COST			$1,658,305
45	YEAR LIFE CYCLE	CRFn = 0.0407852			MAINTENANCE ANNUAL COST PER MILE			$27,229

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 8/18/17 4:15 PM

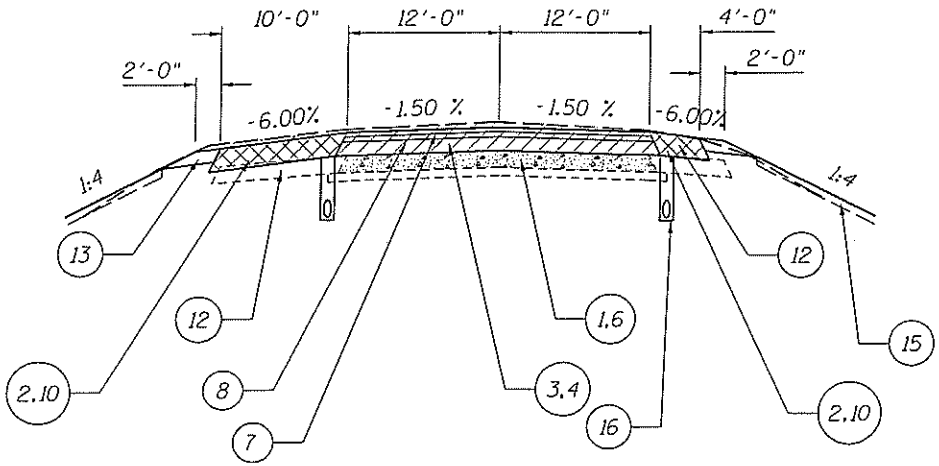
			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	$7,925,339	$7,065,470
		ANNUAL COST PER MILE	$130,133	$116,014
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	$1,658,305	$2,566,294
		ANNUAL COST PER MILE	$27,229	$42,138
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	$9,583,644	$9,631,764
		ANNUAL COST PER MILE	$157,362	$158,152

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

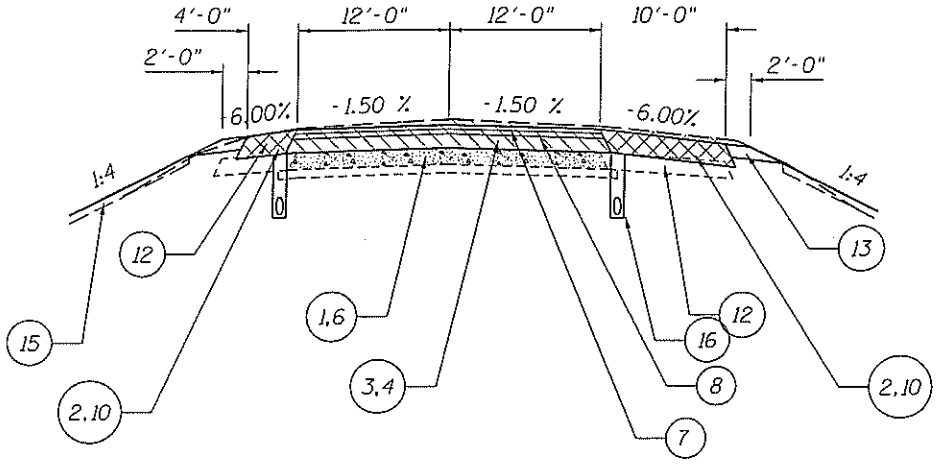
LOWEST COST OPTION	==========>	**JPCP**	**$157,362**	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	**HMA**	**$158,152**	0.5%

C:\Users\DOTSONRJ\Desktop\[I-74 full depth pavement design.xlsm]LifeCycleCost

WEST BOUND



EAST BOUND



LEGEND

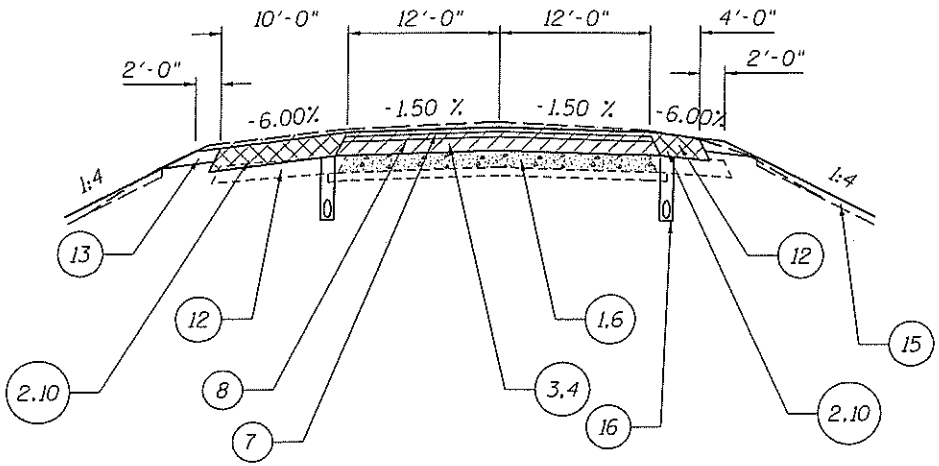
1 EXISTING CRCP PAVEMENT
2 EXISTING HMA SHOULDER
3 EXISTING HMA OVERLAYS
4 PROPOSED HMA SURF REM (SPECIAL) ////
5 PROPOSED PAVEMENT REMOVAL
6 PROPOSED CRCP RUBBLIZED
7 PROPOSED HMA SURFACE COURSE, 2"
8 PROPOSED HMA PAVEMENT, FULL DEPTH, 9 1/4" *
9 PROPOSED HMA PAVEMENT, FULL DEPTH, 12 1/4" *
10 PROPOSED HMA SHOULDER REMOVAL, SPECIAL ** XXXX
11 PROPOSED HMA SHOULDER REMOVAL
12 PROPOSED PAVED SHOULDER (SP) 8"
13 PROPOSED AGGREGATE SHOULDERS, TY B, 6"
14 PROPOSED LIME MODIFIED SOIL, 12"
15 PROPOSED TOPSOIL, F&P 4"
16 PROPOSED PIPE UNDERDRAIN, 4"

EB/WB STA 978+75 to STA 1118+00
WB STA 1127+25 to 1185+75
EB STA 1127+25 to 1181+50
WB STA 1201+00 to 1275+25
EB STA 1204+25 to 1275+25
EB/WB STA 1280+00 to 1326+00
EB/WB STA 1333+75 to STA 1471+75

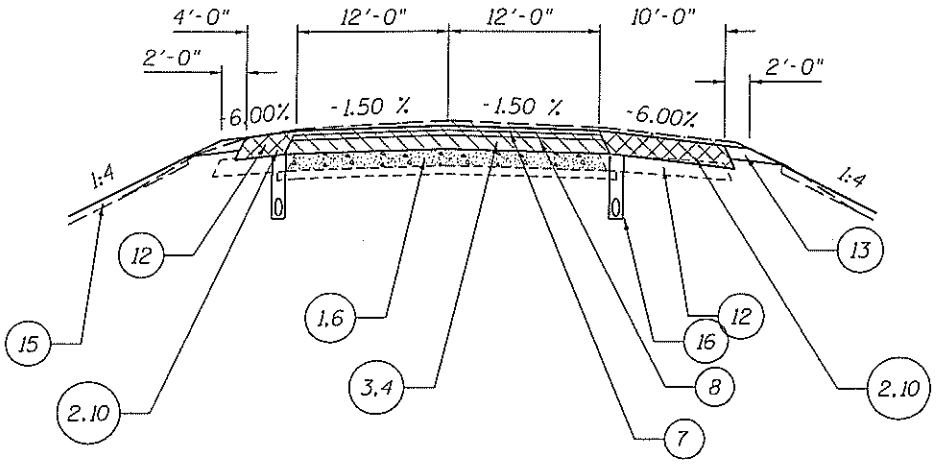
* HMA PAVEMENT CONSISTS OF 2 1/4" TOP BINDER, 7" OR 10" OF LOWER BINDER
** HMA SHOULDER REMOVAL CONSISTS OF HMA REMOVAL 8" BELOW PROPOSED EDGE OF PAVEMENT

FILE NAME =	USER NAME = jacobsm	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	PROPOSED TYPICAL SECTION RUBBLIZED AREAS				F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	PLOT SCALE = 10.0000 ' / in.	CHECKED -	REVISED -								CONTRACT NO.		
Default	PLOT DATE = 11/27/2017	DATE -	REVISED -		SCALE:	SHEET OF SHEETS	STA.	TO STA.			ILLINOIS FED. AID PROJECT		

WEST BOUND



EAST BOUND



LEGEND

1 EXISTING CRCP PAVEMENT
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4 PROPOSED HMA SURF REM (SPECIAL) ////
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9 PROPOSED HMA PAVEMENT, FULL DEPTH, 12 ¼" *
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WB STA 1201+00 to 1275+25
EB STA 1204+25 to 1275+25
EB/WB STA 1280+00 to 1326+00
EB/WB STA 1333+75 to STA 1471+75

* HMA PAVEMENT CONSISTS OF 2¼" TOP BINDER, 7" OR 10" OF LOWER BINDER
** HMA SHOULDER REMOVAL CONSISTS OF HMA REMOVAL 8" BELOW PROPOSED EDGE OF PAVEMENT

FILE NAME =	USER NAME = jacobsen	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	PROPOSED TYPICAL SECTION RUBBILIZED AREAS		F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS / SHEET NO.
	PLOT SCALE = 10.0000 ' / in.	CHECKED -	REVISED -		SCALE:	SHEET OF SHEETS STA. TO STA.			CONTRACT NO.	
Default	PLOT DATE = 11/27/2017	DATE -	REVISED -						ILLINOIS FED. AID PROJECT	