

Calendar Year 2014 Report on

Life-Cycle Cost Analyses

January 2015



Prepared by

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The cost of preparing this report is under \$5,000.

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Legislative Request

This report is required by Minn. Stat. 174.185, which requires a life-cycle cost analysis for every project in the reconditioning, resurfacing and road repair funding categories constructed after July 1, 2011. The LCCA is a comparison of life-cycle costs among competing paving materials using equal design lives and equal comparison periods. Documentation required by the statute includes:

- Lowest life-cycle cost
- Alternatives considered
- Chosen strategy

 Documented justification, if the chosen strategy isn't the low cost

174.185 PAVEMENT LIFE-CYCLE COST ANALYSIS.

Subd. 1. Definitions.

For the purposes of this section, the following definitions apply.

- (a) "Life-cycle cost" is the sum of the cost of the initial pavement project and all anticipated costs for maintenance, repair, and resurfacing over the life of the pavement. Anticipated costs must be based on Minnesota's actual or reasonably projected maintenance, repair, and resurfacing schedules, and costs determined by the Department of Transportation district personnel based upon recently awarded local projects and experience with local material costs.
- (b) "Life-cycle cost analysis" is a comparison of life-cycle costs among competing paving materials using equal design lives and equal comparison periods.

Subd. 2. Required analysis.

For each project in the reconditioning, resurfacing, and road repair funding categories, the commissioner shall perform a life-cycle cost analysis and shall document the lowest life-cycle costs and all alternatives considered. The commissioner shall document the chosen pavement strategy and, if the lowest life cycle is not selected, document the justification for the chosen strategy. A life-cycle cost analysis is required for projects to be constructed after July 1, 2011. For projects to be constructed prior to July 1, 2011, when feasible, the department will use its best efforts to perform life-cycle cost analyses.

Subd. 3. Report.

The commissioner shall report annually to the chairs and ranking minority members of the senate and house of representatives committees with jurisdiction over transportation finance beginning on January 1, 2012, the results of the analyses required in subdivision 2.

Life-Cycle Cost Analysis Report

Implementation

Minn. Stat. 174.185 requires a life-cycle cost analysis for every project in the reconditioning, resurfacing and road repair funding categories constructed after July 1, 2011.

MnDOT first implemented a LCCA process for roadway rehabilitation projects in 1999. That LCCA process was modified in 2010 to meet the specific requirements of the legislation approved in 2008 and presented in <u>Technical Memorandum 10-04-MAT-01</u>.

This memorandum requires that a LCCA consistent with Federal Highway Administration guidelines be performed on all projects in the reconditioning, resurfacing and road repair funding categories. The memorandum limits the LCCA requirement to projects greater than two miles in length or more than 30,000 square yards. The memorandum also limits the requirement for a LCCA to projects that include placing more than two-inch thickness of pavement material. Thin overlays (two inches or less) are considered short-term preventive maintenance and do not have a viable concrete alternative with an equal design life.

The memorandum requires the LCCA includes at least one Portland cement concrete and one hot-mix asphalt alternate with equal design lives. To best determine the most cost effective design, the memorandum also allows the LCCA to include additional alternatives with other design lives.

Technical Memorandum 10-04-MAT-01 was superseded by the updated MnDOT Pavement Design Manual when it was signed on Oct. 31, 2014; however, LCCAs for projects constructed this year were already completed and this report will retain the LCCA procedure in the memorandum as the standard.

Results

In 2014, 34 construction projects were in the reconditioning, resurfacing and road repair funding categories and required a LCCA according to Technical Memorandum 10-04-MAT-01. A LCCA was not submitted for one of these projects. It was a non-programmed project that was developed on an accelerated timeline to repair a road's unexpectedly poor pavement condition.

The results of the 33 LCCAs are as follows:

- Hot-mix asphalt was the low-cost option for 28 construction projects
- Portland cement concrete was the low-cost option for five construction projects
- Twenty-five projects selected the low-cost option for construction
- Four projects used the alternate bidding process to select the pavement option to construct.
- Four projects selected an option other than the low-cost option for construction. Documented justification for selecting other than the low-cost option was provided for three of these projects. The remaining project (SP 8103-113) selected the pavement option as part of an agreement for the turn-back of a road to the county.

A table of LCCA results and copies of the LCCAs submitted by MnDOT districts are attached.

Discussion

Hot-mix asphalt is most often the low-cost option in the submitted LCCAs. Portland cement concrete options usually have a greater initial cost than hot-mix asphalt, but become competitive by having lower maintenance costs over the life of the pavement. However, the relatively short design lives of these rehabilitation-type projects do not allow Portland cement concrete options to exploit this relative advantage. Portland cement concrete options with longer design lives than hot-mix asphalt alternates are more competitive than the Portland cement concrete options with the equal design lives required by the statute.

Recently, procedures were developed to implement two new Portland cement concrete pavement design programs. These new programs resulted in substantially thinner pavement designs, which reduce the initial cost of constructing Portland cement concrete pavements and increase competitiveness. In addition, a research project was started to develop a new procedure to design Portland cement concrete pavements that are built on top of existing Portland cement concrete pavements.

To create competition and to get the most cost-effective pavement, MnDOT continues to use the alternate bidding process on projects that are likely to have competitive hotmix asphalt and Portland cement concrete options. A LCCA is still performed but the option constructed is selected through the alternate bidding process

The alternate bidding process is similar to using a LCCA to determine the low-cost option. However, instead of using an estimate for the initial cost of an option, alternate bidding uses actual bid prices. The process is as follows:

- 1. MnDOT lets a project with two options, a hot-mix asphalt option and a Portland cement concrete option.
- 2. MnDOT calculates a maintenance factor. This is the difference between the maintenance costs of the two options.

- 3. Each contractor bids on either of the two options.
- 4. MnDOT adjusts the bids by adding the maintenance factor to the bids of the option with the greater maintenance costs.
- 5. MnDOT selects the bid with the lowest adjusted bid.

Conclusion

MnDOT implemented the requirements of Minn. Stat. 174.185 through Technical Memorandum 10-04-MAT-01 and provided the required results in this report. MnDOT will continue to ensure that all future projects meet the requirements of the legislation.

In addition, MnDOT is innovating new methods to design and select the most cost-effective pavement structure. Innovations include new pavement design procedures and refining the alternate bidding process to allow bidders of both pavement materials to bid on a project.

Appendix A: Summary of LCCA Results

SP#	Existing Pavement	Exception to selecting low-cost option	Design Life	Option Description	Present Worth/Rdwy Mile	Option Material (1)	Selected (2)	Alternate Bid (3)
0207-100	PCC	No	Liio	Sprion Bosonprion	IIIIIO	(.,	(-)	Yes
			14	Major CPR	\$546,341.00	PCC		
			14	HMA Overlay	\$546,740.00	НМА		
			20	Rubblize w/HMA	\$557,451.00	НМА	Χ	
			35	PCC Overlay	\$476,215.00	PCC	X	
0805-112	НМА	No						No
			13	HMA Overlay	\$562,844.00	HMA	X	
			20	PCC Overlay	\$665,105.00	PCC		
			20	FDR w/HMA	\$640,021.00	HMA		
			35	PCC Overlay	\$602,004.00	PCC		
1002-102	НМА	No						No
			15	HMA Overlay	\$520,208.00	НМА	X	
			20	PCC Overlay	\$1,050,604.00	PCC		
			20	FDR w/HMA	\$903,283.00	HMA		
1102-62	НМА	No						No
			20	New HMA	\$1,374,656.00	HMA	X	
			20	New PCC	\$2,102,453.00	PCC		
			35	New PCC	\$1,696,507.00	PCC		
1117-23	НМА	No						No
			15	PCC Overlay	\$497,268.00	PCC		
			15	HMA Overlay	\$360,706.00	HMA	Χ	
1407-25	PCC	No						No
			18	HMA Overlay	\$400,715.00	HMA	Χ	
			20	PCC Overlay	\$444,910.00	PCC		
			20	HMA Overlay	\$422,926.00	HMA		
1602-49	НМА	No						No
			20	New HMA	\$455,685.00	HMA		
			20	New PCC	\$554,125.00	PCC		
			20	HMA Overlay	\$390,482.00	HMA	X	
			35	New PCC	\$438,144.00	PCC		
1704-27	НМА	Yes						No
			20	FDR w/PCC	\$455,755.00	PCC		
			20	FDR w/ HMA Overlay	\$424,520.00	HMA	Χ	
			35	FDR w/PCC	\$391,936.00	PCC		
2001-36	PCC	No						No
			15	HMA Overlay	\$351,231.00	HMA	X	
			20	PCC Overlay	\$748,410.00	PCC		
			20	HMA Overlay	\$362,732.00	HMA		
2103-35	НМА	No						No
			20	PCC Overlay	\$591,984.00	PCC		
			20	HMA Overlay	\$471,932.00	HMA	Χ	

PCC PCC	No No No No	20 20 20 20 35 35 35	HMA Overlay PCC Overlay FDR w/ PCC FDR w/ HMA New HMA PCC Overlay PCC Overlay PCC Overlay PCC Overlay PCC Overlay New PCC	\$564,964.00 \$727,389.00 \$732,263.00 \$520,715.00 \$1,243,437.00 \$799,542.00 \$778,527.00 \$779,597.00 \$424,219.00 \$922,832.00	HMA PCC PCC HMA HMA PCC PCC PCC	(2) X X	Yes No
НМА	No	20 20 20 20 20 35 35 35	PCC Overlay FDR w/ PCC FDR w/ HMA New HMA PCC Overlay PCC Overlay PCC Overlay PCC Overlay New PCC	\$727,389.00 \$732,263.00 \$520,715.00 \$1,243,437.00 \$799,542.00 \$778,527.00 \$779,597.00	PCC PCC HMA HMA PCC PCC PCC	X	
НМА	No	20 20 20 20 35 35 35	FDR w/ PCC FDR w/ HMA New HMA PCC Overlay PCC Overlay PCC Overlay HMA Overlay New PCC	\$732,263.00 \$520,715.00 \$1,243,437.00 \$799,542.00 \$778,527.00 \$779,597.00	PCC HMA HMA PCC PCC PCC	X	
НМА	No	20 20 35 35 35	New HMA PCC Overlay PCC Overlay PCC Overlay HMA Overlay New PCC	\$520,715.00 \$1,243,437.00 \$799,542.00 \$778,527.00 \$779,597.00 \$424,219.00	HMA PCC PCC PCC		
НМА	No	20 20 35 35 35	New HMA PCC Overlay PCC Overlay PCC Overlay HMA Overlay New PCC	\$1,243,437.00 \$799,542.00 \$778,527.00 \$779,597.00 \$424,219.00	HMA PCC PCC PCC		
НМА	No	20 35 35 15 20	PCC Overlay PCC Overlay PCC Overlay HMA Overlay New PCC	\$799,542.00 \$778,527.00 \$779,597.00 \$424,219.00	PCC PCC PCC		
		20 35 35 15 20	PCC Overlay PCC Overlay PCC Overlay HMA Overlay New PCC	\$799,542.00 \$778,527.00 \$779,597.00 \$424,219.00	PCC PCC PCC		No
		35 35 15 20	PCC Overlay PCC Overlay HMA Overlay New PCC	\$778,527.00 \$779,597.00 \$424,219.00	PCC PCC		No
		35 15 20	PCC Overlay HMA Overlay New PCC	\$779,597.00 \$424,219.00	PCC		No
		15 20	HMA Overlay New PCC	\$424,219.00		X	No
		20	New PCC		НМА	Х	No
PCC	No	20	New PCC		HMA	Χ	
PCC	No			\$922 B32 NN			
PCC	No	20		Ψ / Ζ Ζ , Ο Ο Ζ . Ο Ο	PCC		
PCC	No		New HMA	\$860,349.00	HMA		
							No
		15	HMA Overlay	\$595,560.00	HMA		
		15	PCC Overlay	\$614,272.00	PCC		
		15	HMA Overlay	\$567,694.00	HMA	Х	
PCC	No						Yes
		15	HMA Overlay	\$607,142.00	HMA	Χ	
		20	PCC Overlay	\$684,733.00	PCC		
		20	HMA Overlay	\$614,765.00	HMA		
		35	PCC Overlay	\$562,258.00	PCC	Х	
НМА	No						No
		20	PCC Overlay	\$821,370.00	PCC		
		20	HMA Overlay	\$345,223.00	HMA	X	
		35	New	\$669,207.00			
		35	New	\$680,161.00	PCC		
НМА	No						No
			-	\$389,829.00		X	
		20	PCC Overlay	\$737,640.00	PCC		
		20	New HMA	\$863,679.00			
		20	FDR	\$555,334.00	PCC		
НМА	No						Yes
			-				
			-				
			-			Х	
	НМА	HMA No	HMA No 15 20 20 20 20 20 20 20	HMA No 20 PCC Overlay 20 HMA Overlay 35 New 35 New HMA No 15 HMA Overlay 20 PCC Overlay 20 PCC Overlay 20 PCC Overlay 20 FDR HMA No 16 HMA Overlay 16 HMA Overlay 16 HMA Overlay 20 CIR w/HMA 20 PCC Overlay	HMA No 20 PCC Overlay \$821,370.00 20 HMA Overlay \$345,223.00 35 New \$669,207.00 35 New \$680,161.00 HMA No 15 HMA Overlay \$389,829.00 20 PCC Overlay \$737,640.00 20 New HMA \$863,679.00 20 FDR \$555,334.00 HMA No 16 HMA Overlay \$448,730.00 16 HMA Overlay \$448,730.00 20 CIR w/HMA \$410,657.00 20 PCC Overlay \$436,347.00	HMA NO 20 PCC Overlay \$821,370.00 PCC 20 HMA Overlay \$345,223.00 HMA 35 New \$669,207.00 PCC 35 New \$680,161.00 PCC HMA NO 15 HMA Overlay \$389,829.00 HMA 20 PCC Overlay \$737,640.00 PCC 20 New HMA \$863,679.00 PCC 20 Rew HMA \$863,679.00 PCC 20 FDR \$555,334.00 PCC HMA NO 16 HMA Overlay \$448,730.00 HMA 16 HMA Overlay \$415,404.00 HMA 20 CIR w/HMA \$410,657.00 HMA 20 PCC Overlay \$436,347.00 PCC	HMA No 20 PCC Overlay \$821,370.00 PCC 20 HMA Overlay \$345,223.00 HMA X 35 New \$669,207.00 PCC 35 New \$680,161.00 PCC HMA No 15 HMA Overlay \$389,829.00 HMA X 20 PCC Overlay \$737,640.00 PCC 20 New HMA \$863,679.00 PCC 20 New HMA \$863,679.00 PCC 40 FDR \$555,334.00 PCC HMA No 16 HMA Overlay \$448,730.00 HMA 16 HMA Overlay \$415,404.00 HMA 20 CIR w/HMA \$410,657.00 HMA X 20 PCC Overlay \$436,347.00 PCC X

SP#	Existing Pavement	Exception to selecting low-cost option	Design Life	Option Description	Present Worth/Rdwy Mile	Option Material (1)	Selected (2)	Alternate Bid (3)
4604-32	PCC	No						No
			12	HMA Overlay	\$571,283.00	HMA	X	
			20	HMA Overlay	\$660,680.00	HMA		
			20	PCC Overlay	\$746,089.00	PCC		
			35	PCC Overlay	\$623,609.00	PCC		
4704-47	НМА	No						Yes
			20	FDR w/HMA	\$730,017.00	HMA	X	
			20	PCC Overlay	\$609,892.00	PCC		
			35	PCC Overlay	\$702,902.00	PCC	Χ	
			35	PCC Overlay	\$668,893.00	PCC	Χ	
4711-19	НМА	Yes						No
			20	PCC Overlay	\$539,860.00	PCC	Χ	
			20	CIR w/ HMA Overlay	\$405,983.00	HMA		
4712-18	PCC	No						No
			15	HMA Overlay	\$490,294.00	HMA	Χ	
			20	HMA Overlay	\$509,774.00	HMA		
			20	PCC Overlay	\$636,828.00	PCC		
			35	PCC Overlay	\$529,213.00	PCC		
5006-19	НМА	No						No
			15	HMA Overlay	\$325,291.00	HMA	Χ	
			20	HMA Overlay	\$481,208.00	HMA		
			20	PCC Overlay	\$337,238.00	PCC		
5209-66	PCC	No						No
			12	HMA Overlay	\$645,237.00	HMA		
			15	HMA Overlay	\$570,448.00	HMA	Χ	
			15	PCC Overlay	\$690,692.00	PCC		
			20	PCC Overlay	\$711,502.00	PCC		
			35	PCC Overlay	\$708,995.00	PCC		
5380-121	PCC	Yes						No
			12	HMA Overlay	\$627,315.00	HMA		
			13	HMA Overlay	\$646,051.00	HMA		
			14	HMA Overlay	\$683,814.00	HMA		
			20	Rubblize w/ HMA	\$655,648.00	HMA		
			20	PCC Overlay	\$948,200.00	PCC		
			35	PCC Overlay	\$834,833.00	PCC	Χ	
5407-31	PCC	No						No
			20	Crack & Seat w/HMA	\$445,176.00	HMA	Χ	
			20	PCC Overlay	\$930,631.00	PCC		
			35	PCC Overlay	\$673,387.00	PCC		
			35	New PCC	\$663,651.00	PCC		

SP#	Existing Pavement	Exception to selecting low-cost option	Design Life	Option Description	Present Worth/Rdwy Mile	Option Material (1)	Selected (2)	Alternate Bid (3)
5409-30	PCC	No						No
			20	HMA Overlay	\$383,660.00	HMA	Χ	
			20	PCC Overlay	\$678,358.00	PCC		
			35	PCC Overlay	\$527,793.00	PCC		
5509-79	PCC	No						No
			15	HMA Overlay	\$387,772.00	HMA	Χ	
			20	HMA Overlay	\$425,240.00	HMA		
			20	PCC Overlay	\$572,328.00	PCC		
6304-13	HMA	No						No
			16	HMA Overlay	\$289,429.00	HMA	Χ	
			20	PCC Overlay	\$635,983.00	PCC		
			20	HMA Overlay	\$333,193.00	HMA		
6410-06	НМА	No						No
			15	HMA Overlay	\$463,565.00	HMA	Χ	
			20	PCC Overlay	\$532,509.00	PCC		
			20	FDR w/HMA	\$517,920.00	HMA		
7380-247	НМА	No	None	e (non-programmed pro	oject)	НМА		No
8103-113	HMA	Yes (Selected as						No
		part of agreement	15	HMA Overlay	\$486,392.00	HMA		
		for county	16	HMA Overlay	\$506,364.00	HMA		
		turn-back).	20	PCC Overlay	\$495,093.00	PCC	X	
			20	FDR w/HMA	\$478,056.00	HMA		
8402-17	НМА	No						No
			20	CIR w/HMA	\$342,626.00	HMA		
			20	PCC Overlay	\$594,238.00	PCC		
			20	HMA Overlay	\$305,474.00	HMA	Χ	
8680-167	НМА	No						No
			15	HMA Overlay	\$601,383.00	HMA		
			15	PCC Overlay	\$544,348.00	PCC		
			15	HMA Overlay	\$453,252.00	HMA	Χ	
			16	HMA Overlay	\$478,330.00	HMA		

- (1) Option material The pavement material that each option utilizes.
- (2) **Selected** This is marked (X) if the pavement option was selected to be constructed. If the project uses alternate bidding, more than one option will be marked and and the constructed option will be the low-cost option as determine by alternate bidding.
- (3) Alternate Bidding 'Yes' if the project used alternate bidding to select which option to construct.

Definitions:

= Cold-in-Place Recycling (Recycle a layer of existing HMA with Cold-Mix Asphalt) CIR

Concrete Pavement Repair

Crack & Seat = Crack and compact the existing PCC pavement to delay reflective cracking in a HMA overlay.

FDR = Full-Depth Reclamation (recycle existing HMA and Base as new base)

HMA = Hot-Mix Asphalt

PCC = Portland Cement Concrete

Rubblize = Break the existing PCC into pieces to act at new base for HMA pavement.

District	Metro
Performed By	Amir Azarshin
Analysis Period	35
Discount Rate	2.5

Project Number	0207-100
Date	5/7/2013
Funding Category	RD
Low Cost Option # Chosen Option #	3
Chosen Option #	3 & 4 (Alt Bid)

District	Metro
Performed By	Amir Azarshin
Analysis Period	35
Discount Rate	2.5

			OPTION #1			Ш			OPTION #2						OPTION #3			OPTION #4					
			DESCRIPTION			匚			DESCRIPTION						DESCRIPTION						DESCRIPTION		
			4" HMA OL			▙			Major CPR						6" UBOL	_					5" HMA OL & Rubblize PCC		
		L	DESIGN LIFE		TYPE	1			DESIGN LIFE		YPE				DESIGN LIFE	TY					DESIGN LIFE	TYP	E
				BIT					14	F	PCC				35	PC					20	BIT	
Year	#	Life	Description		Cost/Mile	Yea	ar	# Li	fe Description		Cost/Mile	Year	#	Life	Description		Cost/Mile	Yea	ır #	Lif	Description	С	Cost/Mile
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16				\$	-		6	_		1	\$ -	16				S	-	16		т		\$	
17	AA		Crack Treatment	\$	3,000		7 A	٩A	Crack Treatment	7	\$ 3,000		ΑO		Reseal Joints (12')	S	18,950	17		+		\$	-
18				\$	-		8				\$ -	18				\$	-	18	В	Т		\$	-
19				\$	-		9				\$ -	19				\$	-	19	9			\$	-
20				\$	-		20			\Box	\$ -	20				\$	-	20		3	2" Mill & 3.5" HMA Overlay	\$	178,526
21	AB		Surface Treatment	\$	20,000		21 <i>A</i>	٩B	Surface Treatment		\$ 20,000	21				\$	-	2				\$	-
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27	RR	_		\$	178.526		27	-			\$ -		AQ		Minor CPR (12')	S	94.788	27		3	Surface Treatment	\$	20.000
28			2 Will a c.o Tills Covering	\$	-		28 E	зв	2" Mill & 3.5" HMA Overlay		\$ 178,526	28			WINDI OF ICCIE	S	-	28		1	Canado Frodunon	\$	-
29				\$	-		29			7	\$ -	29				\$	-	29		Т		\$	-
30	AA		Crack Treatment	\$	3,000		30					30				\$	-	30				\$	-
31				\$	-		31 <i>A</i>	٩A	Crack Treatment		\$ 3,000	31				\$	-	31				\$	-
32				\$	-		32			_	\$ -	32				\$	-	32		_		\$	-
33				\$	-	3		4		_	\$ -	33				\$	-	33		_		\$	-
34	AB		Surface Treatment Remaining Service Life Value**	\$	20,000		34 35	+	Remaining Service Life Value*	_	\$ - \$ (82,397)	34 35	Н		Remaining Service Life Value**	\$	(36,457)	35		+	Remaining Service Life Value**	\$	
33	-	_	Remaining Service Life value	Ð	(59,509)		00	_	Remaining Service Life value	+	\$ (02,397)	35			Remaining Service Life value	J.	(30,437)	3:	3	+	Remaining Service Life value	ą.	
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	_	7				T	7	_	1	1			H	H		T			T	t	İ		
			Total Present Worth	\$	546,740	Т			Total Present Worth	h	\$ 546,341				Total Present Worth	\$	476,215				Total Present Worth	\$	557,451
		ı	Eq. Annual Cost*	Ė	\$23,622	1			Eq. Annual Cos		\$23,605			ı	Eq. Annual Cost*	Ė	\$20,575	1			Eq. Annual Cost*	Ė	\$24,08
			% of Low Cost		115%	L			% of Low Co		115%				% of Low Cost		100%				% of Low Cost		1179
_			* Equivalent Annual Cost is include	lad f	for informatio	on o	nhe					_				_			_		* Equivalent Annual Cost is inclu-	dod fo	or informa

^{*} Equivalent Annual Cost is included for information only.

**Remaining Service Life Value is reported as a negative value.

	District		7			Project Number	0805-112	11			1		District	7
	Performed By		Kyle Vogt			Date	6/3/2013						Performed By	Kyle Vogt
	Analysis Period	_	35			Funding Category	0/3/2013						Analysis Period	35
	Discount Rate		2.5			Low Cost Option #							Discount Rate	2.5
	Diocedin rate		2.0			Chosen Option #							Diocount Hate	2.0
						-		<u>- 1</u>					<u> </u>	
	OPTION #1					OPTION #2		1		OPTION #3			OPTION #4	
	DESCRIPTION					DESCRIPTION				DESCRIPTION			DESCRIPTION	
	2" Mill & 3.5" Bituminous C) vorlov			2"	Mill, 12" Reclaimation, & 5" Bitumino	uo Couroo			4" Mill & 6" Whitetopping (Dowels	2)		4" Mill & 6.5" Whitetopping (Dow	volo)
	DESIGN LIFE	venay	TYPE		3		TYPE	1			TYPE	<u> </u>	DESIGN LIFE	TYPE
	13	В				20	Bit.				Conc.		35	Conc.
Year #		D	Cost/Mile	Voor	#		Cost/Mile	Year	# 1 i		Cost/Mile	Year # Lit		Cost/Mile
rear #	· · · · · · · · · · · · · · · · · · ·	0					•							
0	13 2" Mill & 3.5" Bit. Overlay	\$, ,	0	1	20 3" Mill & 6" Bit. Overlay	\$ 506,274	0	2	11 5	\$ 464,062	0 3	5 4" Mill & 6.5" Whitetopping	\$ 494,256
1		\$,	2			\$ - \$ -	2			\$ -	1		\$ - \$ -
3 AA	Crack Treatment	\$,				Ţ	3			\$ -	3		Ţ.
3 AA	Crack freatment	\$	0,000	3	-		\$ - \$ -	4			\$ - \$ -	4		\$ - \$ -
5		\$,	4 5			· ·	5			*	5		. *
6		9	,	Ū			Ψ	6			\$ -	6		\$ -
7 AB	Surface Treatment	\$,	6 7	_		\$ - \$ -	7			\$ - \$ -	7		\$ - \$ -
8 8	Sunace meannem	\$			AA	Crack Treatment	\$ 3,000	8			\$ -	8		\$ -
9		\$		9	_	CIACK HEALINEIL		9				9		1
10		\$		10			\$ - \$ -	10			\$ - \$ -	10		\$ - \$ -
11		\$		11			\$ -	11			\$ -	11		\$ -
12		\$	•		AB	Surface Treatment	\$ 20,000	12			\$ -	12		\$ -
13 AJ	12 2" Mill & 3.5" Overlay	\$	•		_	Sunace Healineil	\$ 20,000	13	BB	20 yr Reseal Jts. & Part. Depth	T			\$ -
13 AJ	Z IVIIII & 3.5 OVERIAY	\$		13 14			\$ -	13	DD	20 yr Kesear Jts. & Part. Depth	\$ 93,496	13		\$ -
15		\$	•	15	_		- 1				Ţ	15		\$ -
16 AA	Crack Treatment	\$		16			\$ - \$ -	15 16			\$ - \$ -	16		ф -
17 AA	Clack Healilletti	4	5,000	17			\$ -	17			\$ -	17 BC	35 yr Reseal Jts. & Part. Dept	h \$ 71,388
18		\$	P	18			\$ -	18			\$ -	18	33 yr Researds. & Part. Dept	ti \$ 71,300
19		\$	•	19			\$ -	19			\$ -	19		\$ -
20 AB	Surface Treatment	\$	•			19 2" Mill & 3.5" Overlay	\$ 171,147	20				20		i
21 21	Sunace Treatment	\$		21		19 2 Will & 3.5 Overlay	\$ -	21			\$ - \$ -	21		\$ - \$ -
22		\$		22			\$ -	22			\$ -	22		\$ -
23		9			AA	Crack Treatment	\$ 3,000	23			\$ -	23		\$ -
24		9	r	24		Clack Healment	\$ 3,000	24			\$ -	24		\$ -
	11 2" Mill & 3.5" Overlay	9	r	25			\$ -	25	DE	20 yr Major CPR (w/Dowels)	\$ 246,979	25		\$ -
26	11 2 Ivilli & 3.3 Overlay	9		26			\$ -	26	DL	20 yr Major CFR (W/Dowels)	\$ 240,979	26		φ -
27		9	7		AB	Surface Treatment	\$ 20,000	27			\$ -	27 BF	35 yr Minor CPR & Full Depth	F \$ 173,146
28 AA	Crack Treatment	\$	r	28		Curace realment	\$ -	28			\$ -	28	35 yr. Willion Of It & Full Deptil	¢ 175,146
29	Orack Treatment	\$		29			\$ -	29			\$ -	29		\$ -
30		\$	•	30			\$ -	30			\$ -	30		\$ -
31		\$		31			\$ -	31			\$ -	31		\$ -
32 AB	Surface Treatment	\$			-		\$ -	32			\$ -	32		\$ -
33	Canado Hodinon	9		33			\$ -	33		 	\$ -	33		\$ -
34		9	•	34			\$ -	34		 	\$ -	34		\$ -
35	Remaining Service Life (1/1	-	r	35		No Remaining Service Life	\$ -	35			\$ -	35	Remaining Service Life (5/13)	\$ (66,594.60)
	(// I	,	(12,000)			2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2				2 2 2 mg 2 2 1 1 1 0 2 1 1 1 0 2 1 1 1 0 0 2 1 1 0 0 2 1 1 0 0 0 0			<u> </u>	, (22,2330)
					\dagger									
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	Total Present V	Vorth \$	562,844			Total Present Worth	\$ 640,021			Total Present Worth	\$ 665,105		Total Present Worth	\$ 602,004
	Eq. Annual (\$24,318			Eq. Annual Cost				Eq. Annual Cost*			Eq. Annual Cost	
	% of Low	Cost	100%			% of Low Cos	114%			% of Low Cost	118%		% of Low Cos	t 107%
	* Equivalent Annual Cost is			n only	/.						- 74	+ + +		
	**Remaining Service Life Va					e.						+ + +		
	Tromaining Corvide Life Ve	10 10	aportou do diffe	Janv	Jiuit	~ . ₁	1	1		1		1 1 1	1	1

District	Metro
Performed By	DFN
Analysis Period	35
Discount Rate	2.2

Project Number	1002-102
Date	1/31/2014
Funding Category	RS
Low Cost Option #	1
Chosen Option #	1

			OPTION #1						OPTION #2						OPTION #3		
			DESCRIPTION						DESCRIPTION						DESCRIPTION		
			2" M & 3.5" OL + UNDERSEAL	_					6.5" WHITETOPPING						FDR + 6.5" Overlay		
			DESIGN LIFE		TYPE				DESIGN LIFE	TYF	Ĕ				DESIGN LIFE	TYPI	<u> </u>
			15	ВІТ					20	PC					20	BIT	
Year	#	Life			Cost/Mile	Year	#	Life			Cost/Mile	Year	#	Life			ost/Mile
0			2" M & 3.5" OL + UNDERSEAL	\$	282,129	0			6.5" WHITETOPPING	\$	904,949	0			FDR + 6.5" Overlay	\$	728,692
1			Z M G O O Z T O N D Z N O Z N Z	\$	-	1			0.0 11.11.21.01.11.10	\$	-	1			. Dr. 1 die Gverlag	\$	-
2				\$	-	2				\$	-	2				\$	-
	AΑ		Crack Treatment	\$	7,000	3				\$	-	3				\$	-
4				\$	-	4				\$	-	4				\$	-
5				\$	-	5				\$	-	5				\$	-
6			Obin Onel	\$	-	6				\$	-	6 7				\$	<u> </u>
8	BG	-	Chip Seal	\$	19,000	7 8				\$	-	_	BD		Light Crack Treatment	\$	3,500
9				\$	-	9				\$	-	9	טט		Light Crack Treatment	\$	3,500
10		+		\$	-	10				\$	-	10				\$	-
11				\$	-	11				\$	-	11				\$	-
12				\$	-	12				\$	-		BG		Chip Seal	\$	19,000
13				\$	-		ВН		Minor CPR (12")	\$	51,913	13				\$	
14				\$	-	14				\$	-	14				\$	-
15	BF		2" M & 3.5" OL	\$	194,803	15				\$	-	15				\$	-
16				\$	-	16				\$	-	16				\$	-
17	ΛΛ	\vdash	Crook Trootmont	\$	7 000	17 18				\$	-	17				\$	-
18 19		+	Crack Treatment	\$	7,000	19				\$	-	18 19				\$	-
20		+		\$	-	20				\$	-		BE		2.5" Mill & 4" Overlay	\$	219,769
21		+		\$	-	21				\$	-	21	DL		2.5 Willia & Overlay	\$	-
22	BG		Chip Seal	\$	19,000	22				\$	-	22				\$	-
23			,	\$	-	23				\$	-		AA		Crack Treatment	\$	7,000
24				\$	-	24				\$	-	24				\$	-
25				\$	-	25	BI		Major CPR (12")	\$	183,551	25				\$	-
26				\$	-	26				\$	-	26				\$	-
27				\$	-	27				\$	-		BG		Chip Seal	\$	19,000
28	ב	\vdash	2" M 8 2 5" OI	\$	-	28				\$	-	28				\$	-
29 30	DГ		2" M & 3.5" OL	\$	194,803	29 30				\$	-	29 30				\$	
31		+		\$		31				\$		31				\$	
32	AA		Crack Treatment	\$	7,000	32				\$	-	32				\$	
33				\$	-	33				\$	-	33				\$	-
34				\$	-	34				\$	-	34				\$	-
35			Remaining Service Life Value**	\$ ((104,894.09)	35			Remaining Service Life Value**	\$	-	35			Remaining Service Life Value**	\$	-
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		4	Total Decome West	Φ.	E00.000				Total Dragget Woods	•	4.050.004				Total December Woods	•	000 000
l			Total Present Worth Eq. Annual Cost*	Ф	520,208 \$21,468	l			Total Present Worth Eq. Annual Cost*	Þ	1,050,604 \$43,356				Total Present Worth Eq. Annual Cost*	Ф	903,283 \$37,276
			% of Low Cost	\vdash	\$21,468 100%				% of Low Cost	1	202%				% of Low Cost	 	\$37,276 174%

[%] of Low Cost 100%

* Equivalent Annual Cost is included for information only.

**Remaining Service Life Value is reported as a negative value.

District	2	Project Number	1102-62
Performed By	КО	Date	3/6/2014
Analysis Period	35	Funding Category	
Discount rate	2.2	Low Cost Option	
		Chosen Option	

	Option 1							
Description	7" bituminous							
Design Life	20							
Year	Description		Cost/Mile					
0	Initial Cost	\$	1,084,759.99					
1								
2								
3								
4								
5								
6								
7								
8	Light Crack Treatment	\$	7,000.00					
9								
10								
11								
12	Chip Seal	\$	38,000.00					
13								
14								
15								
16								
17								
18								
19								
20	Mill & Overlay (1st Overlay)	\$	192,896.00					
21								
22								
23	Crack Treatment	\$	14,000.00					
24								
25								
26								
27	Chip Seal	\$	38,000.00					
28								
29								
30								
31								
32								
33								
34								
35	End of Analysis Period - 0% Remaning Service Life							

Total Present Worth	\$ 1,374,655.99
Eq. Annual Cost	\$ 56,728.78
% of Low Cost	100%

Total	\$ 7,115,219.40

District	2	Project Number	1102-62
Performed By	КО	Date	3/6/2014
Analysis Period	35	Funding Category	
Discount rate	2.2	Low Cost Option	
		Chosen Option	

	Option 2							
Description	8.5" concrete							
Design Life	35							
Year	Description		Cost/Mile					
0	Initial Cost	\$	1,527,547.68					
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17	Reseal Joints & Partial Depth Repair	\$	54,540.29					
18								
19								
20								
21								
22								
23								
24								
25								
26								
27	Minor CPR & Some Full Depth Repairs	\$	184,546.56					
28								
29								
30								
31								
32								
33								
34								
35	End of Analysis Period - 38% Remaning Service Life	\$	(70,127.69)					

Total Present Worth	\$ 1,696,506.84
Eq. Annual Cost	\$ 70,010.80
% of Low Cost	123%

Total	\$ 8,781,119.39

District	2	Project Number
Performed By	КО	Date
Analysis Period	35	Funding Category
Discount rate	2.2	Low Cost Option
		Chosen Option

		Option 3		
Description		7.5" concrete		
Design Life		20		
Year		Description	Cost/Mile)
	0	Initial Cost	\$	1,491,754.87
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
	11			
	12			
	13	Reseal Joints & Partial Depth Repair	\$	83,060.74
	14			
	15			
	16			
	17			
	18			
	19			
	20			
	21			
	22			
	23			
	24			
		Major CPR	\$	527,637.00
	26			
	27			
	28			
	29			
	30			
	31			
	32			
	33			
	34			
	35	End of Analysis Period - 0% Remaning Service Life		

Total Present Worth	\$ 2,102,452.60
Eq. Annual Cost	\$ 86,763.21
% of Low Cost	153%

Total	\$ 10,882,294.66

District	3
Performed By	CD
Analysis Period	35
Discount Rate	2.84

Project Number	1117-23
Date	2/20/2013
Funding Category	RS
Low Cost Option #	1
Chosen Option #	

			OPTION #1			OPTION #2									
			DESCRIPTION						DESCRIPTION						
			2.0" ML Mill and 3.5" FW Overla	V					5.5" Whitetopping						
			DESIGN LIFE	,	TYPE				DESIGN LIFE	TYP	E				
		ŀ		BIT	111 -					PCC					
Vaar	ш І	:4.			Coot/Mile	Vaar	ш	1 :4-	15						
	# L				Cost/Mile	Year	#	LIIE			Cost/Mile				
0			2.0" ML Mill and 3.5" FW Overlay	\$	190,819	0			5.0" Whitetopping	\$	321,911				
2	+			\$	-	2				\$	-				
3	+			\$	-	3				\$	_				
4	+		Crack Treatment	\$	4,000	4				\$	_				
5		_	Seal Coat	\$	25,000	5				\$	-				
6				\$	-	6				\$	-				
7				\$	-	7				\$	-				
8				\$	-	8				\$	-				
9				\$	-	9				\$	-				
10				\$	-	10				\$	-				
11 12	-			\$	-	11 12			Minor CPR	\$	40.000				
13				\$	-	12			IVIIIOI CPK	\$	40,000				
14				\$	-	14				\$	-				
15			2.0" Mill and 2.0" Overlay	\$	98,396	15				\$	-				
16	7		210 111111 210 010112	\$	-	16				\$	-				
17				\$	-	17				\$	-				
18				\$	-	18				\$	-				
19			Crack Treatment	\$	4,000	19				\$	-				
20			Seal Coat	\$	25,000	20			Major CPR	\$	150,000				
21				\$	-	21				\$	-				
22				\$	-	22				\$	-				
23	4			\$	-	23 24				\$ \$	-				
25	+			\$	-	25				\$	-				
26			2.0" Mill and 3.0" Overlay	\$	139,052	26				\$					
27	1		2.0 Nim and 0.0 Overlay	\$	-	27				\$	_				
28				\$	-	28				\$	-				
29				\$	-	29				\$	-				
30			Crack Treatment	\$	4,000	30			Remove and Replace Concrete	\$	339,000				
31			Seal Coat	\$	25,000	31				\$	-				
32	4			\$	-	32				\$	-				
33	4			\$	-	33				\$	-				
34 35			Remaining Service Life Value**	\$	- (42,785)	34 35			Remaining Service Life Value**	\$	(227,130)				
33	+		Tromaining Service Life value	Ψ	(+2,700)	33			Training Service Life value	Ψ	(221,130)				
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			Total Present Worth	\$	360,706				Total Present Worth	\$	497,268				
		j	Eq. Annual Cost*		\$16,397				Eq. Annual Cost*		\$22,605				
			% of Low Cost		100%				% of Low Cost		138%				

^{*} Equivalent Annual Cost is included for information only.
**Remaining Service Life Value is reported as a negative value.

Life Cycle Cost Analysis - Rehabilitation

S.P. `1407-27 Interest Rate: 2.70

T.H. 75 Inflation Rate: 0.00

Date ##### Discount Rate 2.70

Soils Engineer: graig Major Fixes are greater than \$10,000.00

	0	ption 1			Opt	ion 2			0	ption 3		
	1.5" mill a	and 3" overla	ıy		5" unl	oonded			4" m	ill and fill		
	design	life 18 years.			design life	e 20 years.			design	life 20 years.		
Year	Description of Work	Future	Present	Annualized	Description of Work	Future	Present	Annualized	Description of Work	Future	Present	Annualized
roai	Bosonphon of Work	Value	Value	7 tillidalized	Bosonphon of Work	Value	Value	7 ti il idalizadi	Decemplish of Werk	Value	Value	7 ti iridalizoa
		1 555	1 0.000				7 011 01 0				1	†
0	1.5" mill and 3" overlay	210000	210000	9350	5" unbonded	350000	350000	15583	4" mill and fill	275000	275000	12244
1	,		0	0			0	0			0	0
2			0	0			0	0			0	0
3			0	0			0	0			0	0
4			0	0			0	0			0	0
5			0	0			0	0	seal joints	5000	4376	195
6			0	0			0	0			0	0
7	chip seal	25000	20747	924			0	0			0	0
8			0	0			0	0			0	0
9			0	0			0	0	chip seal	27000	21244	946
10			0	0			0	0			0	0
11	patch	10000	7460	332			0	0			0	0
12			0	0			0	0			0	0
13			0	0			0	0			0	0
14			0	0	_		0	0			0	0
15	patch	10000	6706	299	minor cpr	100000	67057	2986	patch	6000	4023	179
16			0	0			0	0			0	0
17			0	0			0	0			0	0
18	5" mill and overlay	250000	154765	6891			0	0			0	0
19			0	0			0	0		040000	0	0
20			0	0			0	0	mill 1.5" and fill 3"	210000	123257	5488
21 22	oroak anal	10000	0 5565	0 248			0	0			0	0
23	crack seal	10000	0	0			0	0			0	0
24			0	0			0	0			0	0
25	chip seal	25000	12843	572	overlay 3"	200000	102747	4575			0	0
26	Chip Seal	23000	0	0	Overlay 3	200000	0	0	crack seal	5000	2501	111
27			0	0			0	0	ordon scar	3000	0	0
28			0	0			0	0			0	0
29	patch	5000	2309	103			0	0		1	0	0
30	Paton	3000	0	0	patch	5000	2248	100	patch	5000	2248	100
31			0	0	E 2000.		0	0	L 200	3000	0	0
32			0	0			0	0			0	0
33	patch		0	0			0	0			0	0
34	1 2022		0	0			0	0			0	0
35	20/25	-50000	-19679	-876	mill 1.5" overlay 3" 1/15x210000	-196000	-77142	-3435	2/17 x 210000	-24705	-9723	-433
Totals		\$405,000	\$400,715	1		\$450,000	\$444,910	 		<u>\$509.205</u>	\$422,926	1
าบเสเร				\$17,841.31		ψ403,000	nnualized	\$19,809.05				\$18,830.24
			Annualizeu Annual Cost				Annualized Annual Cost				Annualizeu Annual Cost	
		,	annuai Gust	10070		•	amuai 60St	111/0		4	Annual Cost	100/0

District	1
Performed By	CJM
Analysis Period	35
Discount Rate	2.2
ESALs (20 yr bit)	1,463,000

Project Number	1602-49
Date	10/1/2013
Funding Category	RC
Low Cost Option #	1
Chosen Option #	1

District	1
Performed By	CJM
Analysis Period	20
Discount Rate	2.2
ESALs (20 yr bit)	1,463,000

С	OPTION #1 (Bituminous Mill and Ove	erlay)		OPTION #2				OPTION #3			OPTION #4		
	DESCRIPTION			DESCRIPTION				DESCRIPTION			DESCRIPTION		
	3.0" Mill & 3.0" Overlay			Reconstruct (7.5 in. PCC over 6 in.	· '		R	econstruct (6.5 in. PCC over 6 in.			6" Bituminous over 6" of Class		
2 20	DESIGN LIFE	TYPE	panel lengt	DESIGN LIFE	TYPE	panel le	ngth	DESIGN LIFE	TYPE		DESIGN LIFE	TYPI	E
		BIT	15 ft	35 year	PCC	6.0 f	ft	20 year	PCC		20	BIT	
Year # Li	fe Description	Cost/Mile	Year # Li	fe Description	Cost/Mile	Year #	Life	Description	Cost/Mile	Year # Lif	e Description	С	ost/Mile
AO	3.0" Mill & 3.0" Overlay	\$ 143,462		Reconstruct PCC	\$ 364,733			Recon 6' Panel PCC Option	\$ 339,310		Reconstruct HMA		\$306,237
1		\$ -	1		\$ -	1			\$ -	1		\$	-
2	One of Toronto and	\$ -	2		\$ -	2			\$ -	2	One of Transferred	\$	7 000
3 AA	Crack Treatment	\$ 7,000 \$ -	3 4		\$ - \$ -	3			\$ - \$ -	3 AA 4	Crack Treatment	\$	7,000
5		\$ -	5		\$ -	5			\$ -	5		\$	-
6		\$ -	6		\$ -	6			\$ -	6		\$	-
7 AB	Surface Treatment (Chip Seal)	\$ 19,000	7		\$ -	7			\$ -	7 AB	Surface Treatment (Chip Seal)	\$	19,000
8	Comp Comp	\$ -	8		\$ -	8			\$ -	8	(\$	-
9		\$ -	9		\$ -	9			\$ -	9		\$	-
10		\$ -	10		\$ -	10			\$ -	10		\$	-
11		\$ -	11		\$ -	11			\$ -	11		\$	-
12		\$ -	12		\$ -	12			\$ -	12		\$	-
13		\$ -	13		\$ -	13 bb		13 year PCC (20 yr design life)	\$ 94,885	13	4.5" MIL 0.4.5" O	\$	-
14 15 AL	2.0" Mill & 3.5" Overlay	\$ - \$ 162,867	15		\$ - \$ -	14 15			\$ - \$ -	14 AH 15	1.5" Mill & 1.5" Overlay	\$	78,208
16 AL	2.0 Will & 3.5 Overlay	\$ 162,867	16		\$ -	16			\$ -	16		\$	-
17		\$ -	17 BF	17 year PCC (35 yr design life)	\$ 29,543	17			\$ -	17 AA	Crack Treatment	\$	7,000
18 AA	Crack Treatment	\$ 7,000	18	17 year ree (ee yr desigir iiie)	\$ -	18			\$ -	18	Crack frediment	\$	-
19		\$ -	19		\$ -	19			\$ -	19		\$	-
20		\$ -	20		\$ -	20			\$ -	20		\$	-
21		\$ -	21		\$ -	21			\$ -	21 AB	Surface Treatment (Chip Seal)	\$	19,000
22 AB	Surface Treatment (Chip Seal)	\$ 19,000	22		\$ -	22			\$ -	22		\$	-
23		\$ -	23		\$ -	23			\$ -	23		\$	-
24		\$ -	24		\$ -	24		DOG (00 1 : 11')	\$ -	24		\$	-
25	_	\$ - \$ -	25 26		\$ - \$ -	25 bc		25 year PCC (20 yr design life)	\$ 246,916	25 26		\$	-
26 27		\$ - \$ -	27 BG	27 year PCC (35 yr design life)	\$ 140,928	27			\$ - \$ -	27 AJ	2.0" Mill & 2.0" Overlay	\$	98,316
28		\$ -	28	27 year 1 CC (33 yr design life)	\$ 140,920	28			\$ -	28	2.0 Willi & 2.0 Overlay	\$	-
29 AL	2.0" Mill & 3.5" Overlay	\$ 162,867	29		\$ -	29			\$ -	29		\$	_
30		\$ -	30		\$ -	30			\$ -	30 AA	Crack Treatment	\$	7,000
31		\$ -	31		\$ -	31			\$ -	31		\$	-
32 AA	Crack Treatment	\$ 7,000	32		\$ -	32			\$ -	32		\$	-
33		\$ -	33		\$ -	33			\$ -	33		\$	-
34		\$ -	34		\$ -	34			\$ -	34 AB		\$	19,000
35 AL	Remaining Service Life Value**	\$ -	35 <mark>BG</mark>	5 Remaining Service Life Value**	\$ (54,203)	35		Remaining Service Life Value**	\$ -	35 AJ 4	Remaining Service Life Value**	\$	(32,772)
				+		\vdash	-				+		
 				+		 							
	<u> </u>					\vdash	-						
	Tatal David (NY 4)			Tatal Days and William	. 400 4 4 4		1	Tatal Days and William			Total December 2011	_	455.005
	Total Present Worth Eq. Annual Cost*	\$ 390,482 \$16,114		Total Present Worth Eq. Annual Cost*	\$ 438,144 \$18,081			Total Present Worth Eq. Annual Cost*	\$ 554,125 \$22,867		Total Present Worth Eq. Annual Cost*	Ъ	455,685 \$18,805
	Eq. Annual Cost	\$16,114 100%		% of Low Cost	\$18,081 112%			Eq. Annual Cost			% of Low Cost	-	\$18,805 117%
<u> </u>	* Equivalent Annual Cost is include		n only	/8 OI LOW COST	112/0	<u> </u>		78 OI LOW COST	142/0	<u> </u>	* Equivalent Annual Cost is include		

^{*} Equivalent Annual Cost is included for information only.

^{*} Equivalent Annual Cost is included for informatic

		District	7	_			Project Number	1704-27	1			
		Performed By	DAV				Date	6/19/2012				
			35				Funding Category	RS 2 ▼				
		Analysis Period Discount Rate	2.5				Low Cost Option #	2				
		Discount Nate	2.5				Chosen Option #					
				_			Checen option "					
		OPTION #4					OPTION #0				OPTION #2	
		OPTION #1	I				OPTION #2				OPTION #3	
		DESCRIPTION	\/\\	_			DESCRIPTION " mill / 8" FDR / 2.5" remove / 6" I	D00			DESCRIPTION	DOO
		5 <mark>" mill / 8" FDR / 5" overlay (MnPA</mark>		-	Т	4		1			4 " mill / 8" FDR / 2.5" remove / 6"	
		DESIGN LIFE	TYPE				DESIGN LIFE	TYPE			DESIGN LIFE	TYPE
		20		7 1			35	PCC 2			20	PCC 2
Year #	Life		Cost/Mile	Yea				Cost/Mile		# Lif		Cost/Mile
0		OPTION #1 - Initial Const	\$ 289,45	_)		OPTION #2 - Initial Const	\$ 341,287	0		OPTION #3 - Initial Const	\$ 341,287
1			\$ -		1			\$ -	1			\$ -
3			\$ - \$ -	_	3			\$ - \$ -	3		-	\$ - \$ -
4			\$ -		4			\$ -	<u>3</u>			\$ -
5			\$ -		5			\$ -	5			\$ -
6			\$ -		3			\$ -	6			\$ -
7			\$ -		7			\$ -	7			\$ -
8 <mark>B</mark> (0	Light Crack Treatment	\$ 2,50		3			\$ -	8			\$ -
9			\$ -		9			\$ -	9			\$ -
10			\$ -	1				\$ -	10			\$ -
11	_	Confess Teachers	\$ -	1				\$ -	11			\$ -
12 Al	3	Surface Treatment	\$ 20,00	0 1:		-		\$ - \$ -	12	BB	1st CPR (20 yr design)	\$ -
14			\$ -	1.				\$ -	14		TSLCPR (20 yr design)	\$ 34,163 \$ -
15			\$ -	1				\$ -	15			\$ -
16			\$ -	1				\$ -	16			\$ -
17			\$ -		7 BF		1st CPR (35 yr design)	\$ 27,184	17			\$ -
18			\$ -	1			\	\$ -	18			\$ -
19			\$ -	1				\$ -	19			\$ -
20 BI		2" Mill & 3.5" Overlay	\$ 172,11					\$ -	20			\$ -
21			\$ -	2				\$ -	21			\$ -
22	^	0	\$ -	2:				\$ -	22			\$ -
23 A/	4	Crack Treatment	\$ 5,00 \$ -	0 2				\$ - \$ -	23 24			\$ - \$ -
25			\$ -	2				\$ -		ВА	2nd CPR (20 yr design)	\$ 166,271
26			\$ -	2				\$ -	26		Ziid Ci it (20 yi deolgii)	\$ -
27 AI	3	Surface Treatment	\$ 20,00		7 BG		2nd CPR (35 yr design)	\$ 93,312	27			\$ -
28			\$ -	2	3			\$ -	28			\$ -
29			\$ -	2				\$ -	29			\$ -
30			\$ -	3				\$ -	30			\$ -
31			\$ -	3				\$ -	31		<u> </u>	\$ -
32 33			\$ - \$ -	3				\$ - \$ -	32 33			\$ - \$ -
34			\$ -	3				\$ -	34			\$ -
35		Remaining Service Life Value**	\$ -	3			Remaining Service Life Value**	\$ (35,889)	35		Remaining Service Life Value**	\$ -
		5 5 2 2 1 1 1 2 2 1 2 1 2 1 2 1 2 1 2 1					3	(10,000)			5 5 5 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5 7 5	
							Option 3 Note (1): There is no reha	ab quantity table	for PC	CC over	FDR. Furthermore, there is no nev	v \$
						[c	construction table in the pavemen	t selection tech r			yr PCC. The table for 20 yr whiteto	
				Щ	1		and unbonded concrete was used.					\$
				-	+						as 5.17 inches which is less than t	he
	-				+		minimum for State THs (6 inches).					Ф ©
				\dashv	+			e a 20-year desig	gn. Th	is desig	n is considered purely to meet the	s -
 	+			╢	+	r	requirements of the LCCA law.					\$
				\dashv				l i				
		Total Present Worth	\$ 424,52	0			Total Present Worth	\$ 391,936			Total Present Worth	\$ 455,755
		Eq. Annual Cost*	\$18,3				Eq. Annual Cost*				Eq. Annual Cost	
		% of Low Cost					% of Low Cost				% of Low Cos	
		* Equivalent Annual Cost is include										
		**Remaining Service Life Value is				alue.						
	–				_	_				_		-

Cost Analysis/ T.H. 14 From I-35 to Dodge Center

Givens:

Length = 14.217 miles

Width of Road = 24 feet(Conc.) 24 feet(Bit.) 5/15/14-TRM

1" Bituminous = 113 lbs/\$Y Interest Rate = 2.2 % Inflation Rate = 0 %

2" MILL & 3.5" Bitur Item	Course	Unit	Price/Unit	Total Cost	Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
2" MILL BITUMINOUS	Course	SY	0.80	\$160,140.29	Initial Cost	0	\$185,139	1.000	\$185,139	\$7,640
PATCH		Ton	100.00	\$56.868.00	Rout & seal	2	\$5,000	0.957	\$4.787	\$198
TACK COAT		GAL	\$1.00	\$40,035.07	Chipseal	4	\$25,000	0.937	\$22,916	\$946
3.5" SPWEB440B	Wear	TON	60.00	\$2,375,080.65	Mill & 3" Overlay	17	\$154,114	0.691	\$106,458	\$4,393
0.0 01 11251105	******	Total Cost:	00.00	\$2,632,124	Rout & seal	19	\$5,000	0.661	\$3,307	\$136
		Cost/Mile:		\$185,139	Chipseal	21	\$25,000	0.633	\$15,830	\$653
				V ,	Mill & 3" Overlay	33	\$154,114	0.488	\$75,156	\$3,102
					Remaining Life Value	35	(\$133,565)	0.467	-\$62,361	-\$2,573
					3	Total P	resent Worth:		\$351,231	\$14,494
						Equivalent	Annual Cost:		\$14,494	\$14,494
									•	
7" Unbonded Overla Item	ay(20 Yea Course	ar Fix) Unit	Price/Unit	Total Cost	Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
6" MILL BITUMINOUS		SY	3.00	\$600,526.08	Initial Cost	0	\$372,793	1.000	\$372,793	\$15,384
PASSRC		Ton	58.54	\$830,598.65	Reseal Joints	13	\$140,976	0.754	\$106,239	\$4,384
Place Concr. Pvmt. 7"		SY	3.60	\$720,631.30	Major CPR	25	\$464,125	0.580	\$269,378	\$11,117
Structural Concrete		CY	68.34	\$2,279,997.35	Remaining Life Value	35	\$0	0.467	\$0	\$0
Reinforcement Bars	Epoxy	lb	0.80	\$70,743.79	•	Total P	resent Worth:		\$748,410	\$30,885
Dowel Bars	Epoxy	each	6.64	\$797,498.63		Equivalent	Annual Cost:		\$30,885	\$30,885
		Total Cost:		\$5,299,996						_
		Cost/Mile:		\$372,793						
MILL 3" & 5.5" Bitur	ninous C	verlav(20 \	Year Fix)							
Item	Course	Unit	Price/Unit	Total Cost	Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
3" MILL BITUMINOUS		SY	1.20	\$240,210.43	Initial Cost	0	\$239,910	1.000	\$239,910	\$9,901
PATCH		Ton	100.00	\$56,868.00	Rout & seal	3	\$5,000	0.937	\$4,684	\$193
TACK COAT		GAL	\$1.00	\$60,052.61	Chipseal	5	\$25,000	0.897	\$22,423	\$925
4.5" SPWEB440B	Wear	TON	60.00	\$3,053,675.12	Mill & 3" Overlay	22	\$154,114	0.620	\$95,482	\$3,940
		Total Cost:		\$3,410,806	Rout & seal	24	\$5,000	0.593	\$2,966	\$122
		Cost/Mile:		\$239,910	Chipseal	26	\$25,000	0.568	\$14,198	\$586
					Remaining Life Value	35	(\$36,262)	0.467	-\$16,931	-\$699
							resent Worth: Annual Cost:		\$362,732 \$14,969	\$14,969 \$14,969

- 1. Preventive Maintenance adds 1 year of life to thin overlays and 2 years to medium and heavy overlays and Reclaimed pavements.
- 2. Each successive overlay has 1 year less life than previous one on a section.
- 3. Thin overlay -10 years life, medium overlay-15 years, heavy bit. overlay-20 years, reclamation overlay-20 years, unbonded-20 years.
- 4. Aggregate and shoulder quantities were not included in each option.
- 5. Calculations are based on 35 year life cycle.
- 6. Costs are based upon recent district project costs.

Life Cycle Cost Analysis - Rehabilitation

S.P. 2103-35 Interest Rate: 2.20

T.H. 29 Inflation Rate: 0.00

Date ##### Discount Rate 2.20

Soils Engineer: Graig Gilbertson Major Fixes are greater than \$10,000.00

		Option 1				option 2			(Option 3		
		nill and fill			concret	e; 5' whitetop	ı			CIR		
	20 year. Last 3	3" mill made 23	years.		20 20							
Year	Description of Work	Future Value	Present Value	Annualized	Description of Work	Future Value	Present Value	Annualized	Description of Work	Future Value	Present Value	Annualized
0	3" mill and fill	225000	225000	9285	concrete; 5' whitetop	350000	350000	14444	CIR	300000	300000	12380
1			0	0			0	0	-	0	0	0
2			0	0			0	0		0	0	0
3			0	0			0	0			0	0
4	seal joints	5000	4583	189			0	0	seal	5000	4583	189
5			0	0			0	0			0	0
6			0	0			0	0		0	0	0
7	chip seal	27000	23185	957			0	0	chip seal	27000	23185	957
8			0	0			0	0			0	0
9			0	0			0	0		0	0	0
10			0	0			0	0			0	0
11			0	0			0	0			0	0
12	minor patch	6000	4621	191			0	0	patch	5000	3851	159
13			0	0			0	0			0	0
14			0	0			0	0			0	0
15			0	0			0	0		0	0	0
16 17			0	0		150000	103616	0 4276		0	0	0
18			0	0	cpr	150000	0	0	patch	5000	3380	139
19			0	0			0	0	patch	5000	0	0
20	reclaim	300000	194135	8011			0	0			0	0
21	reciaiiii	300000	0	0			0	0			0	0
22			0	0			0	0			0	0
23			0	0			0	0			0	0
24	seal joints	5000	2966	122			0	0			0	0
25	ooa. jointo		0	0			0	0	mill and inlay	250000	145100	5988
26			0	0			0	0			0	0
27	chip seal	27000	15003	619			0	0		0	0	0
28	'		0	0	overlay 4.5"	250000	135930	5610			0	0
29			0	0	·		0	0	seal	5000	2660	110
30			0	0			0	0			0	0
31			0	0			0	0			0	0
32			0	0			0	0			0	0
33	patch	5000	2438	101	patch	5000	2438	101	chip seal	27000	13167	543
34			0	0			0	0			0	0
35			0	0			0	0			0	0
Totals		\$600,000	\$471,932	 		\$755,000	\$591,984	 		\$624,000	\$495,926	1
<u> </u>				\$19,475.49			Annualized	\$24,429.77			Annualized	\$20,465.6
			Annual Cost	100%			Annual Cost	125%			Annual Cost	105%

District	7
Performed By	A. Noble
Analysis Period	35
Discount Rate	2.7

Project Number	2212-29
Date	12/13/2011
Funding Category	RD
Low Cost Option #	1
Chosen Option #	1

			OPTION #1						OPTION #2	
			DESCRIPTION						DESCRIPTION	
			Reclamation with a Bituminous Surface						Reclaim with a Concrete Surface	
			DESIGN LIFE	T	TYPE				DESIGN LIFE	TYPE
		ŀ		D		Ī				
V	ш	1 :4-	20		IT	V	ш	11:4-	20	PCC
Year	#	Life	Description		Cost/Mile		#	Life		Cost/Mile
0			Initial Construction		338,733	1			Initial Construction	\$ 630,509
2				\$		2				\$ - \$ -
3				\$		3				\$ -
4				\$		4				\$ -
5				\$		5				\$ -
6				\$) -	6				\$ -
7				\$		7				\$ -
8	BL		Light Crack Treatment	\$		8				\$ -
9				\$		9				\$ -
10				\$		10				\$ -
11 12	BC		Chip Seal	65	20,000	11 12				\$ - \$ -
13	טט		Only Ocal	\$			BQ		Reseal Joints & 1st CPR 20 yr. design	\$ 31,723
14				\$		14	کر		1.0000. Control of 10. Of 10. 20 yr. dodigir	\$ -
15				\$		15				\$ -
16				\$		16				\$ -
17				\$	} -	17				\$ -
18				\$		18				\$ -
19				\$		19				\$ -
20	BP		2" Mill & 3.5" Overlay + 1.5" Shoulders		260,648	20				\$ - \$ -
21 22				\$		21 22				\$ - \$ -
23	ΔΔ		Crack Treatment	\$		23				\$ -
24	, v .		Order Fredition	\$		24				\$ -
25				\$		25	BR		Reseal Joints, 2nd CPR 20 yr., Surface Plane	\$ 154,394
26				\$		26			•	\$ -
27	BG		Chip Seal	\$		27				\$ -
28				\$		28				\$ -
29 30				\$		29 30				\$ -
31				\$		31				\$ - \$ -
32				\$		32				\$ -
33				\$		33				\$ -
34				\$		34				\$ -
35			Remaining Service Life Value	\$		35			Remaining Service Life Value**	\$ -
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			Total Present Worth	. 0	520 715	_		1	Total Present Worth	\$ 732,263
		ŀ	Eq. Annual Cost		\$23,184	1			Eq. Annual Cost*	\$32,603
		ŀ	% of Low Cos		100%				% of Low Cost	

^{*} Equivalent Annual Cost is included for information only.

**Remaining Service Life Value is reported as a negative value.

Project Number	2212-29
Date	########
Funding Category	RD
Low Cost Option #	
Chosen Option #	1

District	7
Performed By	A. Noble
Analysis Period	35
Discount Rate	2.7

			OPTION #3					OPTION #4	
			DESCRIPTION					DESCRIPTION	
			Thick Mill & Overlay					Mill, Concrete Whitetopping	
			DESIGN LIFE	TYPE				DESIGN LIFE	TYPE
			15	BIT				20	PCC
Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile
0	"		Initial Construction	\$307,898	0		Liio	Initial Construction	\$625,635
1			Title Constitution	\$ -	1			Think Conditional	\$ -
2				\$ -	2				\$ -
	AA		Crack Treatment	\$ 5,000	3				\$ -
4				\$ -	4				\$ -
5				\$ -	5				\$ -
6				\$ -	6				\$ -
	BG		Chip Seal	\$ 20,000	7				\$ - \$ -
8				\$ - \$ -	8 9				\$ - \$ -
10				\$ -	10				\$ -
11				\$ -	11				\$ -
12				\$ -	12				\$ -
13				\$ -	13	BP		Reseal Joints & 1st CPR 20 yr. design	\$ 31,723
14				\$ -	14				\$ -
	BP		2" Mill & 3.5" Overlay + 1.5" Shoulders	\$163,206	15				\$ -
16				\$ -	16				\$ -
17	ΛΛ		Crook Trootmont	\$ -	17 18				\$ - \$ -
19	AA		Crack Treatment	\$ 5,000	19				\$ - \$ -
20				\$ -	20				\$ -
21				\$ -	21				\$ -
	BG		Chip Seal	\$ 20,000	22				\$ -
23			•	\$ -	23				\$ -
24				\$ -	24				\$ -
25				\$ -		BQ		Reseal Joints, 2nd CPR 20 yr., Surface Plane	\$154,394
26				\$ -	26				\$ -
27				\$ - \$ -	27		-		\$ - \$ -
28	BP		2" Mill & 3.5" Overlay + 1.5" Shoulders	\$163,206	28 29				\$ - \$ -
30	DF		2 Will & 3.5 Overlay + 1.5 Shoulders	\$ 103,200	30				\$ -
31				\$ -	31				\$ -
32	AA		Crack Treatment	\$ 5,000	32				\$ -
33				\$ -	33				\$ -
34				\$ -	34				\$ -
35			Remaining Service Life Value**	\$ 88,131	35			Remaining Service Life Value**	\$ -
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		\vdash			-		<u> </u>		
		\vdash							
	_	\vdash		 		_	1		
	<u> </u>		Total Present Worth	\$564,964		<u> </u>		Total Present Worth	\$727 389
		ŀ	Eq. Annual Cost*	\$25,154				Eq. Annual Cost*	\$32,386
		ľ	% of Low Cost					% of Low Cost	140%
			70 OI LOW COST	100/0	I			70 OI LOW COST	170/0

^{*} Equivalent Annual Cost is included for information only.

District	7
Performed By	T. Andersen
Analysis Period	35
Discount Rate	2.2

Project Number	2280-132
Date	1/9/2014
Funding Category	RD
Low Cost Option #	3
Chosen Option #	

7
T. Andersen
35
2.2

	OPTION #1			OPTION #2				OPTION #3				OPTION #4		
	DESCRIPTION			DESCRIPTION				DESCRIPTION				DESCRIPTION		
	HMA Reconstruction		7.	.5" UBOL with 4" HMA outside sho	ulders		8"	UBOL with 5" PCC outside shou	ılders		8'	UBOL with 4" HMA outside sho	ulders	
	DESIGN LIFE	TYPE		DESIGN LIFE	TYPE			DESIGN LIFE	TYPE			DESIGN LIFE	TYPE	
	20 yrs	HMA		20 yrs	PCC			35 yrs	PCC			35 yrs	PCC	
Year # Life	Description	Cost/Mile	Year # Lif	fe Description	Cost/Mile	Year 7	# Life	Description	Cost/Mile	Year	# Life	Description	Cos	st/Mile
0		\$ 1,043,679	0		\$ 671,021	0			\$ 711,242	0			\$	708,704
1		\$ -	1		\$ -	1			\$ -	1			\$	-
2		\$ -	2		\$ -	2			\$ -	2			\$	-
3		\$ -	3		\$ -	3	_		\$ -	3			\$	-
4		\$ -	4		\$ -	4			\$ -	4			\$	-
5		\$ - \$ -	5		\$ -	5 6			\$ - \$ -	5 6			\$	-
7		\$ -	7		Φ - •	7	+		\$ - \$ -	7			Φ	-
8 BJ	Light Crack Treatment	\$ 3,500	8		\$ -	8			\$ -	8			\$	
9	Light Grack Treatment	\$ -	9		\$ -	9			\$ -	9			\$	_
10		\$ -	10		\$ -	10			\$ -	10			\$	-
11		\$ -	11		\$ -	11			\$ -	11			\$	-
12 AB	Surface Treatment	\$ 19,000	12		\$ -	12			\$ -	12			\$	-
13		\$ -	13		\$ -	13			\$ -	13			\$	-
14		\$ -	14		\$ -	14			\$ -	14			\$	-
15		\$ -	15 BD	Reseal Joints (15') 20 yr DL	\$ 34,088	15			\$ -	15			\$	-
16		\$ -	16		\$ -	16			\$ -	16			\$	-
17		\$ -	17		\$ -	17 B	G	Reseal Joints (15') 35 yr PCC SI	•	17	BL	Reseal Joints (15') 35 yr HMA S	St \$	34,088
18		\$ -	18		\$ -	18			\$ -	18			\$	-
19	2.5" Mill & 4" HMA Overlay	\$ - \$ 258,658	19 20		\$ -	19 20	_		\$ -	19 20			\$	-
20 BA 13	2.5 IVIIII & 4 HIVIA OVERTAY	\$ 258,658 \$ -	21		\$ - ¢	21	+		\$ - \$ -	21			Φ	-
22		\$ -	22		φ - \$ -	22			\$ -	22			φ \$	
	Crack Treatment	\$ 7,000	23		\$ -	23			\$ -	23			\$	_
24	Crack Frediment	\$ -	24		\$ -	24			\$ -	24			\$	-
25		\$ -	25 BE	Minor CPR (15') 20 yr DL	\$ 179,060	25			\$ -	25			\$	_
26		\$ -	26	· · ·	\$ -	26			\$ -	26			\$	-
27 <mark>AB</mark>	Surface Treatment	\$ 19,000	27		\$ -	27 <mark>B</mark>	Н	Minor CPR (15') 35 yr PCC Shld	\$ 116,292	27	ВМ	Minor CPR (15') 35 yr HMA Shlo	\$ b	179,060
28		\$ -	28		\$ -	28			\$ -	28			\$	-
29		\$ -	29		\$ -	29			\$ -	29			\$	-
30		\$ -	30		\$ -	30			\$ -	30			\$	-
31		\$ -	31		\$ -	31			\$ -	31			\$	-
32 33		\$ - \$ -	32 33		φ - ¢	32 33			\$ - \$ -	32 33			\$	-
34		\$ -	34		\$ -	34			\$ -	34			\$	-
	Remaining Service Life Value**		35	Remaining Service Life Value**	\$ -	35		Remaining Service Life Value**	\$ (44,728)	35		Remaining Service Life Value**	•	(68,869)
	2			James Grand Line Value					(. 1,1 20)			i managed need and talab		(23,000)
											_			
	Total Present Worth			Total Present Worth				Total Present Worth				Total Present Worth		799,597
	Eq. Annual Cost*			Eq. Annual Cost*				Eq. Annual Cost*				Eq. Annual Cost		\$32,997
	% of Low Cost	160%		% of Low Cost	103%			% of Low Cost	100%			% of Low Cos	t	103%



Cost Analysis/T.H. 61 From Ready Mix Entr. to Potter St. & From Old W. Main to T.H. 19

Length = 14.272 miles Width of Road = 24 feet 5/20/14-TRM 24 feet 1" Bituminous = 113 lbs/SY Interest Rate = 2.2 % Inflation Rate = 8" Concrete Doweled-Select Granular(20 Year Fix)

o Concrete Dowele	u-Select	Granu	iai(20 Teai	FIX)						
Item	Course	Unit	Price/Unit	Total Cost	Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
12" Select Granular Mod.		CY	\$11.86	\$794,421.38	Initial Cost	0	\$10,508,243	1.000	\$736,284	\$30,385
8" Class 6		CY	\$19.44	\$868,102.96	Reseal Joints	13	\$55,000	0.754	\$41,448	\$1,710
4" Perf PE Drain		LF	\$3.00	\$452,136.96	Major CPR	25	\$250,000	0.580	\$145,100	\$5,988
Subgrade Excavation		CY	\$8.92	\$995,817.70	Remaining Life Value	35	\$0	0.467	\$0	\$0
Conc Pavement 8"		SY	\$25.70	\$5,164,408.83		Total	Present Worth:		\$922,832	\$38,083
Dowel Bars	Epoxy	each	\$6.64	\$800,583.84		Equivale	nt Annual Cost:		\$38,083	
Remove Pavement		SY	\$7.13	\$1,432,771.79	_					_
	Tota	al Cost:		\$10,508,243	1					
	Cos	st/Mile:		\$736,284						

Bituminous Aggrega	te Base	Modifi	ed(20 Year	Fix)						
Item	Course	Unit	Price/Unit	Total Cost	Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
20" Select Granular Mod.		CY	\$11.86	\$1,324,035.64	Initial Cost	0	\$9,983,407	1.000	\$699,510	\$28,867
Subgrade Excavation		CY	\$8.92	\$1,294,563.01	Rout & Seal	4	\$5,000	0.917	\$4,583	\$189
4" Perf PE Drain		LF	\$3.00	\$452,136.96	Chipseal	6	\$25,000	0.878	\$21,940	\$905
Tack Coats		GAL	\$1.00	\$60,284.93	Mill & 3" Overlay	20	\$180,706	0.647	\$116,938	\$4,826
4" SPWEB440F	Wear	TON	\$70.00	\$3,179,025.20	Rout & Seal	22	\$5,000	0.620	\$3,098	\$128
2" SPNWB430F	NW	TON	\$70.00	\$1,589,512.60	Chipseal	24	\$25,000	0.593	\$14,829	\$612
6" Class 5		CY	\$19.44	\$651,077.22	Remaining Life Value	35	(\$1,177)	0.467	-\$549	-\$23
Remove Pavement		SY	\$7.13	\$1,432,771.79		Total	Present Worth:		\$860,349	\$35,505
	Total Cost: \$9,983,407					Equivaler	nt Annual Cost:	\$35,505		
	Co	st/Mile:		\$699,510	-					_

Item	Course	Unit	Price/Unit	Total Cost	Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
.5" MILL BITUMINOUS		SY	\$0.80	\$160,759.81	Initial Cost	0	\$180,706	1.000	\$180,706	\$7,457
PATCH		Ton	\$100.00	\$96,000.00	Rout & seal	2	\$5,000	0.957	\$4,787	\$198
TACK COAT		GAL	\$1.00	\$40,189.95	Chipseal	4	\$25,000	0.917	\$22,916	\$946
3" SPWEB440E	Wear	TON	\$67.00	\$2,282,085.95	Mill & 3" Overlay	15	\$180,706	0.722	\$130,379	\$5,380
	Total Cost:				Rout & seal	17	\$5,000	0.691	\$3,454	\$143
	Cost/Mile:			\$180,706	Chipseal	19	\$25,000	0.661	\$16,534	\$682
					Mill & 3" Overlay	29	\$180,706	0.532	\$96,138	\$3,967
					Rout & seal	31	\$5,000	0.509	\$2,547	\$105
					Chipseal	33	\$25,000	0.488	\$12,192	\$503
					Remaining Life Value	35	(\$97,310)	0.467	-\$45,434	-\$1,875
					Total Present Wo		Present Worth:		\$424,219	\$17,507
					Equivalent Annual Cost:			\$17,507	\$17,507	

Concrete Regrade design-20 years, bituminous regrade design-20 years, bituminous overlay-15 years.
 Shoulder quantities were not included in each option.

Givens:

^{3.} Calculations are based on 50 year life cycle.

^{4.} Costs are based upon recent district project costs.

3 - Baxter
SZ
35
2.2

Project Number	3003-46
Date	9/11/2013
Funding Category	RS
Low Cost Option #	3
Chosen Option #	3

	ADTION #4			ODTION #6									OPTION #0							
	OPTION #1		4				OPTION #2			OPTION #3										
	DESCRIPTION		4	DESCRIPTION								DESCRIPTION								
	5" Overlay-ML & Shld		4				6" Unbonded Concrete Overlay				3"	Ove	erlay-ML & Shld. and 3/4" UTBWC	1	•					
	DESIGN LIFE	TYPE	_				DESIGN LIFE	TYF	Έ				DESIGN LIFE	TYPE						
	15 Years	BIT					15 Years	PCC					15 Years	BIT						
Year # Life	e Description	Cost/Mile	Υ	'ear	#	Life	Description	(Cost/Mile	Year	#	Life	Description	Co	st/Mile					
0 BP	5.0" Overlay-ML & Shld	\$ 352,35	2	0	AY		6" Unbonded Concrete Overlay	\$	409,279	0	BJ		3" Overlay-ML & Shld. and 3/4" L	\$	295,891					
1	·	\$ -		1			·	\$	-	1				\$	-					
2		\$ -		2				\$	-	2				\$	-					
3		\$ -		3				\$	-	3				\$	-					
4 AA	Crack Treatment	\$ 5,00	0	4				\$	-		AA		Crack Treatment	\$	5,000					
5		\$ -	4	5				\$	-	5				\$	-					
6		\$ - \$ -	4	6 7				\$	-	6 7				\$	-					
8 BL	Micro-Surface	\$ 45,00	$\overline{}$	8				\$	-	8				\$	-					
9	WICTO-Surface	\$ 45,00	\vdash	9				\$			BL		Micro-Surface	\$	45,000					
10		\$ -	\dashv	10				\$	-	10			Wildro Gariage	\$	-					
11		\$ -		11				\$	-	11				\$	-					
12		\$ -		12	AO		Joint Seal (15') & Partial Depth	\$	30,000	12				\$	-					
13		\$ -		13				\$	-	13				\$	-					
14		\$ -		14				\$	-	14				\$	-					
15 BQ	3.0" Mill & Fill-ML Only	\$ 143,40	5	15				\$	-		BM		2.0" Mill & Fill and 3/4"UTBWC-N		184,166					
16		\$ -	4	16				\$	-	16				\$	-					
17		\$ -		17				\$	-	17				\$	-					
18	Crack Treatment	\$ -	\vdash	18				\$	-	18	AA		Crook Trootmont	\$	-					
19 AA 20	Crack Treatment	\$ 5,00 \$ -	<u> </u>	19 20	۸D		Major CPR (6'X6')	\$	125,000	20			Crack Treatment	\$	5,000					
21		\$ -	╬	21	AK		Major CPR (6 A6)	\$	125,000	21				\$	<u> </u>					
22		\$ -	╅	22				\$		22				\$						
23 BL	Micro-Surface	\$ 45,00	0	23				\$	-		BL		Micro-Surface	\$	45,000					
24	more Garrage	\$ -		24				\$	-	24				\$	-					
25		\$ -		25				\$	-	25				\$	-					
26		\$ -		26				\$	-	26				\$	-					
27		\$ -		27				\$	-	27				\$	-					
28		\$ -		28				\$	-	28				\$	<u> </u>					
29 BN	2.0" Mill and 4" Overlay-ML & Sh		4	29	<u> </u>			\$	-		BN		2.0" Mill and 4" Overlay-ML & Sh		229,224					
30		\$ -	4	30	B⊦		Rem and Rep 6" UBCO	\$	482,553	30				\$	-					
31 32		\$ - \$ -	╅	31 32				\$	-	31 32				\$	-					
33 AA	Crack Treatment	\$ 5,00	\cap	33				\$			AA		Crack Treatment	\$	5,000					
34	Crack frediment	\$ -	┪	34				\$	-	34			Crack Treatment	\$	-					
35	Remaining Service Life Value**	\$ (123,42	9)	35			Remaining Service Life Value**	\$	(321,702)				Remaining Service Life Value**		3,428.52)					
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	Total Present Worth						Total Present Worth	\$	614,272				Total Present Worth		567,694					
	Eq. Annual Cost*						Eq. Annual Cost*		\$25,350				Eq. Annual Cost*		\$23,427					
	% of Low Cost	105	%				% of Low Cost		108%				% of Low Cost		100%					

^{*} Equivalent Annual Cost is included for information only.

**Remaining Service Life Value is reported as a negative value.

District	8
Performed By	RY/TA
Analysis Period	35
Discount Rate	2.2

Project Number	3403-66
Date	12/23/2013
Funding Category	RS
Low Cost Option #	4
Chosen Option #	1 & 4



			OPTION #1					OPTION #2						OPTION #3			OPTION #4						
			DESCRIPTION					DESCRIPTION						DESCRIPTION			DESCRIPTION						
		15	" Bit. Overlay for BOC, 15 yr Des	ian			_	6" Bit. Overlay for BOC, 20 yr Des	ian				5"	UBOL 20 Year Design (undowe	lpd)				6" LIBC	DL, 35 Year Design (dowe	lad)		
		7.0	DESIGN LIFE	TYPE					TY) F			Ť	DESIGN LIFE	TYP	_			T OBC	DESIGN LIFE	TY	DE .	
									_				ŀ		_						_		
V		1.76		BIT			li ic.	20	BIT		V	" It is	۲.	20	PCC		Maral I	u Iru		35	PC		
	# BB		Description	Cost/Mi		Year #				Cost/Mile		# Li	_	Description		Cost/Mile	Year #			Description OL, 35 Year Design		Cost/Mile	
1		15	4.5" Bit. Overlay for BOC, 20 yr D		- C61	1	20	6" Bit. Overlay for BOC, 20 yr De	\$	418,728	1	BI 2	U	5" UBOL 20 Year Design	\$	362,598	1	VI 3	5 6 UB	OL, 35 Year Design	\$	446,091	
2		H		•	-	2	+		\$	-	2		Ŧ		\$	-	2	_			\$	-	
3	AA	-	Crack Treatment	\$ 7,	000	3 AA		Crack Treatment	\$	7,000	3		T		\$	-	3				\$	-	
4				Ψ	-	4			\$	-	4				\$	-	4				\$	-	
5						5			\$	-	5		4		\$	-	5				\$	-	
6	AB		Surface Treatment	\$ \$ 19,	-	6 7 AB	+	Surface Treatment	\$	19,000	6	_	+		\$	-	6 7	-			\$	<u>-</u>	
8			Surface Treatment		-	7 AB	+	Surface Treatment	\$	19,000	8		#		\$		8	-			\$		
9					-	9			\$	-	9		Ť		\$		9				\$		
10					-	10			\$	-	10				\$	-	10				\$	-	
11				•	-	11			\$	-	11				\$	-	11				\$	-	
12				7		12			\$	-	12	D	4	4-1 ODD 00 D '	\$	-	12	4			\$	-	
13		┝		•	-	13 14			\$	-	13	BJ	ď	1st CPR, 20 yr Design	\$	105,713	13	_			\$	-	
14	BF	14	2"Mill/ 3.5" OL & 1.5" SHLD OL	\$ \$ 223,	- 321	15			\$	-	14 15		+		\$	-	14 15				\$	-	
16			E WIIII G.O GE W 1.0 GITED GE		-	16	+		\$	-	16		Ť		\$	-	16	_			\$	-	
17					-	17			\$	-	17		T		\$	-	17 BI	٧	1st CF	PR, 35 yr Design	\$	34,088	
	AA		Crack Treatment	\$ 7,	000	18			\$	-	18				\$	-	18				\$	-	
19						19			\$		19		4		\$	-	19				\$	-	
20				7	-	20 BG	+	2.5" Mill/4" OL & 1.5" Shld OL	\$	244,720	20	_	+		\$	-	20	-			\$	-	
	AB		Surface Treatment	\$ \$ 19,		21	+		\$	-	21 22		+		\$	-	22	-			\$	-	
23		H	Carrace Treatment		-	23 AA	+	Crack Treatment	\$	7,000	23		#		\$	-	23	-			\$	-	
24					-	24			\$	-	24		T		\$	-	24				\$	-	
25				7	-	25			\$	-	25	BK	Ź	2nd CPR 20 yr Design	\$	417,764	25				\$	-	
26						26			\$		26		4		\$	-	26				\$		
27 28				-	-	27 AB 28	+	Surface Treatment	\$	19,000	27 28	_	+		\$	-	27 BF	,	2nd C	PR 35 yr Design	\$	246,979	
	BF	13	2"Mill/ 3.5" OL & 1.5" SHLD OL	\$ 223,		29	+		\$		29		+		\$		29	-			\$		
30		10	E WIIII G.O GE & 1.0 GIED GE	\$	-	30	+		\$	-	30		#		\$	-	30	-			\$	-	
31					-	31			\$	-	31				\$	-	31				\$	-	
32			Crack Treatment		000	32			\$	-	32		4		\$	-	32				\$	-	
33				Ψ		33	4		\$	-	33		4		\$	-	33	_			\$	-	
34			Remaining Service Life Value**	\$ (120,249	- 56)	34 35	+	Remaining Service Life Value**	\$	-	34 35		-	Remaining Service Life Value**	Φ Φ		34 35	-	Roma	ining Service Life Value**	Ψ	(94,992.01)	
- 50			ternaliling dervice Life value	Ψ (120,240	.00)	55	+	Remaining dervice Life value	Ψ		55		ť	ternaliling dervice Life value	Ψ		33		Itema	illing dervice Life value	Ψ	(34,332.01)	
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		t											†		1			-			+		
		i i	Total Present Worth	\$ 607,	42	1		Total Present Worth	\$	614,765			Ť	Total Present Worth	\$	684,733			İ	Total Present Worth	1 \$	562,528	
		ſ	Eq. Annual Cost*	\$25				Eq. Annual Cost*	Ė	\$25,370			Ī	Eq. Annual Cost*		\$28,257	1			Eq. Annual Cos		\$23,214	
		Ī	% of Low Cost	1	08%			% of Low Cost		109%				% of Low Cost	t	122%				% of Low Cos	st	100%	

* Equivalent Annual Cost is included for informatio

The PCC thickness falls below the minimum thickness for UBOL and not be considered for an design alternate.

^{*} Equivalent Annual Cost is included for information only.
**Remaining Service Life Value is reported as a negative value.

Performed By	K.Olson
Analysis Period	35
Discount Rate	2.2

Project Number	3501-14
Date	6/20/2013
Funding Category	RS
Low Cost Option #	#1
Chosen Option #	

District	2
Performed By	K.Olson
Analysis Period	35
Discount Rate	2.2

Year # Life 0	OPTION #1 DESCRIPTION 1.5"-3" mill, 3" overlay DESIGN LIFE 20 Description	TYPE			OPTION #2 DESCRIPTION						OPTION #3 DESCRIPTION					OPTION #4 DESCRIPTION		
0 1 2 3 AA (DESIGN LIFE										DECOMI HON				DESCRIPTION			
0 1 2 3 AA (20			6" whitetopping														
0 1 2 3 AA (RIT			DESIGN LIFE	TYP	E			T	DESIGN LIFE	TYPE				DESIGN LIFE	TYPI	E
0 1 2 3 AA (Description	DIT			20	PCC					35	PCC				35	PCC	
1 2 3 AA (Cost/Mile	Year a	# Life	Description	(Year	#	Life	Description	Cost/	Mile	Year	# L	fe Description	С	ost/Mile
2 3 AA (\$ 153,661	0			\$	424,348	0					3,932	0			\$	563,655
3 AA (\$ -	1	_		\$	-	1				\$	-	1	_		\$	-
	Crack Treatment	\$ -	2	+		\$	-	3		_		\$	-	3	_		\$	-
	Clack Heatment	\$ 3,000	4	+		\$	-	4				\$	-	4	\dashv		\$	
5		\$ -	5	+		\$	-	5				\$	-	5	_		\$	-
6		\$ -	6			\$	-	6				\$	-	6			\$	-
	Surface Treatment	\$ 23,000	7			\$		7				\$	-	7			\$	-
8		\$ -	8			\$	-	8				\$	-	8	_		\$	-
9		\$ -	9	_		\$	-	9				\$	-	9	_		\$	-
10		\$ - \$ -	10 11	_		\$	-	10				\$	-	10	_		\$	
12		\$ -	12	+		\$		12				\$	-	12	-		\$	
13		\$ -	13 A	N	Reseal Joints (6'X7')	\$	194,289	13				\$	-	13			\$	-
14		\$ -	14		` ′	\$		14				\$	-	14			\$	
15		\$ -	15			\$	-	15				\$	-	15			\$	-
	2" Mill & 2" Overlay	\$ 105,500	16	4		\$	-	16				\$	-	16		5 111 (12)	\$	
17		\$ - \$ -	17 18	-		\$	-	17	AM	_	Reseal Joints (15')		1,190	17	AO	Reseal Joints (12')	\$	76,487
	Crack Treatment	\$ 3,000	18	+		\$	-	18 19	_	-		\$	-	18 19	-		\$	
20	Clack Heatment	\$ 3,000	20			\$	-	20	_	_		\$	-	20	-		S	
21		\$ -	21			\$	-	21				\$	-	21			\$	-
22		\$ -	22	1		\$	-	22				\$	-	22			\$	-
	Surface Treatment	\$ 23,000	23			\$	-	23				\$	-	23			\$	-
24		\$ -	24			\$	-	24				\$	-	24			\$	-
25		\$ -	25 A	T	Major CPR(6x7)	\$	431,783	25				\$	-	25	_		\$	-
26 27		\$ - \$ -	26 27	_		\$	-	26 27	DD		Minor CPR & full depth (15')	\$ 14	0,133	26 27	۸D	Minor CPR (12')	\$	168,324
28		\$ -	28	+		\$	-	28	DD		Millor CFR & full deptil (15)	\$ 14	-	28	AF	MINOI CFK (12)	\$	100,324
29		\$ -	29			\$	-	29				\$	-	29			\$	-
30		\$ -	30			\$		30				\$	-	30			\$	-
	1.5" Mill & 3" Overlay	\$ 154,300	31			\$	-	31				\$	-	31			\$	-
32		\$ -	32			\$	-	32				\$	-	32	_		\$	-
33		\$ -	33	-		\$	-	33	_			\$	-	33	_		\$	
34 F	Remaining Service Life Value**	\$ -	34 35	+	Remaining Service Life Value**	\$	-	34 35		-	Remaining Service Life Value**	\$ (5	3,251)	34 35	##	Remaining Service Life Value**	\$	(63,963)
33 1	itemaning Service Life value		33	+	Remaining Service Life value	Ψ		33	1111		Remaining Service Life value	Ψ (c	13,231)	- 33	TETT	Itemaning Service Life value	Ψ	(00,300)
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	Total Deces 1347 - 15	® 245.000	\vdash	- 1	Total Dancard W. of	•	004.070			-	Total December 144 and	6 00	0.007			Total Danas (March	•	000.404
⊦	Total Present Worth Eq. Annual Cost*	\$ 345,223 \$14,247	l		Total Present Worth Eq. Annual Cost*		821,370 \$33,896			ŀ	Total Present Worth Eq. Annual Cost*		9,207 27,617			Total Present Worth Eq. Annual Cost*	\$	680,161 \$28,069
F	% of Low Cost		l		% of Low Cost		238%			ŀ	% of Low Cost		194%			% of Low Cost	1	197%
	* Equivalent Annual Cost is inclu		ion only		,	•	20070				,0 0. 20W 003t		.0.70	ш		* Equivalent Annual Cost is inclu		

Mn/DOT DISTRICT 2 REHABILITATION WORKSHEET (General Pre-Scoping / Planning Estimate) TH 11 State Project 3604-73 RD **Funding category** Alternate #1 Alternate #2 Alternate #3 Alternate #4 Description ----> 1.5" MILL 5" whitetopping 6" New bit Reclaim & 3"OVERLAY YR First Cost \$ / Mile \$240,069 \$520,361 \$757,564 \$450,368 Rehab Life in Yrs 35 Interest % 2.50% 2.50% 2.50% 2.50% 20yr 20yr 15yr 20yr 1 \$0 \$0 \$0 \$0 \$0 Notes: 2 \$0 \$0 \$0 Last Revised 11/25/08 (A, F, G, H, I, J, K, L) 3 \$5.000 \$0 \$0 \$0 Last Revised 3/31/10 (B, C, D, E) 4 \$0 \$0 \$0 5 \$0 \$0 \$0 \$0 2-Lane Highway Improvements Cost / mile 6 \$0 \$0 \$5,000 \$0 \$287,589 7 \$25,000 \$0 \$0 Reclaim 1 1/2" Overlay \$60,000 8 \$0 \$0 \$0 \$5,000 2" Mill & 3 1/2" Overlay \$68,000 9 \$0 \$0 \$0 \$0 D 2" Mill & Overlay \$109,140 10 \$0 \$0 \$25,000 \$0 Ε 3" Mill & 3" Overlay \$141,200 11 \$0 \$0 \$0 \$0 \$25,000 Route and Seal \$5,000 12 \$0 \$0 \$0 G \$97,945 Chip seal \$25,000 13 \$0 \$0 \$0 \$0 \$0 \$0 \$0 Joint seal & minor CPR 14 Н \$91,120 Minor CPR w/ Partial depth repair \$97,945 15 \$109,140 \$0 \$0 \$0 \$0 \$0 Major CPR & griding \$271,098 16 \$0 \$0 \$45,500 17 \$0 \$0 Microsurface \$0 \$0 **New Concrete** \$300,553 \$0 \$0 18 \$5,000 \$0 М 5.5" mill, conc rehab, 5" new \$425,510 \$0 \$0 19 \$0 \$0 1.5" MILL 3" OVERLAY \$158,300 20 \$0 \$0 \$109,140 \$109,140 21 \$0 \$0 \$0 \$0 22 G \$25,000 \$0 \$0 \$0 23 \$0 \$0 \$5.000 \$5.000 24 \$0 \$0 \$0 \$0 \$0 25 \$0 \$271,098 \$0 \$0 26 \$0 \$0 \$0 27 \$0 \$0 \$25,000 \$25,000 28 \$0 \$0 \$0 \$0 29 \$0 \$0 \$0 \$0 Alt.1 - 10yrs left of 15yr fix 30 \$158,300 \$0 \$0 \$0 31 \$0 \$0 \$0 \$0 32 \$0 \$0 \$0 \$0 \$0 33 \$0 \$0 \$0 \$0 34 \$0 \$0 \$0 \$0 (\$105,533) 35 \$0 \$0 \$0 36 \$0 \$0 \$0 \$0 37 \$0 \$0 \$0 \$0 \$0 38 \$0 \$0 39 \$0 \$0 \$0 \$0 40 \$0 \$0 \$0 \$0 41 \$0 \$0 \$0 \$0 42 \$0 \$0 \$0 \$0 43 \$0 \$0 \$0 \$0 \$0 44 \$0 \$0 \$0 \$0 45 \$0 \$0 \$0 46 \$0 \$0 \$0 \$0 47 \$0 \$0 \$0 \$0 48 \$0 \$0 \$0 49 \$0 \$0 \$0 Total Cost (Present Worth) \$389,829 \$737,640 \$863,679 \$555,334 **Annual Cost (Present Worth)** \$16,843 \$31,870 \$37,316 \$23,994 142% % Above Low Option 100% 189% 222% Data Furnished By: KO Completed By:

District	4
Performed By	TA check
Analysis Period	35
Discount Rate	2.2

roject Number	4402-19	T.H. 20
ate	3/17/2014	
unding Category	RS	
ow Cost Option #	5	

4
TA check
35
2.2

Project Number	4402-19
Date	3/17/2014
Funding Category	RS
Low Cost Option #	5
Chosen Ontion #	

	OPTION #1			OPTION #2				OPTION #3				OPTION #4				OPTION #5			
	DESCRIPTION			DESCRIPTION				DESCRIPTION			DESCRIPTION				DESCRIPTION				
	4" Mill & 4" HMA OL					4" MIII & 4.5" PCC (BCOA-ME)					3" Mill. 3" CIR. & 3" HMA OL								
	DESIGN LIFE	TYPE		DESIGN LIFE	TYPE			DESIGN LIFE	TYPE			DESIGN LIFE T	YPE			DESIGN LIFE	TYPE		
	16 yrs	HMA		35 yrs	PCC			16 yrs	HMA				CC			20 yrs	HMA		
Year # Life	Description	Cost/Mile	Year #	Life Description	Cost/Mile	Year i	# Lit	fe Description	Cost/Mile	Year	# Life	e Description	Cost/Mile	Year	# Lit	fe Description	Cost/Mile		
0		\$ 233,947	0		\$ 269,844	0			\$ 200,620	0			\$ 269,844	0			\$ 251,752		
1		\$ -	1		\$ -	- 1			\$ -	1			\$ -	- 1			\$ -		
2		\$ -	2		\$ -	2			\$ -	2			\$ -	2			\$ -		
3 AA	Crack Treatment	\$ 7,000	3		S -	3 A	A	Crack Treatment	\$ 7,000	3			\$ -	3	_		\$ -		
4		s -	4		\$ -	4	_		\$ -	4	_		\$ -	4	_		\$ -		
5		s -	5		\$ -	5	+		\$ - \$ -	5	_	-	\$ -	5	_		s -		
7 AB	Surface Treatment	\$ 19,000	7		\$ -	6 7 A	D	Surface Treatment	\$ 19,000	- 5	_	-	\$ -	6 7	-		\$ -		
8 AB	Surface Treatment	\$ 19,000	8		-	8	ь	Sunace Treatment	\$ 19,000	8	_		s -	8 E		Light Crack Treatment	\$ 3.500		
9		S -	9		s -	9	+		s -	9	-	1	s -	9		Light Clack Heathern	\$ 3,300		
10		\$.	10		\$.	10	+		\$.	10	-			10	_		\$.		
11		š -	11		š -	11	\top		š -	11			Š -	11	_		š -		
12		\$ -	12		\$ -	12	1		\$ -	12			\$ -	12 A	λB	Surface Treatment	\$ 19,000		
13		\$ -	13		\$ -	13	Ш		\$ -	13			\$ <u>-</u>	13			\$ -		
14		s -	14		\$ -	14	I		\$ -	14	T		\$ -	14	T		\$ -		
15		\$ -	15		\$ -	15			\$ -	15			\$ -	15			\$ -		
16 BB	2" Mill & 3.5" HMA Overlay	\$ 195,528	16		\$ -	16 B	N	2" Mill & 3.5" OL option#3	\$ 195,528	16	_		\$ -	16	_		ş -		
17		\$ -	17 AP	Minor CPR (6'X6')	\$ 123,331	17	+		\$ -	17	_	-	\$ -	17	_		\$ -		
18 19 AA	Crack Treatment	S 7.000	18		\$ -	18 19 A		Crack Treatment	\$ - \$ 7.000	18 19	_		· ·	18 19	-		\$ -		
19 AA	Crack Freatment	\$ 7,000	20		\$ -	19 A	А	Crack Treatment	\$ 7,000	20	DO 25	Reconstruct with 6" PCC	\$ 437,799		D 4	2" Mill & 3.5" HMA Overlay	\$ 195.528		
21		S -	21		-	21	+		s -	21	BU 33	Reconstruct with 6 PCC	\$ 437,799 \$	21	DD II	2 Mill & 3.5 HWA Overlay	\$ 195,526		
22		\$.	22		\$.	22	+		9 -	22			\$.	22	_		\$.		
23 AB	Surface Treatment	\$ 19,000	23		s -	23 A	B	Surface Treatment	\$ 19,000	23			s -	23 A	\A	Crack Treatment	\$ 7,000		
24		S -	24		S -	24			S -	24			S -	24			S -		
25		S -	25		\$ -	25			\$ -	25			\$ -	25			\$ -		
26		\$ -	26		\$ -	26			\$ -	26			\$ -	26			\$ -		
27		\$ -	27 BL	Minor CPR (6'x6') 35 yr DL	\$ 249,464	27			\$ -	27			\$ -	27 A	λB	Surface Treatment	\$ 19,000		
28		\$ -	28		ş -	28	_		\$ -	28	_		\$ -	28	_		ş -		
29		s -	29		\$ -	29	+		\$ -	29	_	-	\$ -	29	_		\$ -		
30 31 BB	2" Mill & 3.5" HMA Overlay	\$ - \$ 195.528	30		<u> </u>	30 31 B	A1	2" Mill & 3.5" OL option#3	\$ - \$ 195,528	30	-		\$ -	30 31	_		\$ -		
32	2 Mill & 3.5 HIVIA OVERlay	\$ 195,526	32		s -	32	erv.	2 Mill & 3.5 OL option#3	\$ 195,526	32	-	-		32	+		\$ -		
33		c ·	33		0	33	+		9 -	33	-	1	9 -	33	-		s -		
34 AA	Crack Treatment	\$ 7,000	34		s -	34 A	А	Crack Treatment	\$ 7.000	34	_	1	s -	34	-		s -		
35	Remaining Service Life Value		35	Remaining Service Life Value**	\$ (95,947,53)	35	-	Remaining Service Life Value**		35		Remaining Service Life Value**	\$ (250,170.68)	35	_	Remaining Service Life Value**	S -		
36		S -	36		\$ -	36			\$ -	36			\$ -	36		.,	\$ -		
37		ş -	37		\$ -	37			\$ -	37			\$ -	37			\$ -		
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40		s -	40		\$ -	40	-		\$ -	40	_	-	\$ -	40	_		\$ -		
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47		S -	47		s -	47	1		S -	47			S -	47	_		S -		
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49		S -	49		S -	49			S -	49			\$ -	49			\$ -		
50		\$	50		\$ -	50			\$ -	50			\$ -	50			\$ -		
	Total Present Wo			Total Present Worth					\$ 415,404			Total Present Worth	\$ 436,347			Total Present Worth	\$ 410,657		
	Eq. Annual Co.			Eq. Annual Cost*	\$18,524			Eq. Annual Cost*	\$17,143			Eq. Annual Cost*	\$18,007			Eq. Annual Cost*	\$16,947		
	% of Low Co			% of Low Cost	109%			% of Low Cost	101%			% of Low Cost	106%			% of Low Cost	100%		
	* Equivalent Annual Cost is in											* Equivalent Annual Cost is include							

^{*} Equivalent Annual Cost is included for information only.

**Remaining Service Life Value is reported as a negative value.

* Equivalent Annual Cost is included for information only.

	YPE onc. Cost/Mile 3 369,776 5 - 5 -	Year			District Performed By Analysis Period Discount Rate	Ky	7 yle Vogt 35
Analysis Period 35	YPE onc. Cost/Mile 3 369,776 5 - 5 -	Voor			Analysis Period	K	35
Discount Rate	YPE onc. Cost/Mile 3 369,776 5 - 5 -	Voor					
OPTION #1	YPE onc. Cost/Mile 3 369,776 5 - 5 -	Voor			Discount Rate		
OPTION #1 OPTION #2 OPTION #3 DESCRIPTION DESCRI	YPE onc. Cost/Mile 3 369,776 5 - 5 -	Voor					2.5
DESCRIPTION Cost Mile DESCRIPTION S.5' BIL Overlay with Aggregate Shoulders DESGRIPTION S RIPTION DESG	YPE onc. Cost/Mile 3 369,776 5 - 5 -	Voor					
DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTIO	YPE onc. Cost/Mile 3 369,776 5 - 5 -	Voor					
3.5° Bit. Overlay with Aggregate Shoulders 5° Unbonded Concrete Overlay (No Down 12° Unit 12° 12° 12° 12° 13° 14° 14° 15° 14° 15° 14° 15° 14° 15° 14° 15°	YPE onc. Cost/Mile 3 369,776 5 - 5 -	Voor			OPTION #4		-
Solution Solution	YPE onc. Cost/Mile 3 369,776 5 - 5 -	Voor			DESCRIPTION		
DESIGN LIFE TYPE Bit. DESIGN LIFE TYPE 20 Bit. 20 C C C C C C C C C	YPE onc. Cost/Mile 3 369,776 5 - 5 -	Voor		6"	Unbonded Concrete Overlay (Dov	wole)	
	Cost/Mile 369,776	Voor	. 1	U		TYPE	
Vear # Life Description Cost/Mile Year # Life Description Cost/Mile Year # Life Description Description S S S S S S S S S	Cost/Mile 369,776	Voor	\vdash		35	Conc	
O	369,776			1			
1	; - ; -					C	ost/Mile
2	-	0	ш	35	6" Unbonded Conc. (w/ Dowels)	\$	519,887
3 AA	-	1	ш			\$	
4		2				\$	-
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AB	-	5				\$	-
\$ - 8 \$ - 9 \$ \$ - 9 \$ - 9 \$ \$ - 9 \$ \$ - 9 \$ \$ - 9 \$ \$ - 9 \$ \$ \$ - 9 \$ \$ \$ - 9 \$ \$ \$ \$ \$ \$ \$ \$ \$	-	6				\$	-
S	-	7				\$	-
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12 AJ 11 2" Mill & 3.5" Overlay \$ 171,147 12		11				\$	-
\$ - 13 \$ \$ \$ \$ \$ \$ \$ \$ \$		12				\$	
13	,	- '-				Ψ	
14 \$ - 14 \$ - 14 \$ - 14 \$ - 14 \$ - 15 \$ - 15 \$ - 15 \$ - 15 \$ - 16 \$ - 16 \$ - 16 \$ - 16 \$ - 16 \$ - 16 \$ - 16 \$ - 16 \$ - 16 \$ - 16 \$ - 16 \$ - 16 \$ - 16 \$ - 17 \$ - 18 - 18 - 18 - 18 - 19 \$	194,289	13				\$	
15 AA						т —	
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18 \$ - 18 \$ - 18 \$ - 18 \$ - 18 \$ - 19 \$ - 19 \$ - 19 \$ - 19 \$ - 19 \$ - \$ - 19 \$ - \$ - 19 \$ -	-	16	ш			\$	-
18 \$ - 18 \$ - 18 \$ - 18 \$ - 18 \$ - 19 \$ - 19 \$ - 19 \$ - 19 \$ - \$ - 19 \$ -			1 1/		35 yr Reseal Jts. & Part. Depth		
19 AB Surface Treatment \$ 20,000 19 \$ - 19 \$ - 19 \$ - 19 \$ - 20 \$ - 20 AJ 13 2" Mill & 3.5" Overlay \$ 171,147 20 \$ - \$ - 21 \$ - 21 \$ - 21 \$ - 21 \$ - 21 \$ - 21 \$ - 21 \$ - 21 \$ - 21 \$ - 21 \$ - 21 \$ - 22 \$ - 24 \$ - 24 \$ - 24 \$			BC		Rpr (Dowels)	\$	71,388
20	-	18				\$	-
20	; -	19				\$	-
21 \$ - 21 \$ - 21 \$ - 21 \$ - 21 \$ - 22 \$ - 22 \$ - 22 \$ - \$ - 22 \$ - \$ - 22 \$ - \$ - 22 \$ - \$ - 22 \$ - \$ - \$ - 22 \$ - \$ - \$ - 22 \$ -	-	20				\$	-
22 \$ - 22 \$ - 22 \$ - 22 \$ - \$ - 22 \$ - \$ - 22 \$ - \$ - 22 \$ - \$ - 22 \$ -	-	21				\$	_
23 AJ 10 2" Mill & 3.5" Overlay \$ 171,147 23 AA Crack Treatment \$ 3,000 23 \$ \$ 24 \$ 24 <t< td=""><td>-</td><td>22</td><td></td><td></td><td></td><td>\$</td><td>-</td></t<>	-	22				\$	-
24 \$ - 24 \$ - 24 \$ - 24 \$ - \$ - 25 \$ - 25 BE 20 yr Major CPR (No Dowels) \$ - \$ - 26 AA Crack Treatment \$ 3,000 26 \$ - 26 \$ - \$ - \$ - \$ \$ - \$ \$ - \$ \$ - \$ \$ - 27 \$ - 27 AB Surface Treatment \$ 20,000 27 27 \$ \$ - \$ \$ -	-	23				\$	
25 \$ - 25 \$ - 25 BE 20 yr Major CPR (No Dowels) \$ 26 AA 26 AA Crack Treatment \$ 3,000 26 \$ - 26 \$ - 26 \$ \$ - \$ \$ - \$ \$ \$ - \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	-	24				\$	
26 AA Crack Treatment \$ 3,000 26 \$ - 26 \$ 27 \$ - 27 AB Surface Treatment \$ 20,000 27 \$		25				\$	
27 \$ - 27 AB Surface Treatment \$ 20,000 27 \$		26				\$	
	-	20	+		35 yr Minor CPR & Full Depth	Ψ	
		27	DE		Repairs (Dowels)	\$	161 696
					Repairs (Dowels)		161,686
		28				\$	
29 \$ - 29 \$ - 29 \$ - 20 \$ 5 - 29 \$ 5 - 29 \$ 5 - 20 \$ 5 -		29				\$	-
30 AB Surface Treatment \$ 20,000 30 \$ - 30		30				\$	-
31 \$ - 31 \$ - 31		31				\$	-
32 \$ - 32 \$ - 32 \$		32				\$	-
33 AJ 9 2" Mill & 3.5" Overlay \$ 171,147 33 AJ 12 2" Mill & 3.5" Overlay \$ 171,147 33 \$ \$		33				\$	-
34 \$ - 34 \$ - 34		34				\$	
35 Remaining Service Life (7/9) \$ (133,115) 35 Remaining Service Life (10/12) \$ (142,623) 35 No Remaining Service Life	; -	35	\Box		Remaining Service Life (5/13)	\$ ((62,187.08)
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		╙	\sqcup			<u> </u>	
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Total Present Worth \$ 571,283 Total Present Worth \$ 660,680 Total Present Worth \$			一		Total Present Worth	\$	623,609
Eq. Annual Cost* \$24,683 Eq. Annual Cost* \$28,545 Eq. Annual Cost*	746 089 II		\vdash		Eq. Annual Cost*		\$26,943
% of Low Cost 100% % of Low Cost 116% % of Low Cost 16% % of Low C		1	\vdash		% of Low Cost		109%
	\$32,235	\vdash	\dashv		% OI LOW COST		109%
* Equivalent Annual Cost is included for information only The 5" Unbonded Concrete overlay falls below the							
Included for information only. If the 6 Bituminous Overlay is recommended for a 20 year I payoment thickness and will not be used. The des	\$32,235 131%						
design life cycle cost analysis.	\$32,235 131% ne minimum		\vdash				
is reported as a negative value.	\$32,235 131% ne minimum		+				

District	8
Performed By	AA/TA
Analysis Period	35
Discount Rate	2.2

Project Number	4704-47
Date	3/26/2014
Funding Category	RD
Low Cost Option #	2
Chosen Ontion #	

District	8
Performed By	AA/TA
Analysis Period	35
Discount Rate	2.2

	OPTION #4	OPTION #4 OPTION #2									ODTION #2			OPTION #4				
	OPTION #1 DESCRIPTION		OPTION #2 DESCRIPTION								OPTION #3 DESCRIPTION			OPTION #4 DESCRIPTION				
	5"Mill, 10" FDR, 5" HMA (20 Yr Design)			4 5 0	Bit. Mill, 4.5" PCC (Wide) (ME BCOA 2	0 Vr Doolan)	6" Bit. Mill, 6" PCC (Wide), 4" HMA Shld (ME PCC 35 Yr Design)						6" Bit. Mill, 6" PCC (Wide), 4" PCC Shld (ME PCC 35 Yr Design)					
				4.0				0	DIL. IV	niii, C			0	DIL. IVII				
	DESIGN LIFE	TYPE			DESIGN LIFE	PCC				- 1	DESIGN LIFE	PCC			DESIGN LIFE	PCC		
Year # L	20 Life Description	BIT Cost/Mile	Year	4 1	ife Description	Cost/l	Milo	Voor	#	Life	35 Description	Cost/Mile	Voor	#	35 Life Description	Cost/Mile		
	20 Bit. Mill, FDR, 5" HMA (20 Yr Design)	\$ 542.270			20 Concrete (Wide) (20 Yr Design)		2,090				PCC (Wide Design) HMA Shid	\$ 572		BP	PCC (Wide Design) PCC Shld	\$ 576.396		
1	20 Bit. Mill, FDR, 5 HMA (20 Yr Design)	\$ 542,270	1	, DC	20 Concrete (Wide) (20 Yr Design)	\$ 41	2,090	1		30	PCC (Wide Design) HIMA Shid	\$ 5/2	- 1		PCC (Wide Design) PCC Snid	\$ 576,396		
2		\$.	2	-		8	-	2				S	- 2			S -		
3		\$ -	3			S	-	3					- 3			S -		
4		\$ -	4			\$	-	4					- 4			\$ -		
5		\$ -	5			\$	-	5					- 5			\$ -		
6		\$ -	6			\$	-	6					- 6			\$ -		
7		\$ -	7	_		\$	-	7					- 7			\$ -		
8 BX	Light Crack Treatment	\$ 3,500	8	-		\$	-	9					- 8			\$ - \$ -		
10		\$ -	10	-+		3	-	10				\$	- 10			\$.		
11		\$ -	11			\$	-	11				Ÿ	- 10			s -		
12 BE	Chipseal	\$ 19,000	12			\$	-	12					- 12			\$ -		
13		\$ -	13			\$		13				\$	- 13			\$ -		
14		\$ -	14			\$	-	14					- 14			\$ -		
15		\$ -	15			\$	-	15					- 15			\$ -		
16	_	\$ -	16			\$		16					- 16			\$ -		
17 18		\$ - \$ -	17 18	4		\$	-	17 18			1st CPR Concrete (35 Yr Design)	\$ 39. \$	769 17 - 18	BQ	1st CPR Concrete (35 Yr Design)	\$ 39,769 \$ -		
19		\$ -	19	-		\$	-	19				*	- 18			S -		
	Bit. 2" Mill & 3.5" Overlay plus 1.5"	3 -		-		2				_								
20 BC	overlay on Shoulders	\$ 240,098		BY :	5.5" Reconstruction	\$ 52	0,094	20				\$	- 20			\$ -		
21 22		\$ - \$ -	21	-		\$		21				\$	- 21 - 22		_	\$ - \$ -		
23 BD	Crack Treatment	\$ 7,000	23	-+		\$	-	23					- 22			S -		
24	Clack Heatment	\$ 7,000	24	-		S		24					- 24			s -		
25		\$ -	25			\$	-	25				\$	- 25			\$ -		
26		\$ -	26			\$	-	26				\$	- 26			\$ -		
27 BE	Chipseal	\$ 19,000	27			\$	-	27	BM		2nd CPR Concrete (35 Yr Design)	\$ 273.	231 27	BR	2nd CPR Concrete (35 Yr Design)	\$ 172,892		
												_						
28		\$ - \$ -	28 29	-		\$	-	28 29				\$	- 28 - 29		_	\$ - \$ -		
30		\$ -	30	-		S	-	30		_			- 30			S -		
31		\$ -	31			S	-	31					- 31			š -		
32		\$ -	32			\$	-	32				\$	- 32			\$ -		
33		\$ -	33			\$		33				\$	- 33			\$ -		
34		\$ -	34			\$.]	34				\$	- 34			\$ -		
35	Remaining Service Life Value**	\$ -	35		Remaining Service Life Value**	\$ (29	7,197)	35			Remaining Service Life Value**	\$ (105,08	.77) 35		Remaining Service Life Value**	\$ (66,497		
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			\vdash	-	+					\dashv			-1-			1		
	Total Present Worth	\$ 730.017			Total Present Wor	th \$ 60	9.892			一	Total Present Worth	\$ 702	902		Total Present Worth	\$ 668,893		
	Eq. Annual Cost	\$30,126	1		Eq. Annual Co		25,169			ı	Eq. Annual Cost*	\$29			Eq. Annual Cost			
	% of Low Cost				% of Low C		100%			f	% of Low Cost		15%		% of Low Cos			
	* Equivalent Annual Cost is included for in									_					* Equivalent Annual Cost is included for			
	**Remaining Service Life Value is reporte		duo		Due to severe transverse reflective													

^{*} Equivalent Annual Cost is included for information only.

**Remaining Service Life Value is reported as a negative value.

Due to severe transverse reflective cracks, this option will not be considered.

District	8
Performed By	A. A.
Analysis Period	35
Discount Rate	2.2
·	

Project Number	4711-19
Date	9/4/2013
Funding Category	4
Low Cost Option #	1
Chosen Option #	

			OPTION #1		OPTION #2								
			DESCRIPTION		DESCRIPTION								
			2" Mill, 5" CIR,4" HMA						2" Mill, 4" Whitetop				
			DESIGN LIFE		TYPE				DESIGN LIFE	TYP	E		
			20	BIT					20	PCC			
Year	#	Life			Cost/Mile	Year	#	Life			ost/Mile		
	BF		2" Bit. Mill, 5" CIR, 4" HMA	\$	262,181		BB	Liic	2" mill, 4" Whitetop	\$	256,819		
1	<u> </u>		Z Bit. Will, O GITC, 4 THVIX	\$	-	1			2 min, 4 vvinceop	\$	-		
2				\$	-	2				\$	-		
3				\$	-	3				\$	-		
4				\$	-	4				\$	-		
5				\$	-	5				\$	-		
6				\$	-	6				\$	-		
7	BA		Crack Tractment	\$	2 500	7 8				\$	-		
9	ВА		Crack Treatment	\$	3,500	9				\$	-		
10				\$		10				\$			
11				\$	-	11				\$	-		
12				\$	-	12				\$	-		
13				\$	-		ВС		1st CPR, 20 yr Design	\$	123,331		
14				\$	-	14				\$	-		
15				\$	-	15				\$	-		
16				\$	-	16				\$	-		
17 18	_			\$	-	17 18				\$	-		
19				\$	-	19				\$	-		
20	BG		2" Bit. Mill, 3.5" Overlay	\$	194,803	20				\$			
21			2 Bit Will, 6.6 CVollay	\$	-	21				\$	-		
22				\$	-	22				\$	-		
	AA		Crack Treatment	\$	7,000	23				\$	-		
24				\$	-	24				\$	-		
25				\$	-		BD		2nd CPR, 20 yr Design	\$	327,531		
26	A D		Ohio Ohio	\$	-	26				\$	-		
27 28	AB		Chip Seal	\$	19,000	27 28				\$	-		
29				\$		29				\$			
30				\$	-	30				\$	_		
31				\$	-	31				\$	-		
32				\$	-	32				\$	-		
33				\$	-	33				\$	-		
34				\$	-	34				\$	-		
35			Remaining Service Life Value**	\$	-	35			Remaining Service Life Value**	\$	-		
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										1			
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	-	_		-		-		-	 	1			
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\vdash								 		1			
			Total Present Worth	\$	405,983				Total Present Worth	\$	539,860		
		ŀ	Eq. Annual Cost*		\$16,754				Eq. Annual Cost*		\$22,279		
l		ŀ	% of Low Cost		100%				% of Low Cost		133%		

^{*} Equivalent Annual Cost is included for information only.
**Remaining Service Life Value is reported as a negative value.

District	8
Performed By	AAA
Analysis Period	35
Discount Rate	2.5

Project Number	
Date	9/9/2013
Funding Category	RD
Low Cost Option #	1
Chosen Option #	

OPTION #1 OPTION #2					OPTION #3					OPTION #4							
DESCRIPTION DESCRIPTION							DESCRIPTION					DESCRIPTION					
3.	0" Bituminous Overlay + 5/8" UTE	BWC			7.0" Bituminous Overlay	ous Overlay			5" Unbonded Concrete Overlay					6" Unbonded Concrete Overlay			
	DESIGN LIFE	TYPE			DESIGN LIFE	TYPE				DESIGN LIFE	TYPE				DESIGN LIFE	TYF	PE
	15	BIT			20	BIT				20	PCC				35	PC	O
Year # Life	Description	Cost/Mile	Year	# Life	Description	Cost	t/Mile	Year #	Life	Description	Cost/l	Mile	Year	# Life	Description	(Cost/Mile
0 AG 15	3.0" Overlay + 5/8" UTBWC	\$ 293,348	0	BA 20	7.0" Overlay	\$ 3	374,587	0 BC	20 5	5" Unbonded Overlay	\$ 38	0,922	0	BD 35	6" Unbonded Overlay	\$	456,723
1 14		\$ -	1	19		\$	-	1			\$	-	1			\$	-
2 13		\$ -	2	18		\$	-	2			\$	-	2			\$	-
3 12		\$ -	3	17		\$	-	3			\$	-	3			\$	-
4 11		\$ -	4	16		\$	-	4			\$	-	4			\$	-
5 10		\$ -	5	15		\$	-	5			\$	-	5			\$	-
6 9		\$ -	6	14		\$	-	6			\$	-	6			\$	-
	Chip Seal	\$ 20,000	7	13		\$	-	7			\$	-	7			\$	-
8 7		\$ -			Crack Treatment	\$	3,000	8			\$	-	8			\$	-
9 6		\$ -	9	11		\$	-	9			\$	-	9			\$	-
10 5		\$ -	10	10		\$	-	10			\$	-	10			\$	-
11 4		\$ -	11	9		\$	-	11			\$	-	11			\$	-
12 3		\$ -		AB 8	Chip Seal	5	20,000	12 BE		at CDD	Φ 0	-	12			\$	-
13 <u>2</u>		\$ -	13 14	7		Φ	-			st CPR	φ 8	2,053	13 14			Φ	-
	2" Mill & 3.5" Overlay	\$ - \$ 173,506	15	6		Φ	-	14 15			Φ	-				Φ	-
		\$ 173,506 ©	16	5		\$	-	16			Φ	-	15 16			Φ	-
16 13 17 12		\$ -	17	3		\$	-	17			Φ	-	17	DC DC	1st CPR	Φ	18,950
	Crack Treatment	\$ 3,000	18	2		\$	-	18			Φ	-	18	В	ISLOPK	\$	16,950
19 10		\$ 3,000	19	1		\$		19			Φ Φ	-	19			Φ	
20 9		\$ -		BB 15	2" Mill & 3.5" Overlay	т	173,506	20			Φ	_	20			¢	
21 8		\$ -	21	14	2 Willi & 3.3 Overlay	\$	-	21			\$	_	21			\$	
22 AB 7	Chin Seal	\$ 20,000	22	13		\$		22			\$	_	22			\$	_
23 6	Criip Cour	\$ -	23		Crack Treatment	\$	3,000	23			\$	_	23			\$	_
24 5		\$ -	24	11	Order Fredment	\$	-	24			\$	_	24			\$	_
25 4		\$ -	25	10		\$	-	25 BF	2	2nd CPR	\$ 36	4,083	25			\$	_
26 3		\$ -	26	9		\$	-	26			\$	-	26			\$	-
27 2		\$ -	27	AB 8	Chip Seal	\$	20,000	27			\$	-	27	ВН	2nd CPR	\$	170,882
28 1		\$ -	28	7	•	\$	-	28			\$	-	28			\$	-
	2" Mill & 3.5" Overlay	\$ 173,506	29	6		\$	-	29			\$	-	29			\$	-
30 12		\$ -	30	5		\$	-	30			\$	-	30			\$	-
31 11		\$ -	31	4		\$	-	31			\$	-	31			\$	-
32 AA 10	Crack Treatment	\$ 3,000	32	3		\$	-	32			\$	-	32			\$	-
33 9		\$ -	33	2		\$	-	33			\$	-	33			\$	-
34 8		\$ -	34	1		\$	-	34			\$	-	34			\$	-
35 7	Remaining Service Life Value**	\$ (93,426.30)	35	0	Remaining Service Life Value**	\$	-	35	F	Remaining Service Life Value**	\$	-	35		Remaining Service Life Value**	\$	(65,723.94)
	Total Present Worth				Total Present Worth		509,774			Total Present Worth		6,828			Total Present Worth		529,213
	Eq. Annual Cost*	\$21,183			Eq. Annual Cost*		\$22,025			Eq. Annual Cost*		27,515			Eq. Annual Cost*		\$22,865
	% of Low Cost	100%			% of Low Cost	t	104%			% of Low Cost		130%			% of Low Cos	t	108%

^{*} Equivalent Annual Cost is included for information only.

**Remaining Service Life Value is reported as a negative value.

Cost Analysis/ TH 63 From Stewartville to T.H. 16

Givens: Length =

9.434 miles

Width of Road = 24 feet(Conc.) 24 feet(Bit.) 6/19/13-TRM

1" Bituminous = 113 lbs/SY 2.5 % Interest Rate = Inflation Rate =

MILL 2" & 3.5" min.	Bitumino	ous Overla	/(15 Year F	ix)						
Item	Course		Price/Unit	Total Cost	Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
2" MILL BITUMINOUS		SY	0.80	\$106,264.58	Initial Cost	0	\$172,218	1.000	\$172,218	\$7,441
PATCH		Ton	125.00	\$47,170.00	Rout & seal	2	\$5,000	0.952	\$4,759	\$206
TACK COAT		GAL	\$1.00	\$26,566.14	Chipseal	4	\$25,000	0.906	\$22,649	\$979
3.5" SPWEB340B	Wear	TON	55.00	\$1,444,700.12	Mill & 3" Overlay	17	\$146,525	0.657	\$96,296	\$4,161
		Total Cost:		\$1,624,701	Rout & seal	19	\$5,000	0.626	\$3,128	\$135
		Cost/Mile:		\$172,218	Chipseal	21	\$25,000	0.595	\$14,885	\$643
				. ,	Mill & 3" Overlay	33	\$146,525	0.443	\$64,867	\$2,803
					Remaining Life Value	35	(\$126,988)	0.421	-\$53,509	-\$2,312
					Ū	Total P	esent Worth:		\$325,291	\$14,054
						Equivalent	Annual Cost:		\$14,054	\$14,054
7" Whitetopping(20										
Item	Course		Price/Unit	Total Cost	Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
4" MILL BITUMINOUS		SY	1.75	\$232,453.76	Initial Cost	0	\$306,462	1.000	\$306,462	\$13,241
Place Concrete Pave. 7"		SY	4.20	\$557,889.02	Reseal	13	\$55,000	0.725	\$39,898	\$1,724
Structural Concrete		CY	68.34	\$1,512,941.90	Major CPR	25	\$250,000	0.539	\$134,848	\$5,826
Dowel Bars	Epoxy	each	6.64	\$529,197.59	Remaining Life Value	_35	\$0	0.421	\$0	\$0
Reinforcement Bars	Epoxy	lb	1.00	\$58,679.48			esent Worth:		\$481,208	\$20,791
		Total Cost:		\$2,891,162		Equivalent	Annual Cost:		\$20,791	\$20,791
		Cost/Mile:		\$306,462						
MILL 3" & 4.5" min.	Ritumina	nue Overla	//20 Voor F	iv)						
Item	Course		Price/Unit	Total Cost	Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
3" MILL BITUMINOUS		SY	1.25	\$166,038.40	Initial Cost	0	\$223,715	1.000	\$223,715	\$9,666
PATCH		Ton	125.00	\$47,170.00	Rout & seal	2	\$5,000	0.952	\$4,759	\$206
TACK COAT		GAL	\$1.00	\$39,849.22	Chipseal	4	\$25,000	0.906	\$22,649	\$979
4.5" SPWEB340B	Wear	TON	55.00	\$1,857,471.58	Mill & 3" Overlay	22	\$146,525	0.581	\$85,111	\$3,677
		Total Cost:		\$2,110,529	Rout & seal	25	\$5,000	0.539	\$2,697	\$117
		Cost/Mile:		\$223,715	Chipseal	27	\$25,000	0.513	\$12,835	\$555
					Remaining Life Value	35	(\$34,477)	0.421	-\$14,528	-\$628
						Total P	esent Worth:		\$337,238	\$14,571
						Equivalent	Annual Cost:		\$14,571	\$14,571

Preventive Maintenance adds 1 year of life to thin overlays and 2 years to medium and heavy overlays and Reclaimed pavements.
 Each successive overlay has 1 year less life than previous one on a section.
 Medium overlay-15 years, heavy bit. overlay-20 years, reclamation overlay-20 years, CIR-20 years, whitetopping-20 years.
 Aggregate and shoulder quantities were not included in each option.
 Calculations are based on 35 year life cycle.
 Costs are based upon recent district project costs.

District	7
Performed By	
Analysis Period	35
Discount Rate	2.2

Project Number	5209-66
Date	7/23/2013
Funding Category	RD
Low Cost Option #	1
Chosen Option #	

Project Number	5209-66
Date	7/23/2013
Funding Category	RD
Low Cost Option #	1
Chosen Option #	

		OPTION #1		OPTION #2							OPTION #3		OPTION #5							OPTION #6					
		DESCRIPTION				DESCRIPTION					DESCRIPTION					DESCRIPTION					DESCRIPTION				
2	2.5" M	iil & 4.5" HMA OL w/2" HMA OI	_ Shlds			7.0" UBOL w/4" HMA Shlds	1				9" UBOL w/4" HMA Shlds				2.5	5" Mill & 4.5" HMA OL w/2" HMA OL	Shlds				6.5" UBOL w/4"HMA Shids	1			
		DESIGN LIFE	TYPE			DESIGN LIFE	TYPE				DESIGN LIFE	TYPE				DESIGN LIFE	TYPE				DESIGN LIFE	TYPE			
		15 yrs	HMA			20 yrs	PCC				35 yrs	PCC				12 yrs	HMA				15 yrs	PCC			
Year # L	_ife	Description	Cost/Mile	Year	# Life	e Description	Cost/Mile	Year	#	Life	e Description	Cost/Mil	le	Year	# Lif	e Description	Cost/Mile	Υe	ear #	# Lif	e Description	Cost/Mile			
0			\$ 276,478	0			\$ 556,228	0)			\$ 638,	758	0			\$ 276,47	8	0			\$ 509,491			
1			\$ -	1			\$ -	1				Ψ	-	1			\$ -		1	_		\$ -			
2 3 AA	C	rack Treatment	\$ -	3			\$ -	2				<u> </u>	-	2	AA	Crack Treatment	\$ -		2			\$ -			
4	CI	Tack Treatment	\$ 7,000	4			\$ -	4				<u> </u>	_	<u>3</u>		Crack Treatment	\$ 7,00	_	4	+		\$ -			
5			\$ -	5			\$ -	5				\$	-	5			\$ -		5			\$ -			
6			\$ -	6			\$ -	6	6			\$	-	6			\$ -		6			\$ -			
7 AB	Sı	urface Treatment	\$ 19,000	7			\$ -	7	7			\$	-	7			\$ -		7			\$ -			
8			\$ -	8			\$ -	8				Ψ	-	8			\$ -		8	_		\$ -			
10			\$ - \$ -	9 10			\$ - ¢	10				<u> </u>	-	10			\$ - \$ -	_	10	-		\$ -			
11			\$ -	11			\$ -	11	_			<u> </u>	-	11			\$ -	_	11			\$ -			
12			\$ -	12			\$ -	12	_			*	-		BJ	2" Mill & 4" HMA Overlay	\$ 251,51	_	12			\$ -			
13			\$ -	13		Reseal Joints (15') 20 yr DL	\$ 33,274	13	3			\$	-	13			\$ -	_	13 <mark>B</mark>	V	Reseal Joints (12') 15 yr DL	\$ 41,592			
14			\$ -	14			\$ -	14				<u> </u>	-	14			\$ -		14			\$ -			
	14 2"	' Mill & 4" HMA Overlay	\$ 251,512	15 16			\$ -	15 16	_		<u> </u>	<u> </u>	-	15 16	AA	Crack Treatment	\$ 7,00	_	15 16			\$ -			
16			\$ - \$ -	17			\$ -	17			Reseal Joints (15') 35 yr DL	Ψ	637	17			\$ -		17			\$ -			
18 AA	Cı	rack Treatment	\$ 7,000	18			\$ -	18			resear contris (10) 35 yr BE		-	18			\$ -		18	+		\$ -			
19			\$ -	19			\$ -	19	_			\$	-	19			\$ -		19			\$ -			
20			\$ -	20			\$ -	20	_			\$	-	20			\$ -	_	20			\$ -			
21		-	\$ -	21			\$ -	21	_			<u>+</u>	-	21			\$ -		21	_		\$ -			
22 AB	Si	urface Treatment	\$ 19,000 \$ -	22 23			\$ - ¢ -	22 23	_				-	22	BC	2.5" Mill & 3" HMA Overlay	\$ 216,61		22			\$ - \$ -			
24			\$ -	24			\$ -	24	_			Ψ	-	24		2.5 Willi & S TIWA Overlay	\$ 210,01		24	+		\$ -			
25			\$ -	25	BE	Major CPR (15') 20 yr DL	\$ 224,327	25				\$	-	25			\$ -		25 B	W	Major CPR (12') 15 yr DL	\$ 258,196			
26			\$ -	26			\$ -	26	_			т	-	26		Crack Treatment	\$ 7,00		26			\$ -			
27			\$ -	27			\$ -	27			Minor CPR (15') 35 yr DL	\$ 156,		27			\$ -		27			\$ -			
28 BT	15 2	5" Mill & 4.5" HMA Overlay	\$ - \$ 276,478	28 29			\$ -	28 29	_			Ψ	-	28 29			\$ -		28			\$ -			
30	10 2.	3 Will a 4.3 Think overlay	\$ -	30			\$ -	30	_			•	_	30			\$ -	_	30			\$ -			
31			\$ -	31			\$ -	31	_			\$	-	31			\$ -	_	31			\$ -			
32 AA	Cı	rack Treatment	\$ 7,000	32			\$ -	32	_			\$	-	32			\$ -		32			\$ -			
33			\$ -	33			\$ -	33	_			-			BQ	7" Mill & 5" HMA Overlay	\$ 339,09		33	_		\$ -			
34	D,	emaining Service Life Value**	\$ - \$ (165,887)	34 35		Remaining Service Life Value**	\$ - ¢ -	34 35	_		Remaining Service Life Value**	Τ	- 074)	34 35		Remaining Service Life Value**	\$ (293,87		34 35	-	Remaining Service Life Value**	\$ - \$ -			
33	N.	emaining Service Life value	φ (105,667)	33		Remaining Service Life value	Φ -	33			Remaining Service Life value	φ (00,	074)	33		Remaining Service Life value	φ (293,67	0)	33	+	Remaining Service Life value	Φ -			
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		Total Present Worth				Total Present Worth					Total Present Worth					Total Present Worth					Total Present Worth				
	\vdash	Eq. Annual Cost* % of Low Cost				Eq. Annual Cost					Eq. Annual Cost* % of Low Cost	\$29	9,259 24%			Eq. Annual Cost* % of Low Cost	\$26,62 113				Eq. Annual Cost* % of Low Cost				
<u> </u>		% OF LOW COSE	100%	<u> </u>		% OI LOW COS	123%	<u> </u>			% OF LOW COST	I.	∠+ /0			% OF LOW COST	113	/0			% OF LOW COSE	12170			

										1		0		
	District	7		Project Number	5380-121 (EB)					District	7			5380-121 (EB)
	Performed By	Kyle Vogt		Date	2/22/2013					Performed By	Kyle Vogt		Date	2/22/2013
	Analysis Period	35		Funding Category						Analysis Period	35		Funding Category	3
	Discount Rate	2.5		Low Cost Option #						Discount Rate	2.5		Low Cost Option #	
				Chosen Option #									Chosen Option #	
	OPTION #1			OPTION #2			OPTION #3			OPTION #4			OPTION #5	
	DESCRIPTION			DESCRIPTION			DESCRIPTION			DESCRIPTION			DESCRIPTION	
	3.0" Bit. Overlay includes Should	ders		3.5" Bit. Overlay includes Shoulde	ers		4" Bit. Overlay includes Shoulders		6	" Unbonded Concrete Overlay (Dow	wels)		4.5" Bit. over Rubblized Concrete over	CRCP
	DESIGN LIFE	TYPE		DESIGN LIFE	TYPE		DESIGN LIFE	YPE		DESIGN LIFE	TYPE		DESIGN LIFE	TYPE
	12	Bit.		13	Bit.		14	3it.		35	Conc.	Bit.	20	Bit.
Year # Life	e Description	Cost/Mile	Year #	Life Description	Cost/Mile	Year #	Life Description	Cost/Mile	Year # Li	fe Description	Cost/Mile	Year #	Life Description	Cost/Mile
0 12	3" Bit. Overlay	\$ 331,887	0	13 3.5" Bit. Overlay	\$ 386,030	0	14 4" Bit. Overlay	\$ 440,173	0 3	5 6" Unbonded Conc. (Dowels)	\$ 706,387	0	20 4.5" Bit. over Rubblized PCC	\$ 501,650
1	·	\$ -	1		\$ -	1	·	\$ -	1	· · · · · · · · · · · · · · · · · · ·	\$ -	1		\$ -
2		\$ -	2		\$ -	2		\$ -	2		\$ -	2		\$ -
3 AA	Crack Treatment	\$ 3,000	3 AA	Crack Treatment	\$ 3,000	3 AA	Crack Treatment	\$ 3,000	3		\$ -	3		\$ -
4		\$ -	4		\$ -	4		\$ -	4		\$ -	4		\$ -
5		\$ -	5		\$ -	5		\$ -	5		\$ -	5		\$ -
6		\$ -	6		\$ -	6		\$ -	6		\$ -	6		\$ -
7 AB	Surface Treatment	\$ 20,000	7 AB	Surface Treatment	\$ 20,000	7 AB	Surface Treatment	\$ 20,000	7		\$ -	7		\$ -
8		\$ -	8		\$ -	8		\$ -	8		\$ -	8 AA	Crack Treatment	\$ 3,000
9		\$ -	9		\$ -	9		\$ -	9		\$ -	9		\$ -
10		\$ -	10		\$ -	10		\$ -	10		\$ -	10		\$ -
11	Oll Mill of the Consulation of the Cold is	\$ -	11		\$ -	11		\$ -	11		\$ -	11	Confe on Transfer and	\$ -
	2" Mill, 3.5" Overlay & 1.5" Shld		12 DI	42 2" Mill 2 5" Overley 9 4 5" Chil	5 -	12		\$ -	12	_	\$ -	12 AB	Surface Treatment	\$ 20,000
13		\$ - \$ -	13 BI	12 2" Mill, 3.5" Overlay & 1.5" Shld	\$ 193,140	13 PI	13 2" Mill, 3.5" Overlay & 1.5" Shld	\$ - \$ 193,140	13		\$ - \$ -	13 14		\$ - ¢
	Crack Treatment	\$ 3,000	15		\$ -	15	13 2 Mill, 3.5 Overlay & 1.5 Stild	\$ 193,140 \$ -	15		\$ -	15		\$ - \$ -
16	Clack Heatiment	\$ 3,000	16 AA	Crack Treatment	\$ 3,000	16		\$ - \$ -	16		\$ -	16		\$ -
17		\$ -	17	Crack Treatment	\$ 3,000	17 AA	Crack Treatment	\$ 3,000	17 BB	Rseal Jts. & Part. Depth Rpr (Dov	Ψ	17		\$ -
18		\$ -	18		\$ -	18	Crack Treatment	\$ -	18	Racarota. & Fart. Deptil Rep (Dol	\$ -	18		\$ -
	Surface Treatment	\$ 20,000	19		\$ -	19		\$ -	19		\$ -	19		\$ -
20	Curraco rreatment	\$ -	20		\$ -	20		\$ -	20		\$ -		15 2.5" Mill, 4" Overlay & 1.5" Shld	\$ 204,330
21		\$ -	21		\$ -	21 AB	Surface Treatment	\$ 20,000	21		\$ -	21	is and a second of the	\$ -
22		\$ -	22		\$ -	22		\$ -	22		\$ -	22		\$ -
23		\$ -	23		\$ -	23		\$ -	23		\$ -	23 AA	Crack Treatment	\$ 3,000
24 <mark>BI 11</mark>	2" Mill, 3.5" Overlay & 1.5" Shld	1 \$ 193,140	24		\$ -	24		\$ -	24		\$ -	24		\$ -
25		\$ -	25 BI	11 2" Mill, 3.5" Overlay & 1.5" Shld	\$ 193,140	25		\$ -	25		\$ -	25		\$ -
26		\$ -	26		\$ -	26		\$ -	26		\$ -	26		\$ -
	Crack Treatment	\$ 3,000	27		\$ -		12 2" Mill, 3.5" Overlay & 1.5" Shld	\$ 193,140		3 Mnr CPR & Full Depth Rpr (Dowe	\$ 236,826	27 <mark>AB</mark>	Surface Treatment	\$ 20,000
28		\$ -	28 <mark>AA</mark>	Crack Treatment	\$ 3,000	28		\$ -	28		\$ -	28		\$ -
29		\$ -	29		\$ -	29	0.17	\$ -	29		\$ -	29		\$ -
30	Curfo an Transfer and	\$ -	30		\$ -	30 AA	Crack Treatment	\$ 3,000	30		\$ -	30		\$ -
	Surface Treatment	\$ 20,000			\$ -	31		Φ	31	_	\$ -	31		\$ -
32		\$ - \$ -	32 33		\$ -	32	_	\$ - \$ -	32		\$ - \$ -	32		\$ - \$ -
34		\$ -	34		\$ -	34		\$ - \$ -	34	<u> </u>	\$ -	34		\$ -
	No Remaining Service Life	\$ -	35	Remaining Service Life (1/11)	\$ (17,558)	35		\$ (64,380)	35	Remaining Service Life (5/13)	\$ (91,087.00)		No remaining service life	\$ -
00	The Herrian mig Colvide Line	Ψ	00	Tremaining corvide Line (1, 11)	ψ (11,000)	00	rtemaning corvice Life (1/12)	ψ (01,000)		Tremaining Cervice Line (c/ 10)	Ψ (01,001.00)		The remaining certice inc	Ψ
	1										1			
				1					$H \longrightarrow H$	+			+ +	
	 			 	 				$H \rightarrow L$	+	1	 	+ +	
		+			1				$H \rightarrow H$		1	 	+ -	
		+		+ +			+		\mathbb{H}	+		-	+ +	
	+			+ +			+		H 	+	1	 	+ +	
		+		1	+		+		H 		1	 	+ +	
	Total Present Wort	th \$ 627,315		Total Present Worth	\$ 646,051		Total Present Worth	\$ 683,814		Total Present Worth	\$ 834,833		Total Present Worth	\$ 655,648
	Eq. Annual Cos			Eq. Annual Cost*			Eq. Annual Cost*	\$29,545	$H \rightarrow +$	Eq. Annual Cost*	\$36,069		Eq. Annual Cost*	\$28,328
	% of Low Cos			% of Low Cost			% of Low Cost	109%		% of Low Cost			% of Low Cost	
	* Equivalent Annual Cost is incl			75 5. 25 8661			73 57 2577 3001	. 55 76	 	,3 3. 23 3000		<u>n</u>	75 5. 25 5561	
	**Remaining Service Life Value			ue.										
		roportou do dific	ganto van	~~·	1							 		

District	2
Performed By	K.Olson
Analysis Period	35
Discount Rate	2.5

Project Number	5407-31							
Date	5/13/2013							
Funding Category	4							
Low Cost Option #								
Chosen Option #								

District	2
Performed By	K.Olson
Analysis Period	35
Discount Rate	2.5

		OPTION #1						OPTION #2					OPTION #3				OPTION #4		
		DESCRIPTION						DESCRIPTION					DESCRIPTION				DESCRIPTION		
		4.5" bituminous						5" UBOL W/1.5" bond breaker	r				new 7.0" conc				6" UBOL		
		DESIGN LIFE		TYPE				DESIGN LIFE	TYPE				DESIGN LIFE	TYPE			DESIGN LIFE	TYP	_
		20	ВІТ					20	PCC				35	PCC			35	PCC	
Voor	- 4				Voor	. 1 4 1	l ifo			4ilo	Voor 4	4 II ifo			Voorl	μ II :#			
Year 0		Life Description	\$	313,565	rear	#	LIIE	Description	Cost/N \$ 530	0,087	Year #	Lile	Description	Cost/Mile \$ 573,93	Year 3	7 LII	e Description	\$	563,655
1			\$	313,565	1				\$ 530	-	1			\$ 573,93	1			\$	- 203,000
2			\$	_	2				\$	-	2			\$ -	2		 	\$	-
3			\$	-	3				\$	-	3			\$ -	3			\$	-
4			\$	-	4				\$	-	4			\$ -	4			\$	-
5			\$	-	5				\$	-	5			\$ -	5			\$	
6			\$	-	6				\$	-	6			\$ -	6			\$	-
7			\$	-	7				\$	-	7	_		\$ -				\$	-
9	AA	Crack Treatment	\$	3,000	8				\$	-	8	_		\$ -		-		\$	-
10			\$	-	9 10				\$	-	10	_		\$ - \$ -	10	-		\$	-
11			\$	-	11				\$	-	11			\$ -				\$	-
	AB	Surface Treatment	\$	23,000	12				\$	-	12			\$ -	12			\$	-
13			\$			AN		Reseal Joints (6'X7')		3,167	13			\$ -	13			\$	-
14			\$	-	14			` '	\$	-	14			\$ -				\$	-
15			\$	-	15				\$	-	15			\$ -	15			\$	-
16			\$	-	16				\$	-	16			\$ -	16			\$	-
17			\$	-	17				\$	-	17 Al	М	Reseal Joints (15')	\$ 61,19		0	Reseal Joints (12')	\$	76,487
18			\$	-	18				\$	-	18			\$ -	18	_		\$	-
19 20	ΛIZ	3" Mill & 3" Overlay	\$	- 161,467	19 20				\$	-	19 20			\$ - \$ -				\$	-
21	AK	3 Willi & 3 Overlay	\$	-	21				\$	-	21	+		\$ -		+		\$	-
22			\$	-	22				\$	-	22			\$ -			 	\$	-
23	AA	Crack Treatment	\$	3,000	23				\$	-	23			\$ -	23			\$	-
24			\$	-	24				\$	-	24			\$ -	24			\$	-
25			\$	-	25	AT		Major CPR(6x7)		2,625	25			\$ -				\$	-
26			\$	-	26				\$	-	26			\$ -				\$	-
27	AB	Surface Treatment	\$	23,000	27				\$	-	27 BI	В	Minor CPR & full depth (15')	\$ 140,13		Р	Minor CPR (12')	\$	168,324
28			\$	-	28				\$	-	28	_		\$ -	28			\$	-
29			\$	-	29 30				\$	-	29	_		\$ -	29	-		\$	-
30 31			\$	-	31				\$	-	30 31	_		\$ - \$ -	30	-		\$	-
32			\$	-	32				\$	-	32	+		\$ -	_	+		\$	-
33			\$	-	33				\$	-	33			\$ -	33			\$	-
34			\$	-	34				\$	-	34			\$ -	34			\$	-
35		Remaining Service Life Value*	*		35			Remaining Service Life Value**	\$	-	35 #	#	Remaining Service Life Value**	\$ (53,25		#	Remaining Service Life Value**	\$	(63,963)
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		Total Danage ()A/-	h fr	115 170				Total Dranger M/	¢ 000	0.604			Total Present M/	e	┪╟┷┷		Total Decembration	6	672 207
		Total Present Wor Eq. Annual Cos		445,176 \$19.234				Total Present Worth Eq. Annual Cost*		0,631 0,208			Total Present Worth Eq. Annual Cost*	\$ 663,65 \$28.6			Total Present Worth Eq. Annual Cost	, D	673,387 \$29.094
		% of Low Co		100%				% of Low Cost		0,208 209%			% of Low Cost				% of Low Cost		\$29,094 151%
1		70 UI LUW CO	ા	100%	ı			76 UI LOW COST	· [∠U370			76 UI LUW COST	. 148	70		% OI LOW COS	L J	101%

^{*} Equivalent Annual Cost is included for information only.
**Remaining Service Life Value is reported as a negative value.

Life Cycle Cost Analysis

District	2
Performed By	ko
Analysis Period	35

Project Number	5409-30
Date	5/15/2014
Discount Rate	2.2

Funding Category	RS
Low Cost Option	1
Chosen Option	1

	Option 1			Option 2		Option 3						
Description	3" mill and OL		Description	5" UBOL		Description	6" UBOL					
Design Life	20		Design Life	20			Design Life	35				
Year	Description	Cost/Mile	Year	Description	C	Cost/Mile	Year	Description		Cost/Mile		
0	Initial Cost	\$ 215,615.37	0	Initial Cost	\$	429,586.78	0	Initial Cost	\$	457,678.79		
1		\$ -	1		\$	-	1		\$	-		
2		\$ -	2		\$	-	2		\$	-		
3		\$ -	3		\$	-	3		\$	-		
4		\$ -	4		\$	-	4		\$	-		
5		\$ -	5		\$	-	5		\$	-		
6		\$ -	6		\$	-	6		\$	-		
7		\$ -	7		\$	-	7		\$	-		
8	Light Crack Treatment	\$ 3,500.00	-	Light Crack Treatment	\$	159.35	8		\$	-		
9		\$ -	9		\$	-	9		\$	-		
10		\$ -	10		\$	-	10		\$	-		
11		\$ -	11		\$	-	11		\$	-		
12	Chip Seal	\$ 19,000.00	-	Chip Seal	\$	865.02	12		\$	-		
13		\$ -	13	Reseal Joints & Partial Depth Repair	\$	104,968.30	13		\$	-		
14		\$ -	14		\$	-	14		\$	-		
15		\$ -	15		\$ \$	-	15		\$			
16		\$ - \$ -	16	December 1 Value of December 1 December 1 December 1	-	1,291.75	16	December 1 Indicate 0 December 1 December 1 December 1	\$	36,691.35		
17 18			17 18	Reseal Joints & Partial Depth Repair	\$	1,291.75	17 18	Reseal Joints & Partial Depth Repair	\$	30,091.33		
19		\$ - \$ -	19		\$		19		\$			
20	Mill & Overlay (1st Overlay)	\$ 209,652.38		Mill & Overlay (1st Overlay)	\$	6,073.74	20		\$			
21	Willia & Overlay (1st Overlay)	\$ 209,032.36	21	Willia & Overlay (1st Overlay)	\$		21		\$			
22		\$ -	22		\$	_	22		\$			
23	Crack Treatment	\$ 7,000.00		Crack Treatment	\$	318.69	23		\$	_		
24	Chick Troumon	\$ -	24	Citati Treatment	\$	-	24		\$	_		
25		\$ -	25	Major CPR	\$	278,764.38	25		\$	_		
26		\$ -	26		\$	-	26		\$	-		
27	Chip Seal	\$ 19,000.00	27	Minor CPR & Some Full Depth Repairs, Chip Seal	\$	5,031.81	27	Minor CPR & Some Full Depth Repairs	\$	118,354.60		
28	•	\$ -	28		\$	-	28	•	\$	-		
29		\$ -	29		\$	-	29		\$	-		
30		\$ -	30		\$	-	30		\$	-		
31		\$ -	31		\$	-	31		\$	-		
32		\$ -	32		\$	-	32		\$	-		
33		\$ -	33		\$	-	33		\$			
34		\$ -	34		\$	-	34		\$	-		
35	Remaining Service Life	\$ -	35	Remaining Service Life	\$	(1,583.38)	35	Remaining Service Life	\$	(44,974.75)		
	Total Present Worth	\$ 383,660.32		Total Present Worth	\$	678,358.19		Total Present Worth	\$	527,793.13		
	Eq. Annual Cost	\$ 15,832.75		Eq. Annual Cost	\$	27,994.23		Eq. Annual Cost	\$	21,780.77		
	% of Low Cost	100%	ó	% of Low Cost		177%		% of Low Cost		138%		
	Total Project Cost	\$ 2,865,175.28	7	Total Project Cost	\$ 5	5,065,978.96		Total Project Cost	S	3,941,559.08		

This spreadsheet does a weighted cost/mile of all segments within each option.

Cost Analysis/ TH 63 NB & SB From 0.1 Mi. N. T.H. 30 to 28th St. SE(Rochester)

Givens: Length = 12.68 miles

24 feet(Conc.) Width of Road = 24 feet(Bit.) 4/22/14-TRM

1" Bituminous = 115 lbs/SY 2.2 % Interest Rate = Inflation Rate =

MILL & 3" min. Bitur	Course			Total Cont	Strata mi	Year	Cost/Mile	P/F	Dragant Warth	Annual Cost
	Course		Price/Unit	Total Cost	Strategy				Present Worth	
1.5" MILL BITUMINOUS		SY	0.80	\$142,827.52	Initial Cost	0	\$168,666	1.000	\$168,666	\$6,960
PATCH		Ton	100.00	\$50,720.00	Rout & seal	2	\$5,000	0.957	\$4,787	\$198
TACK COAT		GAL	\$1.00	\$35,706.88	Chipseal	4	\$25,000	0.917	\$22,916	\$946
3" SPWEB440E	Wear	TON	62.00	\$1,909,425.41	Mill & 3" Overlay	15	\$168,666	0.722	\$121,693	\$5,022
		Total Cost:		\$2,138,680	Rout & seal	17	\$5,000	0.691	\$3,454	\$143
		Cost/Mile:		\$168,666	Chipseal	19	\$25,000	0.661	\$16,534	\$682
					Mill & 3" Overlay	30	\$168,666	0.521	\$87,801	\$3,623
					Rout & seal	32	\$5,000	0.498	\$2,492	\$103
					Chipseal	34	\$25,000	0.477	\$11,929	\$492
					Remaining Life Value	35	(\$112,444)	0.467	-\$52,499	-\$2,167
					· ·	Total Pr	esent Worth:		\$387,772	\$16,002
						Equivalent	Annual Cost:		\$16,002	\$16,002
7" Unbonded Overla	y(20 Yea	ars)								
Item	Course	Unit	Price/Unit	Total Cost	Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
3.5" MILL BITUMINOUS		SY	1.50	\$267,801.60	Initial Cost	0	\$385,780	1.000	\$385,780	\$15,920
PASSRC		Ton	58.54	\$740,802.63	Reseal	13	\$55,000	0.754	\$41,448	\$1,710
Place Conc. Pave. 7		SY	4.20	\$749,844.48	Major CPR	25	\$250,000	0.580	\$145,100	\$5,988
Structural Concrete		CY	68.34	\$2,358,867.91	Remaining Life Value	35	\$0	0.467	\$0	\$0
Reinforcement Bars	Epoxy	lb	0.80	\$63,095.68		Total Pr	esent Worth:		\$572,328	\$23,619
Dowel Bars	Ероху	each	6.64	\$711,281.05		Equivalent	Annual Cost:		\$23,619	\$23,619
	. ,	Total Cost:		\$4,891,693		•				
		Cost/Mile:		\$385,780						
				, , , , , ,						
MILL & 5" min. Bitur										
Item	Course		Price/Unit	Total Cost	Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
1.5" MILL BITUMINOUS		SY	0.80	\$142,827.52	Initial Cost	0	\$270,464	1.000	\$270,464	\$11,161
PATCH		Ton	100.00	\$50,720.00	Rout & seal	2	\$5,000	0.957	\$4,787	\$198
TACK COAT		GAL	\$1.00	\$53,560.32	Chipseal	4	\$25,000	0.917	\$22,916	\$946
5" SPWEB440E	Wear	TON	62.00	\$3,182,375.68	Mill & 3" Overlay	20	\$168,666	0.647	\$109,146	\$4,504
		Total Cost:		\$3,429,484	Rout & seal	22	\$5,000	0.620	\$3,098	\$128
		Cost/Mile:		\$270,464	Chipseal	24	\$25,000	0.593	\$14,829	\$612
					Remaining Life Value	35	\$0	0.467	\$0	\$0
						Total Pr	esent Worth:		\$425,240	\$17,549
							Annual Cost:		\$17,549	\$17,549

Thin overlay -10 years life, medium overlay-15 years, heavy bit. overlay-20 years, reclamation overlay-20 years, whitetopping-20 years, unbonded-20 years.
 Aggregate and shoulder quantities were not included in each option.
 Calculations are based on 35 year life cycle.
 Costs are based upon recent district project costs.

(General Pre-Scoping / Planning Estimate) **SP.** 6304-12 **TH** 92 RS **Funding category** Alternate #1 Alternate #2 Alternate #3 Alternate #4 2.5" MILL Description ----> 2.5" MILL 2.5" MILL & 3"OVERLAY 5" whitetopping & 5"OVERLAY YR First Cost \$ / Mile \$153,873 \$418,704 \$247,251 \$1,000,000 Rehab Life in Yrs 35 Interest % 2.50% 2.50% 2.50% 2.70% 20 years 20 years 20 years 1 \$0 \$0 \$0 \$0 2 \$0 Notes: \$0 \$0 \$0 3 \$5.000 \$0 \$0 4 \$0 \$0 \$0 2-Lane Highway 5 \$0 \$0 \$5,000 \$0 Improvements Cost / mile 6 \$0 \$0 \$0 \$0 \$287,589 7 \$23,000 \$0 \$0 \$0 Reclaim 1 1/2" Overlay \$60,000 8 \$0 \$0 \$0 \$0 \$0 1 1/2" Mill & 1 1/2" Overlay \$80,000 9 \$0 \$0 \$23,000 D 2" Mill & Overlay \$105,214 10 \$0 \$0 \$0 \$0 Е 3" Mill & 3" Overlay \$137,060 11 \$0 \$0 \$0 \$0 \$0 Route and Seal \$5,000 12 \$0 \$0 \$0 G \$0 \$97,945 Chip seal \$23,000 13 \$0 \$0 \$97,945 14 \$0 \$0 \$0 \$0 Joint seal & minor CPR Н Major CPR & w/full depth repair \$271,098 15 \$0 \$0 \$0 \$0 \$0 \$0 \$0 Major CPR & griding 16 \$105,214 Microsurface \$45,500 17 \$0 \$0 \$0 \$0 **New Concrete** \$300,553 \$0 \$0 \$0 \$0 18 М 5.5" mill, conc rehab, 5" new \$425,510 19 \$0 \$0 \$0 \$0 2" overlay \$83,160 20 \$5,000 \$0 \$80,000 \$0 21 \$0 \$0 \$0 \$0 \$0 22 \$0 \$0 \$0 \$0 23 \$0 \$0 \$0 24 \$23,000 \$0 \$5,000 \$0 \$271,098 \$0 25 \$0 \$0 \$0 \$0 \$0 This roadways has a history of 26 \$0 17-20 years between fixes. 27 \$0 \$0 \$0 \$0 28 \$0 \$0 \$23,000 \$0 29 \$0 \$0 \$0 \$0 30 \$0 \$0 \$0 \$0 31 \$137,060 \$0 \$0 \$0 32 \$0 \$0 \$0 \$0 Alt #1 - 10yrs left of 14 yr fix \$0 33 \$0 \$0 \$0 \$0 Alt #2 - no life left 34 \$5,000 \$0 \$0 Alt #3 - no life left 35 (\$97,270)\$0 \$0 \$0 36 \$0 \$0 37 \$0 \$0 \$0 \$0 \$0 38 \$0 \$0 \$0 39 \$0 \$0 \$0 \$0 40 \$0 \$0 \$0 \$0 41 \$0 \$0 \$0 \$0 42 \$0 \$0 \$0 \$0 43 \$0 \$0 \$0 \$0 \$0 44 \$0 \$0 \$0 \$0 45 \$0 \$0 \$0 46 \$0 \$0 \$0 \$0 47 \$0 \$0 \$0 \$0 48 \$0 \$0 \$0 \$0 49 \$0 \$0 \$0 Total Cost (Present Worth) \$1,000,000 \$333,193 \$289,429 \$635,983 **Annual Cost (Present Worth)** \$12,505 \$27,478 \$14,396 \$44,524 % Above Low Option 100% 220% 115% 356% Data Furnished By: TA for conc. Rehab costs

REHABILITATION WORKSHEET

Mn/DOT DISTRICT 2

Completed By:

Date:

KO

7/2/2012

Ī		1	District		- I		_		Desirat Namehan		0.110.00	1		ı			
			District	اء ما ۸	7				Project Number		6410-06						
			Performed By Analysis Period	And	lrew Lawver 35				Date Funding Category		2/10/2014					 	
			Discount Rate		2.2				Low Cost Option #		1					\vdash	
			Discount Rate		2.2				Chosen Option #		1					\vdash	
									Chosen Option #		<u> </u>					<u> </u>	
			OPTION #1						OPTION #2						OPTION #3	<u> </u>	
									I .							<u> </u>	
		011	DESCRIPTION 45				0"	N #:11	DESCRIPTION	- 0	20		011	N 4:11	DESCRIPTION	20	
			Mill & 3" Bituminous Overlay - 15 DESIGN LIFE		TYPE		3	WIIII,	8" Reclaim, 4" Bituminous Course DESIGN LIFE	TY			2	IVIIII	and 4" Whitetopping (No Dowels) DESIGN LIFE	TYPE	ear
				Bit	IIFE				20	Bit						PCC	
Year	#	Ιifρ	-		Cost/Mile	Year	#	l ifo			Cost/Mile	Year	#	Ιifρ			ost/Mile
			2" Mill & 3" Bituminous Overlay -		241,356				3" Mill, 8" Reclaim, 4" Bituminous		356,951				2" Mill and 4" Whitetopping (No D		285,413
1	DD	13	2 Ivilli & 3 Biturninous Overlay -	\$	241,330	1	De	20	5 Willi, 8 Reclaim, 4 Bituminous	\$	330,931	1	ווט	20	2 Willi and 4 Writtetopping (No b	\$	200,413
2				\$	_	2				\$	-	2				\$	_
	aa		Crack Treatment	\$	7,000	3				\$	-	3				\$	-
4			Ordon Froduitoria	\$	-	4				\$	-	4				\$	-
5				\$	-	5				\$	-	5				\$	_
6				\$	-	6				\$	-	6				\$	-
	ab		Surface Treatment - Chip Seal	\$	19,000	7				\$	-	7				\$	-
8				\$	-	8	aa		Crack Treatment	\$	7,000	8				\$	-
9				\$	-	9				\$	-	9				\$	-
10				\$	-	10				\$	-	10				\$	-
11				\$	-	11				\$	-	11				\$	-
12				\$	-	12			Surface Treatment - Chip Seal	\$	19,000	12				\$	-
13				\$	-	13				\$	-	13			Year 13 - Reseal Joints & Partial	\$	105,713
14			0 14: 0 0 5 0:	\$	-	14				\$	-	14				\$	-
		14	2" Mill & 3.5" Bituminous Overlay		172,774	15				\$	-	15				\$	-
16				\$	-	16				\$	-	16				\$	-
17			Crook Trootmont	\$	7 000	17				\$	-	17				\$	-
19	aa		Crack Treatment	\$	7,000	18 19				\$	-	18 19				\$	-
20				\$	-	20		15	2.5" Mill, 4" Overlay	\$	194,174	20				\$	
21				\$	-	21	DI	13	2.5 Willi, 4 Overlay	\$	194,174	21				\$	
	ab		Surface Treatment - Chip Seal	\$	19,000	22				\$		22				\$	-
23			Canade Fredericht Chip Cedi	\$	-		aa		Crack Treatment	\$	7,000	23				\$	_
24				\$	_	24			Orden Fredminent	\$	-	24				\$	-
25				\$	-	25				\$	-	25	bi		Year 25 - Major CPR - Mainline	\$	288,475
26				\$	-	26				\$	-	26			,	\$	-
27				\$	-	27	ab		Surface Treatment - Chip Seal	\$	19,000	27				\$	-
28				\$	-	28				\$	-	28				\$	-
	bc	13	2" Mill & 3.5" Bituminous Overlay	\$	172,774	29				\$	-	29				\$	-
30				\$	-	30				\$	-	30				\$	-
31				\$	-	31				\$	-	31				\$	-
32	aa		Crack Treatment	\$	7,000	32				\$	-	32				\$	-
33				\$	-	33				\$	-	33				\$	-
34			Pomoining Comica Life (C/40)	\$	(79,742)	34			No Romaining Comice Life	\$	-	34 35			No Remaining Constant life	\$	-
35			Remaining Service Life (6/13)	\$	(19,142)	35			No Remaining Service Life	\$	-	35			No Remaining Service Life	\$	-
																 	
																	
				-						\vdash							
				1													
			Total Present Worth		463,565				Total Present Worth		517,920				Total Present Worth	\$	532,509
			Eq. Annual Cost*		\$19,130				Eq. Annual Cost*		\$21,373				Eq. Annual Cost*	<u> </u>	\$21,975
	<u>_</u>		% of Low Cost		100%		<u> </u>		% of Low Cost		112%	<u></u>			% of Low Cost		115%
			* Equivalent Annual Cost is include														
			**Remaining Service Life Value is	repo	orted as a ne	gative	e val	ue.								L	

	District	7	1		Project Number									District	7	7
	Performed By	John Hager	1		Date									Performed By	John F	Hager
	Analysis Period		1		Funding Category		RD							Analysis Period		
	Discount Rate	35 2.5	-		Low Cost Option #		2							Discount Rate	35 2.5	
	Discount Rate	2.5	 		Chosen Option #									Discourit Rate	Z.:	3
			<u> </u>		Chosen Option #									<u> </u>		
			1													
	OPTION #1				OPTION #2					OPTION #3				OPTION #4		
	DESCRIPTION				DESCRIPTION					DESCRIPTION				DESCRIPTION		
	5" Concrete Whitetopping (20 yea	rs)			5.5" Reclaim and Pave 4.5"					2.5" Mill and 4.5" overlay				2" Mill and 4" overlay		
	DESIGN LIFE	TYPE			DESIGN LIFE	TY	PE			DESIGN LIFE	TYPE			DESIGN LIFE	TYPE	
	20 years	PCC			20 years	BIT				16 years	BIT				BIT	
Year # L		Cost/Mile	Year	# Lif	·	İ	Cost/Mile	Year #	Life		Cost/Mile	Year #	Life	Description	Cost/	/Mile
0 AX	Concrete Whitetopping	\$ 331,147			Reclaim and Pave 4.5"	\$	363,040			2.5" Mill & 4.5" Overlay	\$ 352,891		_	2" Mill & 4" Overlay		16,213
1	- Commercial Printing	\$ -	1			\$	-	1			\$ -	1			\$	-
2		\$ -	2			\$	-	2			\$ -	2			\$	-
3		\$ -	3			\$	-	3 AA		Crack Treatment	\$ 3,000	3 AA		Crack Treatment	\$	3,000
4		\$ -	4			\$	-	4			\$ -	4			\$	
5		\$ -	5			\$	-	5			\$ -	5			\$	-
6		\$ -	6			\$	-	6			\$ -	6			\$	-
7		\$ -	7			\$	-	7 AB	3	Surface Treatment	\$ 20,000	7 AB	3	Surface Treatment		20,000
8		\$ -		BD	Light Crack Treatment	\$	1,500	8			\$ -	8			\$	-
9		\$ -	9			\$	-	9			\$ -	9			\$	-
10		\$ -	10			\$	-	10			\$ -	10			\$	-
11		\$ - \$ -	11	AB	Surface Treatment	\$	20,000	11 12			\$ -	11 12			\$	-
13 BA	Reseal Joints and Partial Depth	Ψ	13		Surface Treatment	Φ	20,000	13			\$ - \$ -	13			\$	
14 14	Reseal Joints and Fartial Deptin	\$ 71,300	14			\$		14			\$ -	14			\$	
15		\$ -	15			\$	-	15			\$ -		14	2" Mill & 3" Overlay	Ψ	42,470
16		\$ -	16			\$	_	_	15	2" Mill & 3" Overlay	\$ 142,470	16	+ ' '	2 iviii a o o vonay	\$	-
17		\$ -	17			\$	-	17			\$ -	17			\$	-
18		\$ -	18			\$	-	18			\$ -	18 AA		Crack Treatment	\$	3,000
19		\$ -	19			\$	-	19 AA		Crack Treatment	\$ 3,000	19			\$	-
20		\$ -	20	AJ 1	2" Mill & 3" Overlay	\$	142,470	20			\$ -	20			\$	-
21		\$ -	21			\$	-	21			\$ -	21			\$	-
22		\$ -	22			\$	-	22			\$ -	22 AB		Surface Treatment	\$ 2	20,000
23		\$ -		AA	Crack Treatment	\$	3,000	23 AB	3	Surface Treatment	\$ 20,000	23			\$	-
24	Minor CDD and some a fall day the	\$ -	24			\$	-	24			\$ -	24			\$	-
25 BB	Minor CPR and some full depth r	\$ 207,937 \$ -	25 26			\$	-	25 26			\$ - \$ -	25 26			\$ \$	-
27		\$ -		AB	Surface Treatment	\$	20,000	27			\$ -	27			\$	_
28	 	\$ -	28		Canado Hoalmont	\$	-	28			\$ -	28			\$	-
29	<u> </u>	\$ -	29			\$	-	29			\$ -		1.3	2" Mill & 3" Overlay		42,470
30		\$ -	30			\$	-	30			\$ -	30			\$	-
31		\$ -	31			\$	-		14	2" Mill & 3" Overlay	\$ 142,470	31			\$	-
32		\$ -	32			\$	-	32		,	\$ -	32 <mark>AA</mark>		Crack Treatment	\$	3,000
33		\$ -	33			\$	-	33			\$ -	33			\$	
34		\$ -	34			\$	-	34 AA	\	Crack Treatment	\$ 3,000	34			\$	-
35	<u> </u>	\$ -	35		Remaining Service Life Value**		\$0	35		Remaining Service Life Value**	-\$101,764	35		Remaining Service Life Value**		
	Total Present Worth				Total Present Worth		478,056			Total Present Worth				Total Present Worth		86,392
	Eq. Annual Cost*	\$21,391			Eq. Annual Cost*		\$20,655			Eq. Annual Cost*				Eq. Annual Cost		\$21,015
	% of Low Cost	104%			% of Low Cost	t	100%			% of Low Cost	106%			% of Low Cos	t	102%

Appendix 4

AB Suffice Treatment \$0,000 \$ \$ \$ \$ \$ \$ \$ \$ \$																		
Analysis Pelads 35					District		4			Project Number	8402	2-17	1					
Discourt Rate 2.5 Discourt Rate 2.5 Discourt Rate 2.					Performed By	Kr	nopf				4/30/2	2013						
Discourt Rate 2.5 Discourt Rate 2.5 Discourt Rate 2.					Analysis Period	-	35			Funding Category	BS 2	Ţ						
Description Description				_						Low Cost Option #								
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## DESCRIPTION ## DES									†									
DESCRIPTION DESCRIPTION DESCRIPTION TYPE DESCRIPTION DESCRIP					OPTION #1				Т	OPTION #2				_		OPTION #3		
DESIGN LIFE TYPE 20 RT We 20 RT We 20 RT RT RT RT RT RT RT R								_	_									
Secretarion					4" Mill & Inlay					4.5" Mill & 5" Whitetopping						3" Mill/4" CIR & 3" Inlay		
Pear of Life Operation					DESIGN LIFE	TY	/PE		П	DESIGN LIFE	TYPE					DESIGN LIFE	TYPE	
B Description Cost/Mile A Cost Testiment \$3.000 Cost/Mile Cost State Cost/Mile Cost State Cost/Mile Cost State Cost/Mile Cost State Cost State Cost State Cost State Cost State Cost State Cost State			i			BIT	₩					₩2					BIT	-
AB Care Treatment \$3.000 \$ 167.220 0 \$ 20.009 0 \$ 170. According to the properties of the properties o	Description	Cost/Mile	Year	# I it	fe Description		t/Mile	Year #	Life	Description		Mile	Year	- #	Life	Description		ost/Mile
AB Outcome Teachment														_				170,888
AC Control S			1	_			-	_	т				1					-
AD Potentry		4-1,010	2	_			-		+			-	2					-
AP Control S			3					3			\$		3	AA		Crack Treatment	\$	3,000
AG LS* Overlay	3" Overlay		4			\$		4			\$		4				53	-
All 7 Mile 3 C Podrigy All 5 C Podrigy S			5										5				+	
SAA Contest SAA Contest SAA Contest SAA Contest SAA Contest SAA SA													6					
All PMB 4.5 Contriby St. 4, 756.62 Total Pmseurit With St. 4, 756.62 Total Pmseurit With St. 4, 756.62 Total Pmseurit With St. 4, 756.62 Total St.									4							Surface Treatment		20,000
AX 5 'Mail & 3' Overlay AN S' Mail & 4.5' Overlay AN Mill & 5' Overlay AN Mill & 5' Overlay				AA	Crack Treatment		3,000		1									-
11 S				-			-		+									
12 AB Surface Treatment \$ 20,000 12 \$ \$ \$ \$ \$ \$ \$ \$ \$				-					+									
AN Broad Joints (27) AP AP AP AP AP AP AP A				AR	Surface Treatment		20.000		+			-						
AQ Minor CPR (12) AQ Minor CPR (12) 16 \$. 16				AD	Junace Healment		20,000		12	13 YR Repair		94.289						
Ap Minor CPR (878) 15 \$. 15 \$. 15 \$. 16 \$. 16 \$. 16 \$. 17 \$ \$. 18 \$. 1				+			-	14	1 12	15 TK Kepaii		-						
AQ Minor CPR (12)				_								-					_	-
AR Major CPR (672) AX Major CPR (675) AT CIR wNew Structure AV JEPR wNew Structure AV JURO MNew Corner work AV Jepr wnew Structure AV JURO MNew Corner wnew Structure AV JURO MNew Corner work AV Jepr wnew Structure AV JURO MNew Corner work AV Jepr wnew Structure AV JURO MNew Corner work AV Jepr wnew Structure AV JURO MNew Corner work AV Jepr wnew Structure AV JURO MNew Corner work AV Jepr wnew Structure AV JURO MNew Corner work AV Jepr wnew Structure AV JEPR wNew Corner wnew Structure AV JEPR wNew Corner wnew Structure AV JEPR wNew Corner wnew Structure AV JEPR wNew Corner wnew Structure AV				_					+							2" Mill & 3.5" HMA Overlay	_	164,272
AS Major CPR (15)							-									, , , , , , , , , , , , , , , , , , , ,	\$	-
AT Circ Window Structure						\$	-				\$		18				\$	-
AU FDR w/New Structure		ure					-		Т		\$	-	19	AA		Crack Treatment	\$	3,000
AV SPR w/New Structure 21	FDR w/New Structu	ture		AK	3" Mill & 3" Overlay	\$ 1	145,756	20	L		\$	-	20				\$	
XX Unbonded Concrete Overlay 23 AA Crack Treatment \$ 3,000 23 \$ 23 AB Surface Treatment \$ 20 AZ Nw Bituminous Structure AZ Surface Treatment \$ 20 AZ Surfa	SFDR w/New Struc	cture				\$	-	21									\$	-
AX Concrete Whitetopping	New Concrete Stru	ucture		1			-				\$						\$	
AZ New Bituminous Structure				AA	Crack Treatment		3,000									Surface Treatment	+	20,000
BA 25 Mil 8 4* HMA Overlay 26							-		1									-
BB 2 Mill & 3.5 MMA Overlay \$164.272 \$ \$ \$ \$ \$ \$ \$ \$ \$				_			-		10	25 YK Repair	\$ 4:	31,783						
SC Light Crack Treatment St. Sc Sc Sc Sc Sc Sc Sc S				AD	Conference Transference				+		\$	•					-	
BD 13 YR Repair 194288 864 29				AB	Suriace Treatment		20,000		+								+	
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F				+					+		S	-					9	
S	LO IN Nepall	431703.147		+					+		'S	-		BB		2" Mill & 3.5" HMA Ouerlas	\$	164,272
BH							-				s			2		a o.o ram coloridy	\$.01,212
BI 34 S - 34 M Cack Treatment S 3 35 Remaining Service Life Value** \$ - 35 Remaining Service Life Value** \$ (117 BK BK							-				-						\$	-
BI 35 Remaining Service Life Value** \$ - 3							-				7	-				Crack Treatment	\$	3,000
SK					Remaining Service Life Value**		-			Remaining Service Life Value**	\$	-					\$	(117,337)
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BW BX BY BZ Yellow Cells are unprotected for input. Total Present Worth \$ 305.474 Total Present Worth \$ 594.238 Total Present Worth \$ 342 Light Blue contain Formulas but are unprotected. Eq. Annual Cost \$13.198 Eq. Annual Cost \$25,674 Eq. Annual Cost \$1.09% % of Low Cost \$1.09% % o				+		 			╁		-			Н	-			
BX BY BY BY BZ Yellow Cells are unprotected for input. Light Blue contain Formulas but are unprotected. White Cells are protected from input. **Equivalent Annual Cost*** **Equivalent Annual Cost*				+		 		+	╁		-			Н	-			
BY BZ Vellow Cells are unprotected for input. Light Blue contain Formulas but are unprotected. Eq. Annual Cost* \$13,198 Eq. Annual Cost* \$25,674 White Cells are protected from input. * Equivalent Annual Cost* is included for information only. * Equivalent Annual Cost* is included for information only.				+		1			t					Н				
Yellow Cells are unprotected for input. Total Present Worth \$ 305.474 Total Present Worth \$ 54.238 Total Present Worth \$ 34.248 Eq. Annual Cost \$ 13.198 Eq. Annual Cost \$ 52.5674 Eq. Annual Cost \$ 53.0428 White Cells are protected from input. **Equivalent Annual Cost is included for			 	\top		t			t					П				
Yellow Cells are unprotected for input. Total Present Worth \$ 305,474 Total Present Worth \$ 594,238 Total Present Worth \$ 342 Light Blue contain Formulas but are unprotected. Eq. Annual Cost* \$13,198 Eq. Annual Cost* \$25,674 Eq. Annual Cost* \$1 White Cells are protected from input. % of Low Cost 100% % of Low Cost 195% % of Low Cost									T					П				
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White Cells are protected from input. % of Low Cost 100% % of Low Cost 195% % of Low Cost 9 % of Low Cost 195% % of Low Cost 1	Light Blue contain	n Formulas but are unprote	ected.								9	25,674						\$14,803
						<u></u>	100%											112%
"Remaining Service Life Value is reported as a negative value.					* Equivalent Annual Cost is incl	uded for	informat	ion only.	Т					П	_			
					**Remaining Service Life Value	is report	ted as a	negative	value	h								

District	3 - Baxter
Performed By	SZ
Analysis Period	35
Discount Rate	1.7
Inflation Rate	1.0094

Project Number	8680-167
Date	4/24/2014
Funding Category	RS
Low Cost Option #	1
Chosen Option #	1

		OPTION #1						OPTION #2					OPTION #3					OPTION #4		
		DESCRIPTION						DESCRIPTION					DESCRIPTION					DESCRIPTION		
	2.	.0" Mill & OL ML, 1.5"OL ML & SI	HLD					6.0" Concrete Whitetopping					3" Mill & 3" Overlay, ML & SHL	D				4" Mill & Fill ML, 2" Mill & Fill S	ıld	
		DESIGN LIFE		TYPE				DESIGN LIFE	TY	PE			DESIGN LIFE	TYI	PE			DESIGN LIFE	TY	/PE
		15 Years	BIT					15 Years	PC	C			15 Years	PC	C			16 Years	BI	T
Year #	Life	Description	C	Cost/Mile	Year	#	Life	Description		Cost/Mile	Year	# Li	e Description	_	Cost/Mile	Year	# L	fe Description		Cost/Mile
0 BH		2" Mill & OL ML, 1.5" OL ML & S	\$	203,130	0	AX		6.0" Concrete Whitetopping	\$	310,610	0	3E	3" Mill & OL, ML & SHLD	\$	219,630	0	BG	4" Mill & Fill ML, 2" Mill & Fill Sh	lc \$	251,692
1			\$	-	1				\$	-	1			\$	-	1			\$	-
2			\$	-	2				\$	-	2	_		\$	-	2			\$	-
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4 AA	_	Crack Treatment	\$	7,000	4	_	ш		\$	-	4 /	٩A	Crack Treatment	\$	7,000	4			\$	
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9 BI	-	Micro Surface	\$	45.000	9		\vdash		Đ.		9	31	MICTO SUTTACE	S	45,000	9			9	
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12	_		\$	-		AN		Reseal Joints & Partial Depth Re	\$	30.000	12	30	3.0" Mill & Fill - ML Only	s	142,138	12			\$	-
13			\$	-	13		Н	rtoodar oomto a Tariai Dopur Ita	\$	-	13		O.O. WILL CHILD	S	-	13			\$	
14			\$	-	14				\$	-	14			Š	-	14			\$	-
15 BC		3.0" Mill & Fill - ML Only	\$	142.138	15	20			\$	-	15			\$	-	15			\$	-
16			\$	-	16				\$	-	16 /	٩A	Crack Treatment	\$	7.000	16		3.0" Mill & Fill - ML Only	\$	142,138
17			\$	-	17				\$	-	17			\$	-	17			\$	-
18			\$	-	18				\$	-	18			\$	-	18			\$	-
19 AA		Crack Treatment	\$	7,000	19				\$	-	19			\$	-	19			\$	-
20			\$		20	AR		Major CPR (6'X6')	\$	150,000	20 E	31	Micro Surface	\$	45,000	20	AA	Crack Treatment	\$	7,000
21			\$	-	21				\$	-	21			\$	-	21			\$	-
22			\$	-	22				\$	-	22			\$	-	22			\$	-
23			\$	-	23				\$	-	23 E	3D	1.5" ML Mill & Fill, 1.5" OL ML &		175,991	23			\$	-
24 BI		Micro Surface	\$	45,000	24				\$	-	24			\$	-	24		Micro Surface	\$	45,000
25			\$	-	25				\$	-	25			\$	-	25			\$	-
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29 BD	_	1.5" ML Mill & Fill, 1.5" OL ML &	\$	175,991	29				\$		29			\$	-	29			\$	
30	_		\$	-		BF	Н	Rem and Rep Conc Surf	\$	437,477	30 E	31	Micro Surface	\$	45,000	30		1.5" ML Mill & Fill. 1.5" OL ML 8	\$	475.004
31			\$	-	31		Н		\$		31	-		\$	-	31		1.5" ML Mill & Fill, 1.5" OL ML &	k \$	175,991
32 33 AA		Crack Treatment	\$	7,000	32		Н		\$		33	25	3" Mill & OL, ML & SHLD	\$	219,630	32			\$	
33 AA		Crack reatment	Ď.	7,000	33		Н		3		33 1	DE	3 IVIII & UL, ML & SHLD	\$	219,630	33		Crack Treatment	\$	7.000
35		Remaining Service Life Value**	9	(94.764)	35		H	Remaining Service Life Value**	\$	(291.651)	35	+	Remaining Service Life Value**	9 /	170.823.33)	35		Remaining Service Life Value**	9	(125.707.86)
აა	_	Total Present Worth			35		_		\$		35					35				
	ŀ			453,252				Total Present Worth	-	544,348			Total Present Worth		601,383			Total Present Worth		478,330
	ŀ	Eq. Annual Cost* % of Low Cost	1	\$17,289 100%				Eq. Annual Cost*		\$20,764 120%			Eq. Annual Cost* % of Low Cost		\$22,940 133%			Eq. Annual Cost % of Low Cost		\$18,246
		% of Low Cost * Equivalent Annual Cost is included:	<u> </u>					% of Low Cost	_	120%			% of Low Cost	1	133%			* Equivalent Annual Cost is incl		106%

^{*} Equivalent Annual Cost is included for information only.

**Remaining Service Life Value is reported as a negative value.

Appendix C: LCCA Exceptions

Office Memorandum

TO:

Steve Lund

MnDOT Pavement Program Manager

FROM:

Lowell Flaten

District 8 Materials Engineer

DATE:

November 24, 2014

SUBJECT:

REQUEST FOR AN EXCEPTION TO SELECTING THE LOW COST ALTERNATE

SP#	4711-19
Highway #	TH 24 from Litchfield to the junction with TH15
Project Limits	RP 0+00.000 to RP 15+0.609
Project Description	Mill 2 inches of existing bituminous pavement and construct a 4 inch bonded concrete overlay.

LCCA Results

Alternative	Design Life	Total Present Cost / Mile	Requested Selection	% of Low Cost
2" Mill and 4" Whitetopping	20	\$539,860	Yes	133
2"Mill, 5" CIR, 4"HMA	20	405,983	No	100

Reason for Request

Project costs were based on the district cost estimating practices used in the Project Scoping Process. This project was selected for Destination Innovation funding, to study the suitability of thin, bonded-concrete overlays as an alternative to medium-thickness bituminous overlays. The low cost option was the bituminous fix at \$16,754/mile equivalent annual cost. The life cycle cost analysis is located in EDMS (DOC#1380487).

District Engineer

12-1-14

INTERSTATE INVESTMENT PROPOSAL...October 2013

Background Information

- Based on 2011 data, the most recent data available from the Federal Highway
 Administration (FHWA), <u>Minnesota's rural interstate pavement condition ranks 43rd</u>
 (1=Best, 50=Worst) in terms of the percent of miles in Poor condition (3.56%). This
 ranking is lower than all of our surrounding states. Just to be ranked in the middle of
 the 50 states, we would have to reduce our percent Poor to 0.66%.
- 2. The recently enacted MAP-21 legislation will require each state to meet minimum, as yet to be determined, condition levels on the interstate system. While we still do not know what level that will be, <u>having a national ranking of 43rd does not provide much room for funding flexibility</u>. If the FHWA sets the condition close or better than our current level we will be forced to spend federal funds on our interstate pavements to improve their condition.
- 3. The pavement management system was used to identify the sections of interstate, at least ½ mile long, that are expected to be in Poor condition after the 2014-2017 STIP. Of the 67 miles of interstate expected to be in Poor condition at the end of 2017, 52 miles (78%) are on I-90 in D-7. Long life fixes on nearly all of the D-7 segments could be done for \$50M.
- 4. Remaining Service Life (RSL) is defined as the number of years until the pavement section will reach the point where rehabilitation is needed. At the end of the 2014-2017 STIP, the average RSL of the interstate system in D-7 is expected to be 7.5 years, more than 5 years less than the next closest district (D-1) at 12.4 years.
- 5. <u>Statewide, extensive work has been done on the interstate system over the last few years</u>. In particular, unbonded concrete overlays have been or are being done on I-35 near Owatonna, Lakeville, Hugo, North Branch, and Duluth, I-694 in Oakdale, I-94 in D-3, and I-90 in D-6. Few, if any of these have been done on I-90 in D-7.

Proposal

Invest \$50M to reduce the amount of Poor pavement on I-90 by constructing long-life fixes that will provide maximum MAP-21 funding flexibility in the future.

Benefits provided by this investment

- Will provide maximum future funding flexibility under MAP-21
- The Average RSL of D-7's interstate will increase from 7.5 to 11.2 years
- Eliminates nearly all sections of poor pavement from one end of the state to the other along I-90.

DECISION SUPPORT TOOL

Decision Statement: Invest \$50M to reduce the percentage of mileage in poor condition on I-90, providing maximum funding flexibility, under MAP-21, and improve Minnesota's national interstate ranking.

Date: October 2, 2013

Document prepared by: Office of Materials and Road Research

Final Decision Makers: Senior Leadership Team

Persons/positions consulted:

Jon Chiglo, Amr Jabr (Engineering Services Division)

- Greg Ous, Chad Fowlds (District 7 Management Team)
- Tim Quinn (Metro District)
- Mike Barnes (Operations Division)
- Matt Zeller (Concrete Paving Industry)

Area/person directly affected by decision and impacts:

- District 7 staff
- Travelling public
- Contractors

Area/person indirectly affected by decision and impacts:

- All other Districts
- Office of Technical Support
- Construction Office

Givens:

- Investment will be on Interstate Pavements in Poor Condition Only
- Maximize service life, get in, get out, stay out (long life fixes)
- New projects, not in currently in the STIP
- Maintain two healthy paving industries
- Accelerated delivery techniques
- Innovative quality methods

Assumptions:

- District 7 buy-in
- Contracting industry can deliver
- MnDOT can deliver this on time

Coordination with projects in current STIP

Objective: What are we trying to achieve?

Reduce the % of poor Interstate pavements so we meet the MAP-21 requirements for the maximum number of years. This will allow MnDOT flexibility, under MAP-21, to use funding in future years on a variety of project types, not simply pavement preservation.

Business Impacts:

- Construction of these projects will give MnDOT more flexibility in the followings years to spend funds on a variety of projects
- Short-term large increase in program delivery effort for D-7

Risks:

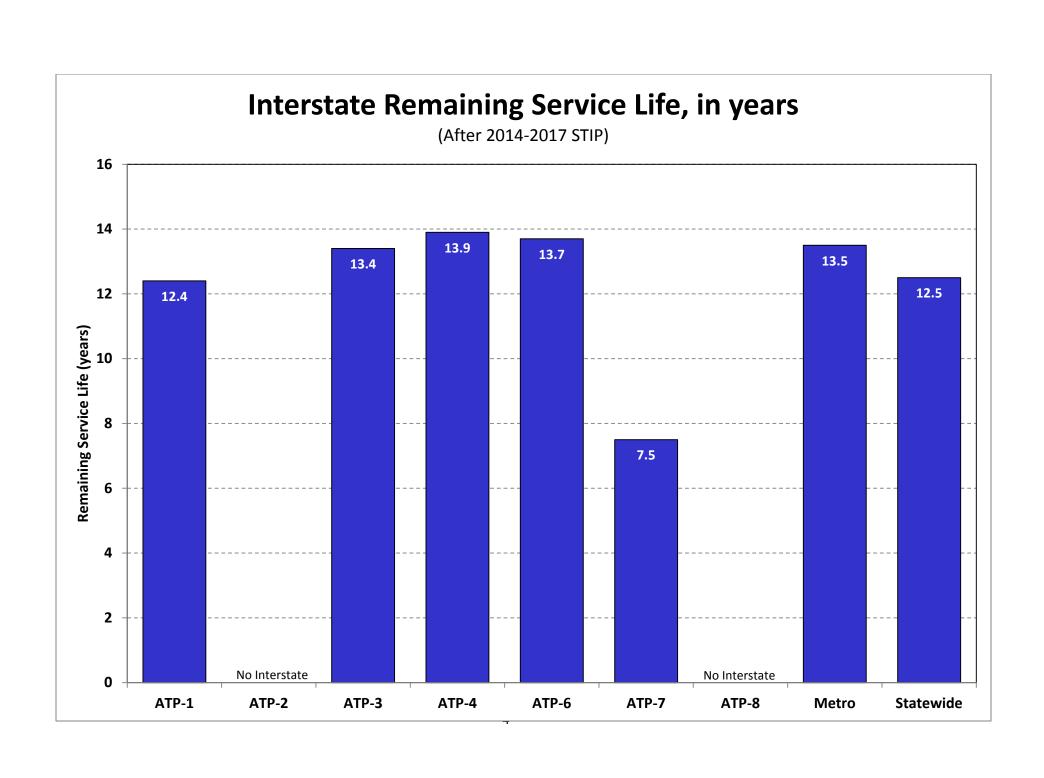
- We need to get buy-in and agreement from the district on these projects to make sure they are not included in their STIP and are good candidates.
- We also need to determine if they could deliver them in the timeframe the \$50M need to be spent.
- Negative reaction from other Districts, Industry, and other specialty groups, etc.
- Coordination with other projects on I-90
- Can the construction industry deliver a quality product on time?

Action/Assistance Needed:

• Additional MnDOT resources will be needed to deliver these projects.

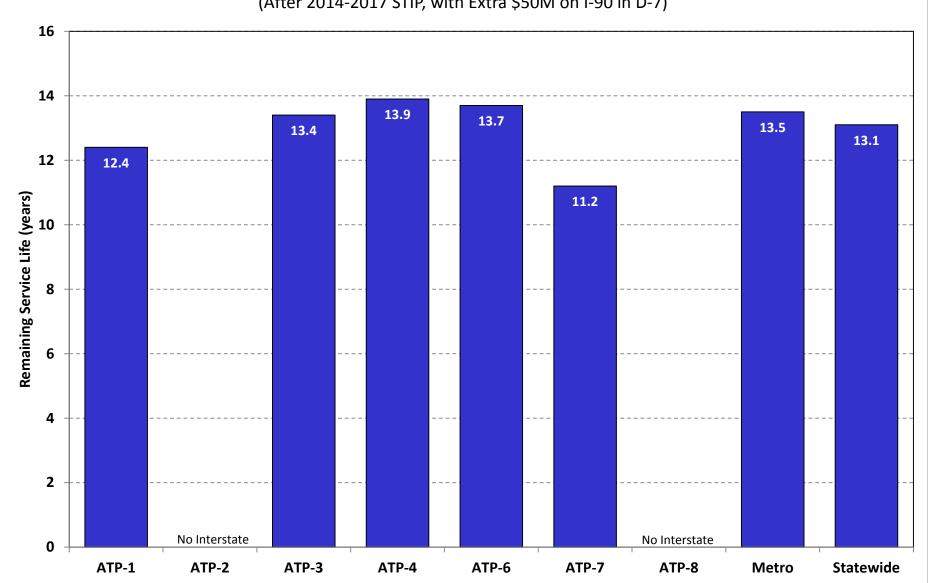
Other Information:

Pavement Co		on the Nat t of Miles in (Poor = IRI)	Poor Con	dition (201	-	the Mid	west
State		Interstates			Other NHS		NHS
State	Rural	Urban	All	Rural	Urban	All	All
lowa	1	35	14	35	36	29	26
Minnesota	43	41	38	46	15	35	35
North Dakota	1	1	1	6	5	4	4
South Dakota	14	31	11	11	24	7	8
Wisconsin	33	33	32	40	43	40	41





(After 2014-2017 STIP, with Extra \$50M on I-90 in D-7)



Minnesota Department of Transportation District 7 2151 Bassett Drive Mankato, MN 56001-6888

Office Tel: 507-304-6100 Fax: 507-304-6119

Memo

TO:

Curt Turgeon, Pavement Engineer

Office of Materials & Road Research

FROM:

R. Kent Purrier, Senior Engineer

District 7 Design

DATE:

Sept. 30, 2013

SUBJECT:

Alternate Bid Exception Request for SP 1704-27 (TH 62)

The above project was designed for alternate bid. The current concrete option in the Materials Design Recommendation calls for milling some asphalt, reclaiming the remaining asphalt and paving concrete. Feedback received from CPAM (Concrete Paving Association of Minnesota) indicates that this option is not competitive; therefore the District will be removing the current concrete option from the plans.

The District has considered a 5" whitetopping design involving a 1" grade raise as another potential concrete alternate. After reviewing cores of the existing pavement, it appears that the bituminous that would remain after milling does not have enough integrity to withstand construction traffic to place a whitetopping surface. In many cases there would not be the minimum 4" of bituminous remaining after milling. After looking at all of the data, the District will not pursue a whitetopping concrete alternate for this project.

Email documentation of the CPAM feedback and whitetopping consideration is attached.

Given the above, the District would like to pursue an exception from the alternate bidding process for this project and prepare a bituminous option only. Please indicate whether this approach is acceptable. Thank you.

I concur:

Curt Turgeon, Pavement Engineer

Office of Materials & Road Research

CC:

Greg Ous Chad Fowlds Lisa Bigham John Hager Tim Andersen

An Equal Opportunity Employer

















From:

Fowlds, Chad (DOT)

Sent:

Thursday, September 26, 2013 11:03 AM

To:

Turgeon, Curtis (DOT)

Cc:

Hager, John (DOT); Andersen, Tim (DOT); Ous, Greg (DOT); Bloomgren, Keith (DOT); Purrier, Richard

(DOT); Benzkofer, Brett (DOT)

Subject:

Re: TH 62, SP 1704-27

Follow Up Flag: Flag Status:

Follow up Completed

All,

I viewed the photos of the cores yesterday with John and it is very apparent to me that the bituminous that is remaining after milling does not have enough integrity to withstand construction traffic to place a whitetopping surface. In many cases there isn't 4" of bituminous remaining after milling.

After looking at all of the data, the District will not pursue a whitetopping concrete alternate for this project.

Given feedback from CPAM that the concrete alternate over the reclaimed pavement is not competitive, we will be removing the concrete alternate from the plans and seeking an exemption from using alternate bid.

Kent - please draft a letter for Curt's concurrence on an exemption for alternate bid. If you need help with language, etc let me know.

Thanks.

Chad

Sent from my iPhone

On Sep 24, 2013, at 3:11 PM, "Turgeon, Curtis (DOT)" < curt.turgeon@state.mn.us > wrote:

Chad

At this time the District is proceeding with an alternate big plan for the above reference SP. Tim Andersen shared the MDR and LCCA with Matt Zeller of CPAM for preliminary comments. . Matt does not think concrete will be competitive with the current typical sections. (4.5" bit on FDR vs. 6.5" concrete on FDR) Mr. Zeller wondered if a whitetopping approach might be more competitive

The current concrete option in the MDR calls for milling some asphalt, reclaiming the remaining asphalt and paving concrete. The concrete thickness is based upon the process for designing a new concrete pavement.

There are two restrictive issues on this project that precludes the use of a concrete whitetopping design. The current whitetopping standard requires a minimum of 4.0" of remaining asphalt after milling. The in place pavement is just over 8" thick, GPR data (over 9" thick based on cores). The second restriction is the zero grade raise. With this in mind, the only way to build a whitetopping would be to mill 4.0" and inlay 4.0" of concrete.

If a grade raise was possible, a 5.0" whitetopping could handle around 35 years of traffic. This would be similar to the TH 30 whitetopping in your District. TH 30 was built slightly thicker than the original design.

So there are two potential outcomes:

- 1. If the District can abide a 1.0" grade raise, we could continue discussing the possibility of a 5.0" whitetopping design and associated LCCA considerations.
- 2. If the District cannot abide a grade raise, the current concrete typical is 2.0" thicker than the asphalt typical AND a 4.0" whitetopping is not feasible for this traffic volume. Therefore, based on Mr Zeller's input, this should not proceed as an alternate bid project, just build asphalt.

Curt

Curt Turgeon State Pavement Engineer 1400 Gervais Avenue Maplewood, Mn 55109