



Illinois Department of Transportation

To: Anthony J. Quigley Attn: John Baczek
From: Maureen M. Addis *MA MOS*
Subject: Pavement Design Approval
Date: November 1, 2017

Route: IL 56
Section: Section 61HB-B
County: Kane
Limits: at Hanks Road

Job No.: D-91-309-13
Contract No.: 60W52
Target Letting: January 2018

We have reviewed the pavement design for the above referenced project which was submitted on October 25, 2017. The scope of the project is to reconstruct Hanks Road over IL 56, raising the profile and realigning the roadway.

The pavement design resulted in two reconstruction options: 10" Full-Depth HMA and 9" Jointed PCC. The life-cycle cost analysis of those two options resulted in the HMA pavement being 18.8% less expensive (\$80,089 per mile as opposed to PCC's \$95,091) and thus the preferred option.

In summary, the approved pavement design is as follows:

Hanks Road

10" Full-Depth HMA Pavement with HMA Shoulders
12" Aggregate Subgrade Improvement

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



Illinois Department of Transportation

Memorandum

To: Maureen Addis

Attn: Michael Brand

From: Jose A. Dominguez

By: Ojas Patel

Subject: Pavement Analysis*

Date: October 25, 2017

*Route: IL 56

Limits: at Hanks Road

Section: 61HB-B

Current target: 01CY18

County: Kane

Contract No.: 60W52

Job No.: D-91-309-13

We have completed the pavement analysis for the above captioned location. Review by the Central Office is required since the total pavement area for reconstruction exceeds 4,750 Square Yards. The following is the scope of the project:

Reconstruction to realign and raise the profile of Hanks Road over IL 56. The full scope of providing a new interchange is not included in this contract/scope.

A 20-year pavement analysis was performed on the above segments. We recommend a mechanistic flexible pavement design based on the life cycle cost analysis which favors HMA pavement by 19% for Hanks Road as follows:

Hanks Road

Reconstruction

HMA Shoulder

10" Full Depth HMA^{1,7}

2" HMA Surface Course, Mix "D", N70

8" HMA Base Course, IL-19.0, N70

12" Aggregate Subgrade Improvement²

Hankes Road (Temporary Pavement)

Option 1³

Temporary Pavement

- 8" Full Depth Temporary HMA Pavement⁴
- 2" HMA Surface Course, Mix "D", N70
- 6" HMA Binder Course, IL-19.0, N70
- 4" Subbase Granular Material Type B (CA-6)⁵

Option 2³

Temporary Pavement

- 8" Temporary PCC Pavement⁴
- 4" Subbase Granular Material Type B (CA-6)⁵

IL 56 (Temporary Pavement)

Option 1³

Temporary Pavement

- 10" Full Depth Temporary HMA Pavement⁴
- 2" HMA Surface Course, Mix "D", N70
- 8" HMA Binder Course, IL-19.0, N70
- 4" Subbase Granular Material Type B (CA-6)^{5,6}

Option 2³

Temporary Pavement

- 8" Temporary PCC Pavement⁴
- 4" Subbase Granular Material Type B (CA-6)^{5,6}

¹Designer Note 1: Use pay item **40701881, HOT-MIX ASPHALT PAVEMENT (FULL-DEPTH), 10"**, paid for in square yards.

²Designer Note 2: Use pay item **30300112, AGGREGATE SUBGRADE IMPROVEMENT, 12"**, paid in square yards.

M. Addis
October 25, 2017
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³Designer Note 3: 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.

⁴Designer Note 4: 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.

⁵Designer Note 5: Use pay item **31101200, SUBBASE GRANULAR MATERIAL, TYPE B 4"**, paid in square yards.

⁶Designer Note 6: Provide 12" Aggregate Subgrade Improvement in lieu of 4" Subbase Granular Material, Type B due to poor soils at the land bridge location (at a minimum from Sta. 228+80 to 233+43).

⁷Designer Note 7: 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.

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

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

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: Hankes Road	Comments: IL 56 at Hankes Road		
Section: 61HB-B	Design Date: 10/28/2017	ONP	<- BY
County: Kane	Modify Date:		<- BY
Location: at IL 56			ADT
			Year
			Current: 5,200
			Future: 21,000
			2011
			2040
Facility Type: Other Marked State Route	# of Lanes = 2 or 3	Structural Design Traffic	
Part of future 4 lanes or more ? No	One Way Street ? No	Minimum ADT	Actual ADT
Road Class: II	Subgrade Support Rating (SSR): Poor	Actual % of Total ADT	% of ADT in Design Lane
Construction Year: 2019	Design Period (DP) = 20 years	PV = 0	P = 50%
		SU = 250	S = 50%
		MU = 750	M = 50%
		Struct. Design ADT = 15,007	(2029)

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = 0.15
 Csu = **112.06**
 Cmu = **385.44**
 TF flexible (Actual) = 0.60 (Actual ADT)
 TF flexible (Min) = 3.17 (Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv = 0.15
 Csu = **135.78**
 Cmu = **567.21**
 TF rigid (Actual) = 0.79 (Actual ADT)
 TF rigid (Min) = 4.59 (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement	JPC Pavement
Use TF flexible = 3.17	Use TF rigid = 4.59
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)	Edge Support = Tied Shoulder or C.&G.
HMA Mixture Temp. = 75.0 deg. F (Fig. 54-5.C)	Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)
Design HMA Mixture Modulus (E _{HMA}) = 690 ksi (Fig. 54-5.D)	
Design HMA Strain (ε _{HMA}) = 86 (Fig. 54-5.E)	CRCP Pavement
Full Depth HMA Design Thickness = 10.00 in. (Fig. 54-5.F)	Use TF rigid = 4.59
Limiting Strain Criterion Thickness = 14.75 in. (Fig. 54-5.I)	IBR value = 3
Use Full-Depth HMA Thickness = 10.00 inches	CRCP Thickness = 7.75 in. (Fig. 54-4.N)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC	Unbonded Concrete Overlay
Use TF flexible = 3.17	Review 54-4.03 for limitations and special considerations.
HMA Overlay Design Thickness = 7.25 in. (Fig. 54-5.U)	
Limiting Strain Criterion Thickness = 999.00 in. (Fig. 54-5.V)	JPCP Thickness = NA inches
Use HMA Overlay Thickness = 999.00 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	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
	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 One-Way Streets	
ADT	Class
0 - 3500	II
>3501	I

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)						
Number of Lanes	Rural			Urban		
	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

Standard Design

ROUTE **Hankes Road**
 SECTION **61HB-B**
 COUNTY **Kane**
 LOCATION **at IL 56**

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **2225 FT** == > 0.42 Miles
 # OF CENTERLINES **1 CL**
 # OF LANES **2 LANES**
 # OF EDGES **2 EP**
 LANE WIDTH - AVERAGE **12 FT**
 SHOULDER WIDTH HMA Left **8 FT**
 HMA Right **8 FT**
 Total Width of Paved Shoulders **16 FT**

PAVEMENT THICKNESS (FLEXIBLE) **10.00 IN** **14.75 IN MAX**
 SHOULDER THICKNESS **8.00 IN** HMA_SD **Standard Design**
 POLICY OVERLAY THICKNESS **2.25 IN**

FLEX PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		3.17	0.60	3.17

[Read Me!](#)

HMA	COST PER TON	UNIT PRICE
HMA SURFACE		\$91.50 / TON
HMA TOP BINDER		\$84.32 / TON
HMA LOWER BINDER		\$84.32 / TON
HMA BINDER (LEVELING)		\$84.32 / TON
HMA SHOULDER		\$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(10.00")	5933	5,933 SQ YD *	\$48.53 / SQ YD	\$287,945 ~
HMA SURFACE COURSE	(2.00")	1.0069	669 TONS	\$91.50 / TON	\$0
HMA TOP BINDER COURSE	(2.25")	1.0217	764 TONS	\$84.32 / TON	\$0
HMA LOWER BINDER COURSE	(5.75")	1.0495	2,005 TONS	\$84.32 / TON	\$0

HMA SHOULDER	(8.00")	3956	1,772 TONS	\$72.00 / TON	\$127,590 ~
CURB & GUTTER			0 LIN FT	\$30.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C (TONS)			106 TONS	\$25.00 / TON	\$2,650
IMPROVED SUBGRADE:	Aggregate Width = 42.7'		10,548 SQ YD	\$7.00 / SQ YD	\$73,836
Reserved For User Supplied Item			0 UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item			0 UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL			5,933 SQ YD	\$15.00 / SQ YD	\$88,995
SHOULDER REMOVAL			3,956 SQ YD	\$10.00 / SQ YD	\$39,560

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST **\$620,576**
 FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE **\$60,062**

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 Mix	2.00	\$10.32 / SQ YD
HMA OVERLAY PVMT	(2.25")	1.0078 Surface Mix	2.25	\$11.31 / SQ YD
HMA SURFACE MIX	(1.50")	1.0052 Surface Mix	1.50	\$7.73 / SQ YD
HMA BINDER MIX	(0.75")	1.0130 Binding Binder Mix	0.75	\$3.59 / 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	\$80.25 / 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	\$79.44 / 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	\$826,985
FLEXIBLE TOTAL ANNUAL COST PER MILE	\$80,039

PCC PAVEMENT

JPCP

ROUTE
SECTION
COUNTY
LOCATION

Hankes Road
61HB-B
Kane
at IL 56

FACILITY TYPE

NON-INTERSTATE

PROJECT LENGTH 2225 FT == > 0.42 Miles
 # OF CENTERLINES 1 CL
 # OF LANES 2 LANES
 # OF EDGES 2 EP
 LANE WIDTH - AVERAGE 12 FT
 SHOULDER WIDTH PCC Left 8 FT
 PCC Right 8 FT
 Total Width of Paved Shoulders 16 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
	4.59	0.79	4.59
Worksheet Construction Type is Reconstruction	The Pavement Type is		JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
JPC PAVEMENT	(9.00")	5,933	SQ YD	\$62.03 / SQ YD	\$368,024
PAVEMENT REINFORCEMENT		0	SQ YD	\$22.00 / SQ YD	\$0
STABILIZED SUBBASE	(4.00")	6,675	SQ YD	\$19.00 / SQ YD	\$126,825
PCC SHOULDERS		3,956	SQ YD	\$40.00 / SQ YD	\$158,240
CURB & GUTTER		0	LIN FT	\$30.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C	(~ 1.80")	483	TONS	\$25.00 / TON	\$12,075
IMPROVED SUBGRADE:	Aggregate Width = 41.0'	10,136	SQ YD	\$7.00 / SQ YD	\$70,952
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL		5,933	SQ YD	\$15.00 / SQ YD	\$88,995
SHOULDER REMOVAL		3,956	SQ YD	\$10.00 / SQ YD	\$39,560

Note: * Denotes User Supplied Quantity
 RIGID CONSTRUCTION INITIAL COST \$864,671
 RIGID CONSTRUCTION ANNUAL COST PER MILE \$83,687

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")	1.0087	2.50	\$12.51 / SQ YD
HMA SURFACE MIX	(1.50")	1.0052	1.50	\$7.73 / SQ YD
HMA BINDER MIX	(1.00")	1.0139	1.00	\$4.79 / 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	\$77.69 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	2.50	\$82.81 / 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 \$982,500
 RIGID TOTAL ANNUAL COST PER MILE \$95,091

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 10/20/17 2:03 PM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$864,671	\$620,576
		ANNUAL COST PER MILE	\$83,687	\$60,062
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$117,829	\$206,409
		ANNUAL COST PER MILE	\$11,404	\$19,977
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$982,500	\$826,985
		ANNUAL COST PER MILE	\$95,091	\$80,039

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

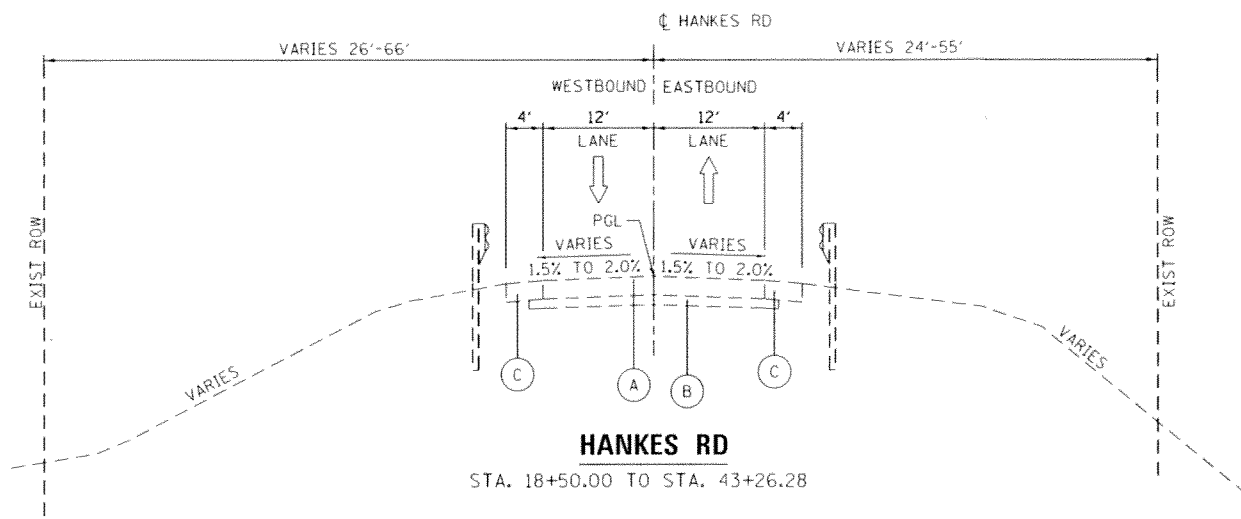
LOWEST COST OPTION	=====>	HMA	\$80,039	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	JPCP	\$95,091	18.8%

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%	4,450	LIN FT	\$2.00	\$8,900	
	CNTR LINE JOINT R&S	100.00%	2,225	LIN FT	\$2.00	\$4,450	
	RNDM / THRM CRACK R&S	50.00%	2,448	LIN FT	\$2.00	\$4,896	
	PD PVMT PATCH M&F SURF	0.10%	6	SQ YD	\$80.25	\$481	
	PWFn =	0.8626		PW =	0.8626 X	\$18,727	\$16,154
YEAR 10							
	LONG SHLD JT R&S	100.00%	4,450	LIN FT	\$2.00	\$8,900	
	CNTR LINE JOINT R&S	100.00%	2,225	LIN FT	\$2.00	\$4,450	
	RNDM / THRM CRACK R&S	50.00%	2,448	LIN FT	\$2.00	\$4,896	
	PD PVMT PATCH M&F SURF	0.50%	30	SQ YD	\$80.25	\$2,407	
	PWFn =	0.7441		PW =	0.7441 X	\$20,653	\$15,368
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	9,889	SQ YD	\$3.00	\$29,667	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	59	SQ YD	\$79.44	\$4,687	
	HMA OVERLAY PVMT 2.00"	100.00%	5,933	SQ YD	\$10.32	\$61,227	
	HMA OVERLAY SHLD 2.00 "	100.00%	3,956	SQ YD	\$8.06	\$31,898	
	PWFn =	0.6419		PW =	0.6419 X	\$127,479	\$81,824
YEAR 20							
	LONG SHLD JT R&S	100.00%	4,450	LIN FT	\$2.00	\$8,900	
	CNTR LINE JOINT R&S	100.00%	2,225	LIN FT	\$2.00	\$4,450	
	RNDM / THRM CRACK R&S	50.00%	2,448	LIN FT	\$2.00	\$4,896	
	PD PVMT PATCH M&F SURF	0.10%	6	SQ YD	\$80.25	\$481	
	PWFn =	0.5537		PW =	0.5537 X	\$18,727	\$10,369
YEAR 25							
	LONG SHLD JT R&S	100.00%	4,450	LIN FT	\$2.00	\$8,900	
	CNTR LINE JOINT R&S	100.00%	2,225	LIN FT	\$2.00	\$4,450	
	RNDM / THRM CRACK R&S	50.00%	2,448	LIN FT	\$2.00	\$4,896	
	PD PVMT PATCH M&F SURF	0.50%	30	SQ YD	\$80.25	\$2,407	
	PWFn =	0.4776		PW =	0.4776 X	\$20,653	\$9,864
HMA SD							
YEAR 30 NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	100.00%	9,889	SQ YD	\$3.00	\$29,667	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	119	SQ YD	\$79.44	\$9,454	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	40	SQ YD	\$78.06	\$3,123	
	HMA OVERLAY PVMT 2.25 "	100.00%	5,933	SQ YD	\$11.31	\$67,127	
	HMA OVERLAY SHLD 2.25 "	100.00%	3,956	SQ YD	\$9.07	\$35,885	
	PWFn =	0.4120		PW =	0.4120 X	\$145,256	\$59,844
YEAR 35							
	LONG SHLD JT R&S	100.00%	4,450	LIN FT	\$2.00	\$8,900	
	CNTR LINE JOINT R&S	100.00%	2,225	LIN FT	\$2.00	\$4,450	
	RNDM / THRM CRACK R&S	50.00%	2,448	LIN FT	\$2.00	\$4,896	
	PD PVMT PATCH M&F SURF	0.10%	6	SQ YD	\$80.25	\$481	
	PWFn =	0.3554		PW =	0.3554 X	\$18,727	\$6,655
YEAR 40							
	LONG SHLD JT R&S	100.00%	4,450	LIN FT	\$2.00	\$8,900	
	CNTR LINE JOINT R&S	100.00%	2,225	LIN FT	\$2.00	\$4,450	
	RNDM / THRM CRACK R&S	50.00%	2,448	LIN FT	\$2.00	\$4,896	
	PD PVMT PATCH M&F SURF	0.50%	30	SQ YD	\$80.25	\$2,407	
	PWFn =	0.3066		PW =	0.3066 X	\$20,653	\$6,331
							\$206,409
ROUTINE MAINTENANCE ACTIVITY				0.84 Lane Miles	0.00	\$0	\$0
						MAINTENANCE LIFE-CYCLE COST	\$206,409
45	YEAR LIFE CYCLE	CRFn = 0.0407852				MAINTENANCE ANNUAL COST PER MILE	\$19,977

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%	6	SQ YD	\$150.00	\$900		
		PWFn = 0.7441			PW = 0.7441 X	\$900	\$670	
YEAR 15								
	PAVEMENT PATCH CLASS B	0.20%	12	SQ YD	\$150.00	\$1,800		
		PWFn = 0.6419			PW = 0.6419 X	\$1,800	\$1,155	
YEAR 20								
	PAVEMENT PATCH CLASS B	2.00%	119	SQ YD	\$150.00	\$17,850		
	SHOULDER PATCH CLASS C	0.50%	20	SQ YD	\$145.00	\$2,900		
	LONGITUDINAL SHLD JT R&S	100.00%	4,450	LIN FT	\$2.00	\$8,900		
	CENTERLINE JT R&S	100.00%	2,225	LIN FT	\$2.00	\$4,450		
		PWFn = 0.5537			PW = 0.5537 X	\$34,100	\$18,880	
YEAR 25								
	PAVEMENT PATCH CLASS B	3.00%	178	SQ YD	\$150.00	\$26,700		
	SHOULDER PATCH CLASS C	1.00%	40	SQ YD	\$145.00	\$5,800		
		PWFn = 0.4776			PW = 0.4776 X	\$32,500	\$15,522	
YEAR 30								
	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	237	SQ YD	\$150.00	\$35,550		
	SHOULDER PATCH CLASS C	1.50%	59	SQ YD	\$145.00	\$8,555		
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	5,933	SQ YD	\$12.51	\$74,247		
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	3,956	SQ YD	\$10.08	\$39,872		
		PWFn = 0.4120			PW = 0.4120 X	\$158,224	\$65,186	
YEAR 35								
	NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	4,450	LIN FT	\$2.00	\$8,900		
	CENTERLINE JT R&S	100.00%	2,225	LIN FT	\$2.00	\$4,450		
	RANDOM CRACK R&S	50.00%	2,225	LIN FT	\$2.00	\$4,450		
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	1,421	LIN FT	\$2.00	\$2,842		
	PD PVMT PATCH M&F HMA 2.50"	0.10%	6	SQ YD	\$82.81	\$497		
		PWFn = 0.3554			PW = 0.3554 X	\$21,139	\$7,512	
YEAR 40								
	NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	30	SQ YD	\$150.00	\$4,500		
	LONGITUDINAL SHLD JT R&S	100.00%	4,450	LIN FT	\$2.00	\$8,900		
	CENTERLINE JT R&S	100.00%	2,225	LIN FT	\$2.00	\$4,450		
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	2,131	LIN FT	\$2.00	\$4,262		
	RANDOM CRACK R&S	50.00%	2,225	LIN FT	\$2.00	\$4,450		
	PD PVMT PATCH M&F HMA 2.50"	0.50%	30	SQ YD	\$82.81	\$2,484		
		PWFn = 0.3066			PW = 0.3066 X	\$29,046	\$8,904	
							\$117,829	
	ROUTINE MAINTENANCE ACTIVITY				0.84 Lane Miles	\$0.00	\$0	\$0
	MAINTENANCE LIFE-CYCLE COST						\$117,829	
45	YEAR LIFE CYCLE	CRFn = 0.0407852	MAINTENANCE ANNUAL COST PER MILE			\$11,404		



- EXISTING**
- (A) EXISTING PAVEMENT (R)
 - (B) EXISTING AGGREGATE SUBBASE (R)
 - (C) EXISTING AGGREGATE AND TURF SHOULDER (R)
 - (D) EXISTING GUARDRAIL (R)
- PROPOSED**
- (1) PROPOSED PAVEMENT
 - (2) PROPOSED AGGREGATE SUBGRADE IMPROVEMENT, 12"
 - (3) PROPOSED SHOULDER
 - (3A) PROPOSED SHOULDER, FULL-DEPTH
 - (4) PROPOSED COMB. CONC. CURB AND GUTTER, B-6.24
 - (5) PROPOSED CONCRETE MEDIAN SURFACE, 4"
 - (6) PROPOSED CONCRETE BARRIER MEDIAN
 - (7) PROPOSED SUBBASE GRANULAR MATERIAL
 - (8) PROPOSED STEEL PLATE BEAM GUARDRAIL, TYPE A
 - (9) ***PROPOSED TOPSOIL FURNISH AND PLACE 4", SODDING SALT TOLERANT, OR SEEDING AS SPECIFIED

*** AS SHOWN ON THE PAVEMENT MARKING AND LANDSCAPING PLAN ITEMS WITH (R) ARE TO BE REMOVED AS SHOWN ON THE TYPICAL SECTIONS AND/OR ON THE PLAN SHEETS.

STRUCTURAL PAVEMENT DESIGN INFORMATION BLOCK

STRUCTURAL DESIGN TRAFFIC: Year XXXX

PV = XX,XXX SU = X,XXX MU = X,XXX

ROAD/STREET CLASSIFICATION: Class XXXXXX

PERCENT OF STRUCTURAL DESIGN TRAFFIC IN DESIGN LANE:

P = XX% S = XX% M = XX%

TRAFFIC FACTOR: Actual TF = XX.X

Minimum TF = X.XX

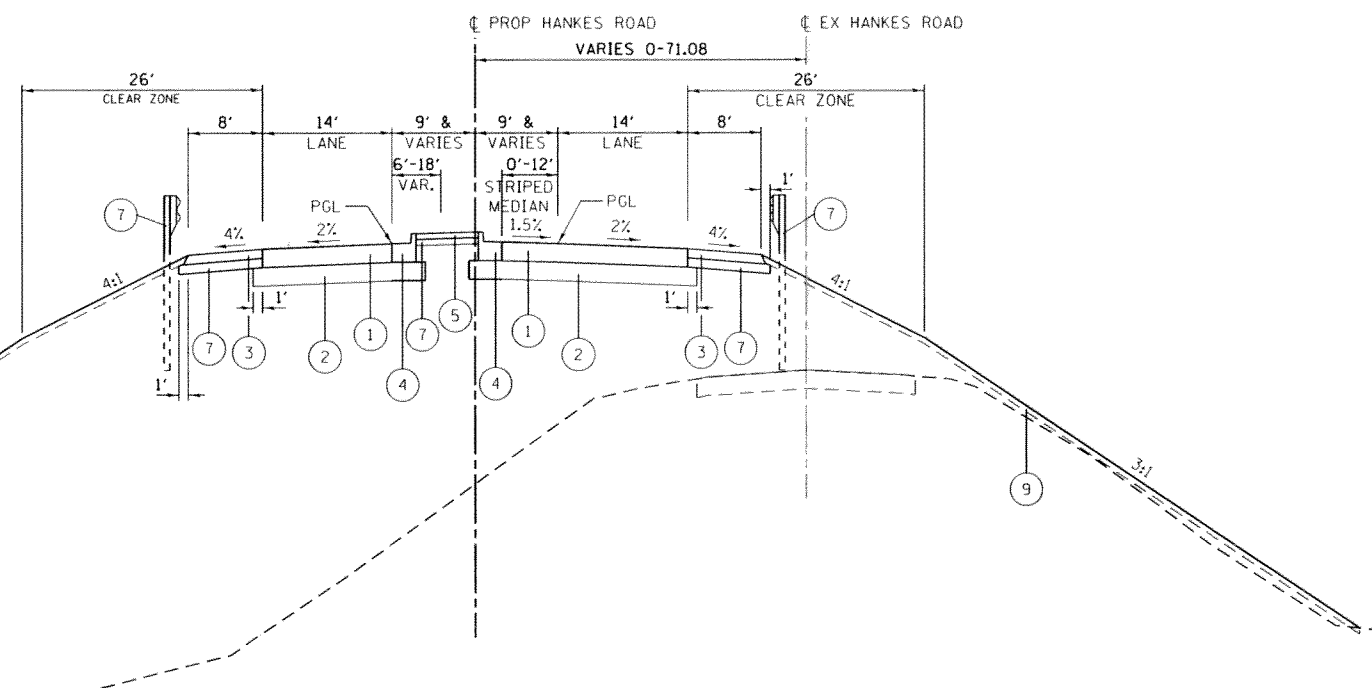
SUBGRADE SUPPORT RATING:

SSR = XXXX

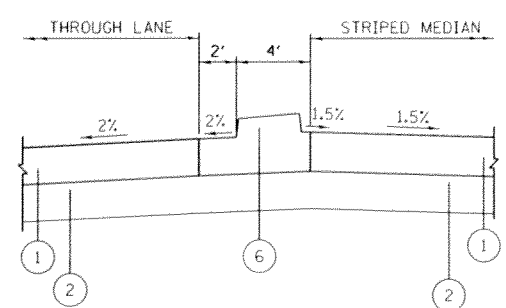
HMA MIXTURE REQUIREMENTS CHART

MIXTURE TYPE	AIR VOIDS @ N _{DES}	THICKNESS	OMP
SHOULDER RECONSTRUCTION: HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N50 (IL-9.5mm) HOT-MIX ASPHALT SHOULDER, HMA BINDER COURSE, IL-19.0, N50	4% @ 50 GYR.	x.0"	
TEMPORARY PAVEMENT: HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70 (IL-9.5mm) HOT-MIX ASPHALT BASE COURSE (HMA BINDER IL-19mm)	4% @ 70 GYR. 4% @ 70 GYR.	x.0" x.0"	

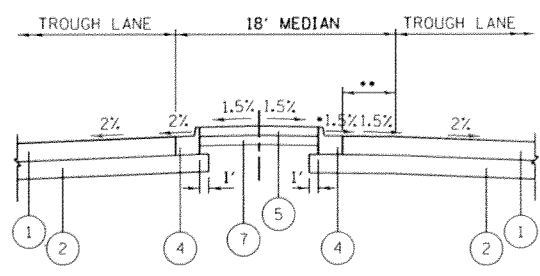
- THE UNIT WEIGHT USED TO CALCULATE ALL HOT-MIX ASPHALT SURFACE AND BINDER MIXTURES IS 112 LBS/SQ YD/IN
- THE AC TYPE FOR POLYMERIZED HMA MIXES SHALL BE SBS/SBR PG 76-22 AND FOR NON-POLYMERIZED HMA THE AC TYPE SHALL BE PG 64-22 UNLESS MODIFIED BY DISTRICT ONE SPECIAL PROVISIONS. FOR THE USE OF RECYCLED MATERIALS SEE DISTRICT ONE SPECIAL PROVISIONS.
- THE CONTRACTOR SHALL HAVE THE OPTION OF USING PCC PAVEMENT 8.0" OR HMA PAVEMENT 10.0" FOR TEMPORARY PAVEMENT AS SPECIFIED IN THE SPECIAL PROVISIONS AND THE MIXTURE TABLE ON THIS SHEET. EITHER OPTION SHALL BE PLACED ON 4.0" SUBBASE GRANULAR MATERIAL, TYPE B (CA-6).
- PC CONCRETE TEMPORARY PAVEMENT SHALL CONSIST OF CLASS PV CONCRETE MEETING THE REQUIREMENTS OF ART. 1020 OF THE STANDARD SPECIFICATIONS.
- QUALITY MANAGEMENT PROGRAM (QMP) IDENTIFIES THE PARTICULAR QUALITY CONTROL SPECIFICATION THAT APPLIES TO THE HMA MIXTURE.



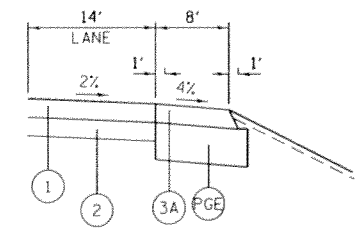
PROPOSED HANKES ROAD TYPICAL SECTION
STA. 18+50.00 TO STA. 43+26.28



MEDIAN DETAIL ADJACENT TO LEFT TURN LANE
STA. 31+19.58 TO STA. 32+02.67



TYPICAL MEDIAN SECTION
STA. 23+20.50 TO STA. 26+77.84
STA. 27+29.80 TO STA. 28+42.14
STA. 34+59.20 TO STA. 36+60.27



TYPICAL FULL-DEPTH SHOULDER SECTION
STA. 25+38.25 TO STA. 26+58.41 LT
STA. 27+00.00 TO STA. 28+47.00 RT
STA. 32+28.45 TO STA. 33+70.83 LT