Minnesota Department of Transportation Report to Legislature on Life-Cycle Cost Analyses

January 2013

Your Destination...Our Priority

Minnesota Department of Transportation Report to the Legislature on Life-Cycle Cost Analyses

To request this document in an alternative format, please contact the Affirmative Action Office at 651-366-4723 or 1-800-657-3774 (Greater Minnesota); 711 or 1-800-627-3529 (Minnesota Relay). You may also send an e-mail to ADArequest.dot@state.mn.us.

Report Development Cost

As required in Minnesota Stat. § 3.197, this document must contain the cost of preparing the report, including any costs incurred by another agency or another level of government.

Minnesota Department of Transportation staff costs were less than $2,000 to produce this report.

Introduction

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

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

Implementation

MnDOT has had a process for performing LCCA on roadway rehabilitation projects since 1999. The existing LCCA process, presented in Technical Memorandum 07-17-MAT-01 was modified to meet the detailed requirements of the legislation and presented in Technical Memorandum 10-04-MAT-01.

This memorandum requires that an LCCA, that is consistent with Federal Highway Administration guidelines, is 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 an LCCA to projects that include placing more than 2-inch thickness of pavement material. Thin overlays (2 inches or less) are considered as short-term preventive maintenance and do not have a viable concrete alternative with an equal design life.

The memorandum requires that 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.

Results

In 2012, 45 let projects were in the reconditioning, resurfacing and road repair funding categories that required an LCCA, according to Technical Memorandum 10-04-MAT-01.

HMA options are the low-cost option for 40 of the submitted LCCAs. PCC options are the low-cost option for five of the submitted LCCAs.

Two projects have a signed exception form, because an option other than the low-cost option was selected for construction.

Seven projects did not select an option for construction because the selected option will be determined by the alternate bidding process.

Attached is a table of LCCA results and copies of the LCCAs submitted by MnDOT districts.

Discussion

Typically, HMA is the low cost option in the submitted LCCAs. Often it’s difficult for PCC options to be competitive with HMA options for projects in these funding categories. PCC options usually have a greater initial cost than HMA options but become competitive by having lower maintenance costs. The relatively short design lives of these rehabilitation-type projects do not allow the PCC options to exploit their relative advantage with HMA options. PCC options that have longer design lives than HMA alternates are more competitive than PCC options with the equal design lives that are required by the statute.

PCC options may be hindered by MnDOT’s limited experience with the performance and design of thin PCC options. To address these challenges, MnDOT continues to gain experience with the performance of PCC overlay projects and to research PCC design tools. Currently, MnDOT leads a pooled-fund study for the design of thin PCC overlays over existing HMA and has initiated a project to develop a new design tool for new PCC pavements and PCC overlays of existing PCC.

To create competition and to get the most cost-effective pavement design and materials, MnDOT has continued using the alternate bidding process. A LCCA is still performed as required by Technical Memorandum 10-04-MAT-01, but the option that is constructed is selected through the alternate bidding process.

The Alternate Bidding process is used on projects with pavement ≥4” to ≤7” thick, which are likely to have competitive HMA and PCC options.

The alternate bidding process is similar to using an 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 alternate bidding process is as follows:

1. MnDOT lets a project with two options, one HMA and one PCC.
2. MnDOT calculates an adjustment factor. This is the difference between the maintenance costs of the two options.
3. MnDOT receives bids and determines the low-cost bidder after adding the adjustment factor to the alternate with the greatest maintenance costs.

Conclusion

MnDOT implemented the requirements of the law with a technical memorandum and has provided the required results. MnDOT will work to ensure that all future projects meet the requirements of the technical memorandum and legislation. In addition, MnDOT has introduced the alternate bidding process to create competition to get the most cost-effective pavement design and materials.

MnDOT will continue to provide this report on an annual basis as required by the legislation.

Attachments

- Technical Memorandum 10-04-MAT-01: Implements requirements of legislation
- LCCA summary: A summary of all the LCCAs in the required funding categories for projects let in 2012
- Individual project LCCAs and signed exception forms in state project number order

MINNESOTA DEPARTMENT OF TRANSPORTATION
Policy, Safety, and Strategic Initiatives Division
Technical Memorandum No. 10-04-MAT-01
January 28, 2010

To: Distribution 57, 612, 618, 650

From: Khani Sahebjam
Deputy Commissioner and Chief Engineer

Subject: Life Cycle Cost Analysis (LCCA) of Pavement Preservation Projects

Expiration
This Technical Memorandum supersedes Technical Memorandum No. 07-17-MAT-01. It will remain in effect until January 28, 2015 unless it is superseded.

Implementation
This technical memorandum applies to all *pavement* preservation projects in the reconditioning, resurfacing, and road repair funding categories. Projects that meet the criteria of the Pavement Selection Process will continue to follow that process.

Introduction
To comply with the requirements of legislation and Mn/DOT policy; a Life Cycle Cost Analysis (LCCA) must be submitted with the project Materials Design Recommendation (MDR). The submitted LCCA must include at least one PCC and one HMA option with equal pavement design lives (in years) and analysis periods.

Purpose
This Technical Memorandum implements the requirements of Minnesota state legislation for LCCA of alternate pavement materials and updates LCCA procedures required by Mn/DOT policy.

In 2008, the Minnesota State Legislature passed bill HF 3486 (Chapter 287). This legislation requires a life cycle cost analysis (LCCA) be performed for all pavement projects in the reconditioning, resurfacing, and road repair funding categories that are to be constructed after July 1, 2011. The LCCA are to use equal design lives and equal comparison periods to compare competing paving materials. If the chosen option does not have the lowest life cycle cost, the justification is required to be documented. The legislation requires that the commissioner report annually to members of the Senate and House of Representatives the results of the analyses. The full text of the legislation that applies to the requirement for LCCA is attached in Appendix A.

Guidelines
A LCCA is not required for preventive maintenance projects or for short projects. Preventive maintenance projects include projects that place 2” or less of paving material. Short projects meet the following criteria:

Two-Lane Roadways: Projects less than **2 miles** long
Multi-Lane Roadways: Projects less than **30,000 square yards**

-MORE-

The project length/size listed above is determined using only the driving lanes, no turn lanes, parking lanes or ancillary lanes.

Follow sections I and II to develop a LCCA to submit with the MDR. However, to make the best use of LCCA, perform the LCCA early in the project development process.

I. Procedure

1. Establish Design Life and Pavement Design Alternatives

   - For all LCCA, develop at least one HMA and one PCC pavement design alternative with equal design lives. The alternatives should be pavement designs that are capable of meeting the design life required by the scope of the project and meet Mn/DOT pavement design policy and procedures. However, the design life that best meets the scope of the project may have only one available pavement material alternate that conforms to Mn/DOT pavement design policies and procedures. In such a case, compare the alternate design with the selected design life to at least one HMA and one PCC pavement alternate developed using the closest available design life that provides both a HMA and a PCC alternate.

2. Determine Activity Timing

   - Use District experience, Pavement Manual – Appendix E, and/or HPMA data.

3. Estimate Costs

   - Only costs that demonstrate the differences between alternatives need to be explored.
   - The District will develop the initial and activity costs based on their data and experience.
   - Do not include user costs.

4. Compute Life Cycle Costs

   - Calculate the present worth, of the initial construction and maintenance activities, of each of the pavement alternatives on a cost per mile basis.
   - The present worth will be calculated using a discount rate equal to the real interest rate on 30-year treasury bonds as published each year by the federal Office of Management and Budget (OMB). The value to be used each year will be determined by the Mn/DOT Office of Investment Management and kept on file in the Mn/DOT Estimating Unit.
   - Include any remaining life value of the pavement alternative that remains at the end of the analysis period. Remaining life value is calculated as the prorated share of the cost of the last activity based on the service life that extends past the analysis period.
   - Do not include an inflation rate.

5. Analyze Results

   - Unless there is justification for an exception, choose the low cost alternative. If the chosen alternative does not have the lowest life cycle cost, the District Engineer or designee shall sign off on the supporting justification.

-MORE-

II. Pavement Alternatives

HMA Overlay

Description

- HMA overlay (or mill and overlay) of existing HMA or PCC pavement that will restore ride and reduce pavement distresses. The thickness of a HMA overlay may be designed to improve the load carrying capacity of an existing roadway so that it does not require a seasonal load restriction.

Design

- To remove the requirements for spring load restrictions on a roadway, Mn/DOT has a thickness design procedure based on FWD pavement deflections. A design life is not part of this design procedure. For design life, there is no formal design procedure as the performance of the overlay is very dependent on the condition of the existing pavement. Instead of a design life, HMA overlays have an expected life. Base the expected life on HPMA data and engineering judgment. The expected life of a HMA overlay is typically from 7 to 19 years.

LCCA

- Schedule the 1st overlay or reconstruction at the end of the overlay's functional life.
- Each successive overlay has 1 year less life then the previous overlay.
- Minimum of a 35 year analysis period.

HMA on Base (No Work on Subgrade)

Description

- These projects place HMA on new or existing material that behaves as base in the pavement section. These types of projects include CIR, FDR, crack and seat, full mill and repave, or new base without working the subgrade. Typically, very specific engineering requirements need to be met to make these options practical. Only consider the options that are practical in the LCCA.

Design

- Design these pavements with the Mn/DOT procedures used for new HMA pavement. Some adjustments may need to be made for the properties of the base.
- Design these projects to carry 20 years of accumulated traffic loading.

LCCA

- Use the maintenance schedule provided in the pavement selection memo.
- Minimum of a 35 year analysis period.

PCC Overlay

Description

- These projects place PCC on existing HMA (whitetopping) or existing PCC with a stress relief layer (unbonded overlay). A PCC overlay will functionally and structurally improve an existing pavement.

Design

- Follow Mn/DOT design procedures for either whitetopping or unbonded overlays.
- The design life of these projects may be from 15-35 years.

LCCA

- If the Mn/DOT design procedure results in a thickness less than the minimum PCC thickness allowed by Mn/DOT policy, contact the Pavement Design Unit.
- An intermediate minor CPR project may add an additional 5 years until major CPR or replacement is required.
- For PCC overlay projects, the pavement should receive its first major CPR or reconstruction at the end of its design life.
- Use a life expectancy of about half the pavement design life for major CPR.
- Minimum of a 35 year analysis period.

PCC Pavement (No Work on Subgrade)

Description

- These projects place new PCC pavement on new or existing base and do not involve working the subgrade.

Design

- Follow Mn/DOT design procedures for PCC pavement.
- The preferred design life is 35 years for these projects.

LCCA

- For 35 year designs, use the maintenance schedule provided in the pavement selection memo.
- For designs for less than 35 years, follow the same maintenance schedule guidelines as for PCC overlays.
- Use a 50 year analysis period.

Questions
Contact Jerry Geib, **Pavement Design Engineer, at (651) 366-5496**, for information on the technical contents of this memorandum.

Any questions regarding publication of this Technical Memorandum should be referred to the Design Standards unit, designstandards@dot.state.mn.us. A link to all active and historical Technical Memoranda can be found at http://www.dot.state.mn.us/design/tech-memos/index.html.

To add, remove, or change your name and/or address on the Technical Memoranda mailing list, write or call the Mn/DOT Central Office Mail Room G-18 Transportation Building, 395 John Ireland Blvd., St. Paul, MN 55155, phone number (651) 366-3051.

-END-

Appendix A

Sec. 71. **[174.185] PAVEMENT LIFE-CYCLE COST ANALYSIS.**

Subdivision 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.

SP #	EXISTING PAVEMNT	EXCEPTION	DESIGN LIFE	OPTION DESCRIPTION	PRESENT WORTH/RDWY MILE	OPTION MATERIAL	SELECTED OPTION	ALTERNATE BID
0106-29	HMA	No	15	3.5" HMA Overlay	$364,850.00	HMA	✓	
			15	5" PCC Overlay	$468,151.00	PCC		
			20	FDR w/ 3" HMA	$428,790.00	HMA		
0208-146	HMA	No	15	6.5" PCC Overlay	$693,056.00	PCC		
			15	4" HMA Overlay	$565,277.00	HMA		
			35	8" PCC Overlay	$554,518.00	PCC	✓	
0705-21	HMA	No	16	3.5" HMA Overlay	$467,936.00	HMA	✓	
			20	HMA Reconstruction	$915,604.00	HMA		
			20	PCC Overlay	$571,359.00	PCC		
0708-35	PCC	No	14	4" HMA Overlay	$544,536.00	HMA	✓	
			20	HMA Reconstruction	$1,909,266.00	HMA		
			20	6.5 " PCC Overlay	$707,685.00	PCC		
0980-139	PCC	No	10	2" HMA Overlay	$502,784.00	HMA		
			20	8" New HMA	$603,996.00	HMA		
			20	7.5" PCC Overlay	$482,920.00	PCC		
			30	8.5" PCC Overlay	$479,080.00	PCC	✓	
1002-89	HMA	No	15	4" HMA Overlay	$389,163.00	HMA	✓	
			15	6" PCC Overlay	$571,365.00	PCC		
1212-30	HMA	No	20	7.5" PCC Overlay	$1,137,306.00	PCC		Yes
			20	8" New HMA	$719,756.00	HMA	✓	
			35	8" PCC Overlay	$1,098,922.00	PCC	✓	
1301-113	PCC	No	15	4" HMA Overlay	$526,782.00	HMA	✓	Yes
			20	Rubblize w/6" HMA Overlay	$625,304.00	HMA		
			20	6" PCC Overlay	$644,087.00	PCC		
			35	6" PCC Overlay	$625,304.00	PCC	✓	
1306-40	HMA	No	20	FDR w/6" PCC	$529,087.00	PCC		Yes
			20	FDR w/ 6" HMA Overlay	$622,862.00	HMA	✓	
			35	FDR w/7" PCC	$525,191.00	PCC	✓	
1901-168	HMA	No	15	4" HMA Overlay	$402,421.00	HMA	✓	
			15	6" PCC Overlay	$535,314.00	PCC		
			20	6.5" PCC Overlay	$463,761.00	PCC		
2102-54	HMA	No	15	6.5 PCC Overlay	$570,363.00	PCC		
			15	3" HMA Overlay	$230,219.00	HMA	✓	
2401-39	PCC	No	15	4.5" HMA Overlay	$205,915.00	HMA	✓	
			15	6" PCC Overlay	$332,069.00	PCC		
2212-28	HMA	No	20	FDR w/HMA Overlay	$537,829.00	HMA	✓	
			20	FDR w/PCC Overlay	$749,431.00			

SP #	EXISTING PAVEMNT	EXCEPTION	DESIGN LIFE	OPTION DESCRIPTION	PRESENT WORTH/RDWY MILE	OPTION MATERIAL	SELECTED OPTION	ALTERNATE BID
2404-39	PCC	No	15	3.5" HMA Overlay	$171,218.00	HMA	✓	
			20	6" PCC Overlay	$448,460.00	PCC		
			20	4.5" HMA Overlay	$216,379.00	HMA		
2722-81	HMA	No	15	4.5" HMA Overlay	$461,799.00	HMA	✓	
			20	7" PCC Overlay	$555,098.00	PCC		
			20	6" HMA Overlay	$463,554.00	HMA		
2774-21	PCC	No	15	5" PCC Overlay	$611,113.00	PCC		
			15	3.5" HMA Overlay	$524,483.00	HMA	✓	
2785-367	HMA	No	15	7" PCC Overlay	$824,423.00	PCC		
			15	4" HMA Overlay	$549,042.00	HMA	✓	
2804-33	PCC	No	15	3" HMA Overlay	$261,014.00	HMA	✓	
			20	8.5" PCC Overlay	$470,554.00	PCC		
			20	5" HMA Overlay	$305,451.00	HMA		
3280-117	PCC	No	14	3" HMA Overlay	$351,956.00	HMA	✓	
			20	6 "PCC Overlay	$899,205.00	PCC		
			20	CIR w/4" HMA Overlay	$601,290.00	HMA		
3309-14	HMA	No	15	4" HMA Overlay	$367,055.00	HMA	✓	Yes
			20	FDR w/5" HMA	$430,529.00	HMA		
			20	5.5" PCC Overlay	$482,274.00	PCC	✓	
3602-25	HMA	No	20	5" PCC Overlay	$580,737.00	PCC		
			20	3" HMA Overlay	$217,415.00	HMA	✓	
3604-72	HMA	No	17	3" HMA Overlay	$385,951.00	HMA	✓	
			17	5" PCC Overlay	$569,402.00	PCC		
			20	New HMA	$787,437.00	HMA		
			20	FDR w/ HMA Overlay	$502,555.00	HMA		
3706-39	HMA	No	20	7" PCC Overlay	$1,071,274.00	PCC		
			20	8" New HMA	$636,966.00	HMA	✓	Yes
			35	8" PCC Overlay	$912,789.00	PCC	✓	
4405-26	HMA	No	15	3" HMA Overlay	$326,249.00	HMA	✓	
			15	5" PCC Overlay	$465,110.00	PCC		
			20	4.5" New HMA	$383,222.00	HMA		
			35	6" PCC Overlay	$560,891.00	PCC		
4507-48	PCC	No	20	6" PCC Overlay	$687,913.00	PCC		
			20	5" HMA Overlay	$369,817.00	HMA	✓	
			35	6.5" PCC Overlay	$596,447.00	PCC		
4705-42	HMA	No	13	3" HMA Overlay	$497,794.00	HMA	✓	
			15	6.5" PCC Overlay	$673,474.00	PCC		
			15	4.5" HMA Overlay	$554,729.00	HMA		

SP #	EXISTING PAVEMNT	EXCEPTION	DESIGN LIFE	OPTION DESCRIPTION	PRESENT WORTH/RDWY MILE	OPTION MATERIAL	SELECTED OPTION	ALTERNATE BID
4812-83	HMA	No	9	2" HMA Overlay	$427,792.00	HMA		
			15	3.5" HMA Overlay	$415,072.00	HMA	✓	
			15	8.5" PCC Overlay	$623,592.00	PCC		
5105-21	PCC	No	15	4" PCC Overlay	$1,014,390.00	PCC		
			15	4.5" HMA Overlay	$463,450.00	HMA	✓	Yes
			35	6" PCC Overlay	$968,310.00	PCC	✓	
5204-112	PCC	No	15	3" HMA Overlay	$772,767.00	HMA	✓	
			20	Rubblize w/HMA Overlay	$939,220.00	HMA		
			20	6" PCC Overlay	$791,500.00	PCC		
5501-35	PCC	No	17	4.5" HMA Overlay	$303,561.00	HMA	✓	
			20	9" PCC Overlay	$420,854.00	PCC		
			20	5.5" HMA OVERLAY	$344,646.00	HMA		
5618-26	HMA	Yes	13	3" HMA Overlay	$237,547.00	HMA		
			15	4.5" HMA Overlay	$282,952.00	HMA	✓	
			15	4" HMA Overlay	$261,835.00	HMA		
			15	5.5" PCC Overlay	$500,667.00	PCC		
			25	5.5" New HMA	$401,129.00	HMA		
6016-37	PCC	No	20	5" PCC Overlay	$570,548.00	PCC		
			20	3" HMA Overlay	$279,456.00	HMA	✓	
6104-11	HMA	No	15	4.5" HMA Overlay	$268,815.00	HMA	✓	
			15	6" PCC Overlay	$467,412.00	PCC		
6105-20	HMA	No	15	3" HMA Overlay	$237,757.00	HMA	✓	
			15	5.5" PCC Overlay	$497,299.00	PCC		
6222-165	PCC	No	12	3.5" HMA Overlay	$548,693.00	HMA	✓	
			13	6" HMA Overlay	$573,536.00	HMA		
			15	7" PCC Overlay	$575,040.00	PCC		
			20	FDR w/ 6" HMA	$628,512.00	HMA		
			20	FDR w/6" PCC	$678,411.00	PCC		
6602-29	PCC	No	15	3.5" HMA Overlay	$300,554.00	HMA	✓	
			15	6" PCC Overlay	$500,796.00	PCC		
6703-23	HMA	Yes	16	4" HMA Overlay	$409,995.00	HMA		
			20	New HMA	$622,875.00	HMA	✓	
			35	PCC Overlay	$394,901.00	PCC		
			25	PCC Overlay	$439,398.00	PCC		Yes
			35	FDR w/ PCC	$504,521.00	PCC		
			35	FDR w/ PCC	$463,900.00	PCC	✓	
			20	PCC Overlay	$364,438.00	PCC		

SP #	EXISTING PAVEMNT	EXCEPTION	DESIGN LIFE	OPTION DESCRIPTION	PRESENT WORTH/RDWY MILE	OPTION MATERIAL	SELECTED OPTION	ALTERNATE BID
7306-95	HMA	No	15	3.5" HMA Overlay	$339,316.00	HMA	✓	
			20	5" HMA Overlay	$383,748.00	HMA		
			20	5" PCC overlay	$594,818.00	PCC		
7307-12	HMA	No	9	1.5" HMA Overlay	$246,116.00	HMA		
			15	5" PCC Overlay	$410,085.00	PCC		
			15	3" HMA Overlay	$234,988.00	HMA	✓	
7326-14	HMA	No	15	3" HMA Overlay	$281,544.00	HMA	✓	
			15	5" PCC Overlay	$489,128.00	PCC		
			20	FDR w/ 6" HMA Overlay	$380,347.00	HMA		
			20	FDR w/ 7" PCC Overlay	$558,274.00	PCC		
7380-238	PCC	Yes	12	6" HMA	$647,222.00	HMA		
			12	6" PCC Overlay	$634,852.00	PCC		
			15	6" SMA Overlay	$777,417.00	HMA		
			15	7" PCC Overlay	$622,422.00	PCC		
			30	9" PCC Overlay	$624,570.00	PCC	✓	
8304-113	PCC	No	14	3" HMA Overlay	$625,384.00	HMA	✓	
			20	7" PCC Overlay	$949,236.00	PCC		
			20	New HMA	$1,921,621.00	HMA		
8501-61	PCC	No	15	3" HMA Overlay	$261,014.00	HMA	✓	
			20	5" HMA Overlay	$305,451.00	HMA		
			20	7.5" PCC Overlay	$575,706.00	PCC		
8711-89	HMA	No	15	6" PCC overlay	$1,019,371.00	PCC		
			15	3" HMA Overlay	$359,495.00	HMA	✓	
			20	4.5" HMA Overlay	$367,985.00	HMA		
8821-153	HMA	No	15	3.5" HMA Overlay	$272,176.00	HMA	✓	
			20	5" HMA Overlay	$279,809.00	HMA		
			20	5" PCC Overlay	$403,843.00	PCC		

Definitions:

HMA = Hot-Mix Asphalt
PCC = Portland Cement Concrete
FDR = Full-Depth Reclamation (recycle existing HMA and Base as new base)
SFDR = Stabilized Full-Depth Reclamation (recycle existing HMA and Base as new base w/ a stabilizer)
CIR = Cold-in-Place Recycling (Recycle a layer of existing HMA with Cold-Mix Asphalt)

District	3
Performed By	CD
Analysis Period	35
Discount Rate	2.84

Project Number	0106-29
Date	6/15/2011
Funding Category	RS
Low Cost Option #	1
Chosen Option #	

OPTION #1					OPTION #2					OPTION #3				
DESCRIPTION					DESCRIPTION					DESCRIPTION				
2.0" Mill and 3.5" Overlay					5.0" Whitetopping					Mll 3.0", Reclaim 6", Pave 5.5"				
			DESIGN LIFE	TYPE				DESIGN LIFE	TYPE				DESIGN LIFE	TYPE
			15	BIT				15	PCC				20	BIT
Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile
0			2.0" Mill and 3.5" Overlay	$ 182,148	0			5.0" Whitetopping	$ 292,683	0			Mll 3.0", Reclaim 6", Pave 5.5"	$ 325,764
1				$ -	1				$ -	1				$ -
2				$ -	2				$ -	2				$ -
3				$ -	3				$ -	3				$ -
4			Crack Treatment	$ 4,000	4				$ -	4				$ -
5			Seal Coat	$ 25,000	5				$ -	5				$ -
6				$ -	6				$ -	6			Crack Treatment	$ 4,000
7				$ -	7				$ -	7			Surface Treatment	$ 25,000
8				$ -	8				$ -	8				$ -
9				$ -	9				$ -	9				$ -
10				$ -	10				$ -	10				$ -
11				$ -	11				$ -	11				$ -
12				$ -	12			Minor CPR	$ 40,000	12				$ -
13				$ -	13				$ -	13				$ -
14				$ -	14				$ -	14				$ -
15			2.0" Mill and 2.0" Overlay	$ 112,452	15				$ -	15				$ -
16				$ -	16				$ -	16				$ -
17				$ -	17				$ -	17				$ -
18				$ -	18				$ -	18				$ -
19			Crack Treatment	$ 4,000	19				$ -	19				$ -
20			Seal Coat	$ 25,000	20			Major CPR	$ 150,000	20			2.0" Mill and 2.0" Overlay	$ 112,452
21				$ -	21				$ -	21				$ -
22				$ -	22				$ -	22				$ -
23				$ -	23				$ -	23			Crack Treatment	$ 4,000
24				$ -	24				$ -	24			Surface Treatment	$ 25,000
25				$ -	25				$ -	25				$ -
26				$ -	26				$ -	26				$ -
27			2.5" Mill and 2.5" Overlay	$ 139,439	27				$ -	27				$ -
28				$ -	28				$ -	28				$ -
29				$ -	29				$ -	29				$ -
30				$ -	30			Remove and Replace Concrete	$ 339,616	30				$ -
31			Crack Treatment	$ 4,000	31				$ -	31				$ -
32			Seal Coat	$ 25,000	32				$ -	32				$ -
33				$ -	33				$ -	33				$ -
34				$ -	34				$ -	34				$ -
35			Remaining Service Life Value**	$ (27,888)	35			Remaining Service Life Value**	$ (227,543)	35			Remaining Service Life Value**	$ -
			Total Present Worth	$ 364,850				Total Present Worth	$ 468,151				Total Present Worth	$ 428,790
			Eq. Annual Cost*	$16,586				Eq. Annual Cost*	$21,282				Eq. Annual Cost*	$19,492
			% of Low Cost	100%				% of Low Cost	128%				% of Low Cost	118%

* Equivalent Annual Cost is included for information only.

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

District	Metro
Performed By	D.Palmquist
Analysis Period	35
Discount Rate	2.7

Project Number	0208-146
Date	11/14/2011
Funding Category	RD
Low Cost Option #	3
Chosen Option #	

OPTION #1					OPTION #2					OPTION #3				
DESCRIPTION					DESCRIPTION					DESCRIPTION				
4" mill and 4" Bituminous Overlay					6.5" Concrete Whitetopping with Concrete Shoulders					8.0" Concrete Whitetopping with Concrete Shoulders				
			DESIGN LIFE	TYPE				DESIGN LIFE	TYPE				DESIGN LIFE	TYPE
			15	BIT				15	PCC				35	BIT
Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile
0			Initial Cost	$ 325,000	0			Initial Cost	$ 461,000	0			Initial Cost	$ 521,000
1				$ -	1				$ -	1				$ -
2				$ -	2				$ -	2				$ -
3	AA		Crack Treatment	$ 5,000	3				$ -	3				$ -
4				$ -	4				$ -	4				$ -
5				$ -	5				$ -	5				$ -
6				$ -	6				$ -	6				$ -
7	BA		Chip Seal	$ 20,000	7				$ -	7				$ -
8				$ -	8				$ -	8				$ -
9				$ -	9				$ -	9				$ -
10				$ -	10				$ -	10				$ -
11				$ -	11				$ -	11				$ -
12				$ -	12	BD		1st CPR (15 year)	$ 29,282	12				$ -
13				$ -	13				$ -	13				$ -
14				$ -	14				$ -	14				$ -
15	BB		2" Mill,3.5" fill, 1.5" shldrs	$ 220,228	15				$ -	15				$ -
16				$ -	16				$ -	16				$ -
17				$ -	17				$ -	17	BF		1st CPR (35 year)	$ 18,640
18	AA		Crack Treatment	$ 5,000	18				$ -	18				$ -
19				$ -	19				$ -	19				$ -
20				$ -	20	BE		2nd CPR (15 year)	$ 143,214	20				$ -
21				$ -	21				$ -	21				$ -
22	BA		Chip Seal	$ 20,000	22				$ -	22				$ -
23				$ -	23				$ -	23				$ -
24				$ -	24				$ -	24				$ -
25				$ -	25				$ -	25				$ -
26				$ -	26				$ -	26				$ -
27				$ -	27				$ -	27	BG		2nd CPR (35 year)	$ 64,543
28				$ -	28				$ -	28				$ -
29	BB		2" Mill,3.5" fill, 1.5" shldrs	$ 220,228	29				$ -	29				$ -
30				$ -	30	BH		Concrete Removal and Recon	$ 552,179	30				$ -
31				$ -	31				$ -	31				$ -
32	AA		Crack Treatment	$ 5,000	32				$ -	32				$ -
33				$ -	33				$ -	33				$ -
34				$ -	34				$ -	34				$ -
35			Remaining Service Life Value**	$ (118,584)	35			Remaining Service Life Value**	$ (308,870)	35			Remaining Service Life Value**	$ (24,824)
			Total Present Worth	$ 565,277				Total Present Worth	$ 693,056				Total Present Worth	$ 554,518
			Eq. Annual Cost*	$25,168				Eq. Annual Cost*	$30,857				Eq. Annual Cost*	$24,689
			% of Low Cost	102%				% of Low Cost	125%				% of Low Cost	100%

* Equivalent Annual Cost is included for information only.

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

District	7
Performed By	C. Bower
Analysis Period	35
Discount Rate	2.7

Project Number	0705-21
Date	12/5/2012
Funding Category	2
Low Cost Option #	1
Chosen Option #	

RS

OPTION #1

DESCRIPTION: Mill 3.5 , Pave 3.5" (BIT)

DESIGN LIFE	TYPE
16	1

Year	#	Life	Description	Cost/Mile
0		16	Initial Construction	$ 250,137
1				$ -
2				$ -
3	AA		Crack Treatment	$ 10,000
4				$ -
5				$ -
6				$ -
7	BA		Chip Seal	$ 40,000
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15				$ -
16	BB	15	2" Mill, 3.5" Overlay	$ 177,396
17				$ -
18				$ -
19	AA		Crack Treatment	$ 10,000
20				$ -
21				$ -
22				$ -
23	BA		Chip Seal	$ 40,000
24				$ -
25				$ -
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31	BB	14	2" Mill, 3.5" Overlay	$ 177,396
32				$ -
33				$ -
34	AA		Crack Treatment	$ 10,000
35		10	Remaining Service Life Value**	$ (126,711.74)
			Total Present Worth	$ 467,936
			Eq. Annual Cost*	$20,834
			% of Low Cost	100%

OPTION #2

DESCRIPTION: Bit Reconstruct (BIT)

DESIGN LIFE	TYPE
20	1

Year	#	Life	Description	Cost/Mile
0		20	Initial Construction	$ 753,487
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8	BC		Light Crack Treatment	$ 5,000
9				$ -
10				$ -
11				$ -
12	BA		Chip Seal	$ 40,000
13				$ -
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20	BB	15	2" Mill, 3.5" Overlay	$ 177,396
21				$ -
22				$ -
23	AA		Crack Treatment	$ 10,000
24				$ -
25				$ -
26				$ -
27	BA		Chip Seal	$ 40,000
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			No Remaining Service Life	$ -
			Total Present Worth	$ 915,604
			Eq. Annual Cost*	$40,766
			% of Low Cost	196%

OPTION #3

DESCRIPTION: Whitetopping (PCC)

DESIGN LIFE	TYPE
20	2

Year	#	Life	Description	Cost/Mile
0		20	Initial Construction	$ 384,088
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13	BD		20 yr whitetopping - Yr 13 fix	$ 121,355
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25	BE		20 yr whitetopping - Yr 25 fix	$ 197,457
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			No Remaining Service Life	$ -
			Total Present Worth	$ 571,359
			Eq. Annual Cost*	$25,439
			% of Low Cost	122%

* Equivalent Annual Cost is included for information only.

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

District	7
Performed By	C. Bower
Analysis Period	35
Discount Rate	2.7

Project Number	0708-35
Date	12/5/2012
Funding Category	RS
Low Cost Option #	1
Chosen Option #	

OPTION #1

DESCRIPTION				
2" Mill (29') wide, 3.5" O/L (29' wide), 1.5" O/L (8' wide)				
			DESIGN LIFE	TYPE
			14	BIT
Year	#	Life	Description	Cost/Mile
0			Initial Construction	$ 266,693
1				$ -
2				$ -
3	AA		Crack Treatment	$ 10,000
4				$ -
5				$ -
6				$ -
7	BA		Chip Seal	$ 40,000
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14	BB	13	2" Mill, 3.5" Overlay	$ 177,396
15				$ -
16				$ -
17	AA		Crack Treatment	$ 10,000
18				$ -
19				$ -
20				$ -
21	BA		Chip Seal	$ 40,000
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27	BB	12	2" Mill, 3.5" Overlay	$ 177,396
28				$ -
29				$ -
30	AA		Crack Treatment	$ 10,000
31				$ -
32				$ -
33				$ -
34	BA		Chip Seal	$ 40,000
35		4	Remaining Service Life Value**	$ (58,541)
			Total Present Worth	$ 544,536
			Eq. Annual Cost*	$24,245
			% of Low Cost	100%

OPTION #2

DESCRIPTION				
Bit Reconstruct				
			DESIGN LIFE	TYPE
			20	BIT
Year	#	Life	Description	Cost/Mile
0			Initial Construction	$ 1,747,149
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8	BC		Light Crack Treatment	$ 5,000
9				$ -
10				$ -
11				$ -
12	BA		Chip Seal	$ 40,000
13				$ -
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20	BB	15	2" Mill, 3.5" Overlay	$ 177,396
21				$ -
22				$ -
23	AA		Crack Treatment	$ 10,000
24				$ -
25				$ -
26				$ -
27	BA		Chip Seal	$ 40,000
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35		No	Remaining Service Life Value**	$ -
			Total Present Worth	$ 1,909,266
			Eq. Annual Cost*	$85,008
			% of Low Cost	351%

OPTION #3

DESCRIPTION				
6.5" Unbonded Concrete Overlay				
			DESIGN LIFE	TYPE
			20	PCC
Year	#	Life	Description	Cost/Mile
0			Initial Construction	$ 604,683
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13	BF		20 yr UBOL - Yr. 13 fix	$ 25,378
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25	BG		20 yr UBOL - Yr. 25 fix	$ 165,557
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35		No	Remaining Service Life Value**	$ -
			Total Present Worth	$ 707,685
			Eq. Annual Cost*	$31,509
			% of Low Cost	130%

* Equivalent Annual Cost is included for information only.

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

District	1
Performed By	TA check
Analysis Period	35
Discount Rate	2.7

Project Number	0980-139
Date	1/23/2012
Funding Category	RD
Low Cost Option #	2
Chosen Option #	

District	1
Performed By	TA check
Analysis Period	35
Discount Rate	2.7

OPTION #1

DESCRIPTION	DESIGN LIFE	TYPE
7.5" UBOL	20	PCC

Year	#	Life	Description	Cost/Mile
0				$ 383,878
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13	ao		Reseal Joints (15')	$ 9,572
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25	as		Major CPR (15')	$ 179,611
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ -

Total Present Worth	$ 482,920
Eq. Annual Cost*	$21,501
% of Low Cost	101%

OPTION #2

DESCRIPTION	DESIGN LIFE	TYPE
8.5" UBOL	30	PCC

Year	#	Life	Description	Cost/Mile
0				$ 409,300
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15	ba		Reseal joints & minor repair	$ 4,786
16				$ -
17				$ -
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25	aq		Minor CPR (15')	$ 129,582
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ -

Total Present Worth	$ 479,080
Eq. Annual Cost*	$21,330
% of Low Cost	100%

OPTION #3

DESCRIPTION	DESIGN LIFE	TYPE
2" HMA with 5/8" Ultra Thin Wear Course	10	BIT

Year	#	Life	Description	Cost/Mile
0				$ 208,843
1				$ -
2				$ -
3	bb		Crack Seal	$ 2,200
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10	bc	7	Thin OL	$ 111,514
11				$ -
12				$ -
13	bb		Crack Seal	$ 2,200
14				$ -
15				$ -
16				$ -
17	bd	7	Thin Mill * OL	$ 120,666
18				$ -
19				$ -
20	bb		Crack Seal	$ 2,200
21				$ -
22				$ -
23				$ -
24	be	16	Thick OL	$ 238,515
25				$ -
26				$ -
27	bb		Crack Seal	$ 2,200
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ -

Total Present Worth	$ 502,784
Eq. Annual Cost*	$22,386
% of Low Cost	105%

OPTION #4

DESCRIPTION	DESIGN LIFE	TYPE
8" HMA reconstruct	20	BIT

Year	#	Life	Description	Cost/Mile
0				$ 466,053
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8	aa		Crack Treatment	$ 5,000
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20	bg	12	Med Mill & OL	$ 180,646
21				$ -
22				$ -
23				$ -
24				$ -
25	aa		Crack Treatment	$ 5,000
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32	bg	11	Med Mill & OL	$ 180,646
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (131,379)

Total Present Worth	$ 603,996
Eq. Annual Cost*	$26,892
% of Low Cost	126%

* Equivalent Annual Cost is included for information only.

* Equivalent Annual Cost is included for informatic

District	Metro	Draft
Performed By	A. Azarshin	Draft
Analysis Period	35	Draft
Discount Rate	2.84	Draft
		Draft

Project Number	1002-89 TH 5	Draft
Date	12/6/2010	Draft
Funding Category	RX	Draft
Low Cost Option #	1	Draft
Chosen Option #	3	Draft

Option #1

Description	4" M & O
Design Life (Years)	15 BITUMINOUS

Year	Description	Cost/Mile	PW/Mile
0	4" Mill and Overlay	$ 200,000	$ 200,000
1			$ -
2			$ -
3			$ -
4	Crack Seal	$ 5,000	$ 4,470
5			$ -
6			$ -
7			$ -
8			$ -
9			$ -
10			$ -
11			$ -
12			$ -
13			$ -
14			$ -
15	4" Mill and Overlay (2" on Sho	$ 200,000	$ 131,401
16			$ -
17			$ -
18			$ -
19	Crack Seal	$ 5,000	$ 2,937
20			$ -
21			$ -
22			$ -
23			$ -
24			$ -
25			$ -
26			$ -
27			$ -
28			$ -
29	4" Mill and Overlay (2" on Sho	$ 200,000	$ 88,783
30			$ -
31			$ -
32			$ -
33	Crack Seal	$ 5,000	$ 1,984
34			$ -
35	Remaining Life	$ (107,692)	$ (40,412)
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
	Total Present Worth		$ 389,163
	% of Low Cost		100%

Option #2

Description	6" whitetopping
Design Life (Years)	15 PCC

Year	Description	Cost/Mile	PW/Mile
0	6" Whitetopping	$ 300,000	$ 300,000
1			$ -
2			$ -
3			$ -
4			$ -
5			$ -
6			$ -
7			$ -
8			$ -
9			$ -
10			$ -
11			$ -
12	Minor CPR	$ 100,000	$ 71,459
13			$ -
14			$ -
15			$ -
16			$ -
17			$ -
18			$ -
19			$ -
20	Remove & Replace	$ 350,000	$ 199,906
21			$ -
22			$ -
23			$ -
24			$ -
25			$ -
26			$ -
27			$ -
28			$ -
29			$ -
30			$ -
31			$ -
32			$ -
33			$ -
34			$ -
35	Remaining Life	$ -	$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
	Total Present Worth		$ 571,365
	% of Low Cost		147%

District	8
Performed By	S. Pedersen
Analysis Period	35
Discount Rate	2.84

Project Number	1212-30
Date	4/12/2011
Funding Category	2
Low Cost Option #	1
Chosen Option #	0

OPTION #1			OPTION #2			OPTION #3		
DESCRIPTION			DESCRIPTION			DESCRIPTION		
Stabilized Full Deph Reclamation			Whitetopping			Whitetopping		
	DESIGN LIFE	TYPE		DESIGN LIFE	TYPE		DESIGN LIFE	TYPE
	20	1		20	2		35	2
Year	Description	Cost/Mile	Year	Description	Cost/Mile	Year	Description	Cost/Mile
0	BAB	$ 594,128	0	7.5" UBOL (20 yr)	$ 986,574	0	8" UBOL (35 yr)	$ 1,007,034
1		$ -	1		$ -	1		$ -
2		$ -	2		$ -	2		$ -
3		$ -	3		$ -	3		$ -
4		$ -	4		$ -	4		$ -
5		$ -	5		$ -	5		$ -
6	Crack Treatment	$ 5,000	6		$ -	6		$ -
7	Surface Treatment	$ 25,000	7		$ -	7		$ -
8		$ -	8		$ -	8		$ -
9		$ -	9		$ -	9		$ -
10		$ -	10		$ -	10		$ -
11		$ -	11		$ -	11		$ -
12		$ -	12		$ -	12		$ -
13		$ -	13	Minor CPR + Seal	$ 54,000	13		$ -
14		$ -	14		$ -	14		$ -
15		$ -	15		$ -	15		$ -
16		$ -	16		$ -	16		$ -
17		$ -	17		$ -	17	Minor CPR	$ 119,500
18		$ -	18		$ -	18		$ -
19		$ -	19		$ -	19		$ -
20	2"Mill & 2" Overlay + chip shlds	$ 149,626	20		$ -	20		$ -
21		$ -	21		$ -	21		$ -
22		$ -	22		$ -	22		$ -
23	Crack Treatment	$ 5,000	23		$ -	23		$ -
24	Surface Treatment	$ 25,000	24		$ -	24		$ -
25		$ -	25	Major CPR + Grind	$ 228,000	25		$ -
26		$ -	26		$ -	26		$ -
27		$ -	27		$ -	27	Minor CPR + Seal	$ 54,000
28		$ -	28		$ -	28		$ -
29		$ -	29		$ -	29		$ -
30		$ -	30		$ -	30		$ -
31		$ -	31		$ -	31		$ -
32		$ -	32		$ -	32		$ -
33		$ -	33		$ -	33		$ -
34		$ -	34		$ -	34		$ -
35	End of Analysis	$ -	35	End of Analysis	$ -	35	Remaining Service Life Value**	$ (20,520)
	Total Present Worth	$ 719,756		Total Present Worth	$ 1,137,306		Total Present Worth	$ 1,098,922
	Eq. Annual Cost*	$32,719		Eq. Annual Cost*	$51,700		Eq. Annual Cost*	$49,955
	% of Low Cost	100%		% of Low Cost	158%		% of Low Cost	153%

* Equivalent Annual Cost is included for information only.

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

District	Metro
Performed By	D.Palmquist
Analysis Period	35
Discount Rate	2.7

Project Number	1301-113
Date	10/10/2011
Funding Category	RS
Low Cost Option #	1
Chosen Option #	

District	Metro
Performed By	D.Palmquist
Analysis Period	35
Discount Rate	2.7

OPTION #1

DESCRIPTION: 4.5" Mill and 4" Bituminous Overlay

DESIGN LIFE	TYPE
15	BIT

Year	#	Life	Description	Cost/Mile
0			Initial Cost	$ 298,750
1				$ -
2				$ -
3	AA		Crack Treatment	$ 5,000
4				$ -
5				$ -
6				$ -
7	BA		Chip Seal	$ 20,000
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15	BE		2" mill/3.5" overlay/1.5" shld	$ 207,060
16				$ -
17				$ -
18	AA		Crack Treatment	$ 5,000
19				$ -
20				$ -
21				$ -
22	BA		Chip Seal	$ 20,000
23				$ -
24				$ -
25				$ -
26				$ -
27				$ -
28				$ -
29	BE		2" mill/3.5" overlay/1.5" shld	$ 207,060
30				$ -
31				$ -
32	AA		Crack Treatment	$ 5,000
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (111,810)

Total Present Worth	$ 526,782
Eq. Annual Cost*	$23,454
% of Low Cost	100%

OPTION #2

DESCRIPTION: 6" Unbonded Concrete Overlay

DESIGN LIFE	TYPE
35	CONC

Year	#	Life	Description	Cost/Mile
0			Initial Cost	$ 568,700
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15				$ -
16				$ -
17	BF		1st CPR (35 year)	$ 5,982
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27	BG		2nd CPR (35 year)	$ 63,660
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (24,484)

Total Present Worth	$ 593,874
Eq. Annual Cost*	$26,441
% of Low Cost	113%

OPTION #3

DESCRIPTION: Rubblize Concrete/6" Bituminous

DESIGN LIFE	TYPE
20	BIT

Year	#	Life	Description	Cost/Mile
0			Initial Cost	$ 460,200
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8	AA		Crack Treatment	$ 5,000
9				$ -
10				$ -
11				$ -
12	BA		Chip Seal	$ 20,000
13				$ -
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20	BD		2.5" mill/4" overlay/1.5" shld	$ 228,450
21				$ -
22				$ -
23	AA		Crack Treatment	$ 5,000
24				$ -
25				$ -
26				$ -
27	BA		Chip Seal	$ 20,000
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ -

Total Present Worth	$ 625,304
Eq. Annual Cost*	$27,841
% of Low Cost	119%

OPTION #4

DESCRIPTION: 6" Unbonded Concrete Overlay (Minimum Design)

DESIGN LIFE	TYPE
20	CONC

Year	#	Life	Description	Cost/Mile
0			Initial Cost	$ 568,700
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13	BI		1st CPR (20 year)	$ 23,426
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25	BJ		2nd CPR (20 Year)	$ 114,492
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ -

Total Present Worth	$ 644,087
Eq. Annual Cost*	$28,677
% of Low Cost	122%

* Equivalent Annual Cost is included for information only.

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

* Equivalent Annual Cost is included for informatic

District	Metro
Performed By	D.Palmquist
Analysis Period	35
Discount Rate	2.7

Project Number	1306-40
Date	11/14/2011
Funding Category	RD
Low Cost Option #	2
Chosen Option #	

OPTION #1					OPTION #2					OPTION #3				
DESCRIPTION					DESCRIPTION					DESCRIPTION				
6" Bit over 8": Reclaim					7" Concrete over 8" Reclaim					6" Concrete over 8" Reclaim				
			DESIGN LIFE	TYPE				DESIGN LIFE	TYPE				DESIGN LIFE	TYPE
			20	BIT				35	PCC				20	PCC
Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile
0			Initial Cost	$ 482,800	0			Initial Cost	$ 491,700	0			Initial Cost	$ 453,700
1				$ -	1				$ -	1				$ -
2				$ -	2				$ -	2				$ -
3				$ -	3				$ -	3				$ -
4				$ -	4				$ -	4				$ -
5				$ -	5				$ -	5				$ -
6				$ -	6				$ -	6				$ -
7				$ -	7				$ -	7				$ -
8	BA		Light Crack Treatment	$ 2,500	8				$ -	8				$ -
9				$ -	9				$ -	9				$ -
10				$ -	10				$ -	10				$ -
11				$ -	11				$ -	11				$ -
12	BB		Chip Seal	$ 20,000	12				$ -	12				$ -
13				$ -	13				$ -	13	BF		1st CPR (20 year)	$ 23,426
14				$ -	14				$ -	14				$ -
15				$ -	15				$ -	15				$ -
16				$ -	16				$ -	16				$ -
17				$ -	17	BD		1st CPR (35 year)	$ 18,640	17				$ -
18				$ -	18				$ -	18				$ -
19				$ -	19				$ -	19				$ -
20	BC		2.5" Mill and 4" Overlay	$ 189,226	20				$ -	20				$ -
21				$ -	21				$ -	21				$ -
22				$ -	22				$ -	22				$ -
23	AA		Crack Treatment	$ 5,000	23				$ -	23				$ -
24				$ -	24				$ -	24				$ -
25				$ -	25				$ -	25	BG		2nd CPR (20 year)	$ 114,492
26				$ -	26				$ -	26				$ -
27	BB		Chip Seal	$ 20,000	27	BE		2nd CPR (35 year)	$ 64,463	27				$ -
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 Value**	$ -	35			Remaining Service Life Value**	$ (24,793)	35			Remaining Service Life Value**	$ -
			Total Present Worth	$ 622,862				Total Present Worth	$ 525,191				Total Present Worth	$ 529,087
			Eq. Annual Cost*	$27,732				Eq. Annual Cost*	$23,383				Eq. Annual Cost*	$23,557
			% of Low Cost	119%				% of Low Cost	100%				% of Low Cost	101%

* Equivalent Annual Cost is included for information only.

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

LIFE CYCLE COST ANALYSIS

District	Metro
Performed By	C. Kufner
Analysis Period	35
Discount Rate	2.7

Project Number	1901-168
Date	11/17/2011
Funding Category	RS
Low Cost Option #	1
Chosen Option #	1

OPTION #1

DESCRIPTION	DESIGN LIFE	TYPE
4" Mill and 4" Bituminous Overlay (urban)	15	BIT

Year	#	Life	Description	Cost/Mile
0			4" m/o, 2" m/o on shoulder	$ 194,754
1				$ -
2				$ -
3	aa		Crack Treatment	$ 5,000
4				$ -
5				$ -
6				$ -
7	ab		Surface Treatment	$ 20,000
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15	ba		3.5" Mill & Overlay (2" shdr)	$ 181,090
16				$ -
17				$ -
18	aa		Crack Treatment	$ 5,000
19				$ -
20				$ -
21				$ -
22	ab		Surface Treatment	$ 20,000
23				$ -
24				$ -
25				$ -
26				$ -
27				$ -
28				$ -
29	bb		4" Mill and Overlay (2" shdr)	$ 194,754
30				$ -
31				$ -
32	aa		Crack Treatment	$ 5,000
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (104,868)
			Total Present Worth	$ 402,421
			Eq. Annual Cost*	$17,917
			% of Low Cost	100%

OPTION #2

DESCRIPTION	DESIGN LIFE	TYPE
6" mill and 6" Concrete Overlay	15	PCC

Year	#	Life	Description	Cost/Mile
0			6" mill, 6" pcc, 2" m/o shld	$ 336,347
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12	bc		Reseal and partials (12')	$ 29,283
13				$ -
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20	bd		Major CPR (2" shdr)	$ 177,553
21				$ -
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27				$ -
28				$ -
29				$ -
30	bg		rem/replace 6" pcc	$ 392,667
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (261,909)
			Total Present Worth	$ 535,314
			Eq. Annual Cost*	$23,834
			% of Low Cost	133%

OPTION #3

DESCRIPTION	DESIGN LIFE	TYPE
6.5" mill and 6.5" Concrete Overlay	20	PCC

Year	#	Life	Description	Cost/Mile
0			6.5 mill, 6.5" pcc, 2" m/o shdr	$ 351,835
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13	bc		Reseal and partials (12')	$ 29,283
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25	bd		Major CPR (2" shdr)	$ 177,553
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ -
			Total Present Worth	$ 463,761
			Eq. Annual Cost*	$20,648
			% of Low Cost	115%

* Equivalent Annual Cost is included for information only.

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

District	4
Performed By	SM
Analysis Period	35
Discount Rate	2.7

Project Number	2102-54
Date	11/10/2011
Funding Category	RS
Low Cost Option #	1
Chosen Option #	1

OPTION #1					OPTION #2				
DESCRIPTION					DESCRIPTION				
1.5" Mill and 3" Overlay					6.5" Whitetopping				
DESIGN LIFE				TYPE	DESIGN LIFE				TYPE
15				BIT	15				PCC
Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile
0			Initial Cost	$ 102,080	0			Initial Cost	$ 299,155
1				$ -	1				$ -
2				$ -	2				$ -
3	AA	3	Crack Treatment	$ 2,000	3				$ -
4				$ -	4				$ -
5				$ -	5				$ -
6	AB	9	Surface Treatment	$ 20,000	6				$ -
7				$ -	7				$ -
8				$ -	8				$ -
9				$ -	9				$ -
10				$ -	10				$ -
11				$ -	11				$ -
12				$ -	12				$ -
13				$ -	13				$ -
14				$ -	14				$ -
15	AK	14	3" Mill & 3" Overlay	$ 104,000	15	AR	8	Major CPR (6'X6')	$ 200,000
16				$ -	16				$ -
17				$ -	17				$ -
18	AA	3	Crack Treatment	$ 2,000	18				$ -
19				$ -	19				$ -
20				$ -	20				$ -
21	AB	8	Surface Treatment	$ 20,000	21				$ -
22				$ -	22				$ -
23				$ -	23	AZ	20	New Bituminous Structure	$ 330,000
24				$ -	24				$ -
25				$ -	25				$ -
26				$ -	26	AA	3	Crack Treatment	$ 2,000
27				$ -	27				$ -
28				$ -	28				$ -
29	AK	13	3" Mill & 3" Overlay	$ 104,000	29	AB	14	Surface Treatment	$ 20,000
30				$ -	30				$ -
31				$ -	31				$ -
32	AA	3	Crack Treatment	$ 2,000	32				$ -
33				$ -	33				$ -
34				$ -	34				$ -
35			Remaining Service Life Value**	$ (56,000)	35			Remaining Service Life Value**	$ (132,000)
			Total Present Worth	$ 230,219				Total Present Worth	$ 570,363
			Eq. Annual Cost*	$10,250				Eq. Annual Cost*	$25,395
			% of Low Cost	100%				% of Low Cost	248%

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

District	7
Performed By / Updated by	A. Noble / J. Hager
Analysis Period	35
Discount Rate	2.5

Project Number	2212-28
Date	RD
Funding Category	4
Low Cost Option #	1
Chosen Option #	1

OPTION #1

DESCRIPTION

Reclamation with a Bituminous Surface

DESIGN LIFE	TYPE
20	BIT

Year	#	Life	Description	Cost/Mile
0			Initial Construction	$389,283
1				$0
2				$0
3				$0
4				$0
5				$0
6				$0
7				$0
8	AB		Light Crack Treatment	$1,500
9				$0
10				$0
11				$0
12	AC		Chip Seal	$20,000
13				$0
14				$0
15				$0
16				$0
17				$0
18				$0
19				$0
20	AD		2" Mill & 3.5" Overlay + 1.5" Shoulders	$197,413
21				$0
22				$0
23	AA		Crack Treatment	$3,000
24				$0
25				$0
26				$0
27	AC		Chip Seal	$20,000
28				$0
29				$0
30				$0
31				$0
32				$0
33				$0
34				$0
35			NO REMAINING SERVICE LIFE	$0
			Total Present Worth	$537,829
			Eq. Annual Cost*	$23,237
			% of Low Cost	100%

OPTION #2

DESCRIPTION

Reclaim with a Concrete Surface

DESIGN LIFE	TYPE
20	PCC

Year	#	Life	Description	Cost/Mile
0			Initial Construction	$630,716
1				$0
2				$0
3				$0
4				$0
5				$0
6				$0
7				$0
8				$0
9				$0
10				$0
11				$0
12				$0
13	AE		1st CPR 20 yr.	$31,723
14				$0
15				$0
16				$0
17				$0
18				$0
19				$0
20				$0
21				$0
22				$0
23				$0
24				$0
25	AF		2nd CPR 20 yr.	$177,428
26				$0
27				$0
28				$0
29				$0
30				$0
31				$0
32				$0
33				$0
34				$0
35			NO REMAINING SERVICE LIFE	$0
			Total Present Worth	$ 749,431
			Eq. Annual Cost*	$32,380
			% of Low Cost	139%

* Equivalent Annual Cost is included for information only.

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

Cost Analysis/ T.H. 13/S.P. 2401-39(T.H. 69 to I-90)

Givens:

Length =	5.73 miles		
Width of Road =	24 feet(Conc.)	24 feet(Bit.)	11/13/12-TRM
1" Bituminous =	113 lbs/SY		
Interest Rate =	2.5 %		
Inflation Rate =	0 %		

4.5" Bituminous Overlay(15 Year Fix)

Item	Course	Unit	Price/Unit	Total Cost
PATCH		Ton	120.00	$27,504.00
TACK COAT		GAL	$1.00	$24,203.52
4.5" SPWEB340B	Wear	TON	55.00	$1,128,186.58
		Total Cost:		**$1,179,894**
		Cost/Mile:		**$205,915**

Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
Initial Cost	0	$205,915	1.000	$205,915	$8,897
Rout & seal	3	$2,000	0.929	$1,857	$80
Chipseal	5	$20,000	0.884	$17,677	$764
Mill & 3" Overlay	17	$145,117	0.657	$95,370	$4,121
Rout & seal	19	$2,000	0.626	$1,251	$54
Chipseal	21	$20,000	0.595	$11,908	$514
Mill & 3" Overlay	33	$145,117	0.443	$64,244	$2,776
Remaining Life Value	35	($125,768)	0.421	-$52,995	-$2,290
		Total Present Worth:		**$345,227**	$14,916
		Equivalent Annual Cost:		**$14,916**	$14,916

6" Unbonded Overlay(15 Year Fix)

Item	Course	Unit	Price/Unit	Total Cost
PASSRC		Ton	58.54	$334,763.33
Conc Std Width 6		SY	5.00	$403,392.00
Structural Concrete		CY	65.77	$884,369.73
Reinforcement Bars	Epoxy	lb	0.80	$28,512.48
Dowel Bars	Epoxy	each	5.20	$251,716.61
		Total Cost:		**$1,902,754**
		Cost/Mile:		**$332,069**

Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
Initial Cost	0	$332,069	1.000	$332,069	$14,347
Major CPR	15	$150,000	0.690	$103,570	$4,475
3.5" Bit. Overlay	25	$160,754	0.539	$86,709	$3,746
Rout & seal	27	$2,000	0.513	$1,027	$44
Remaining Life Value	35	($53,585)	0.421	-$22,579	-$976
		Total Present Worth:		**$500,796**	$21,637
		Equivalent Annual Cost:		**$21,637**	$21,637

1. Preventive Maintenance adds 1 year of life to thin overlays and 2 years to medium overlays and Reclaimed pavements.
2. Each successive overlay has 1 year less life than previous one on a section.
3. Medium overlay-15 years,unbonded-15 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 TH 65(IOWA/MN SL to I-35)

Givens:

Length =	8.98	miles		
Width of Road =	24	feet	24 feet	trm-8/10/12
1" Bituminous =	113	lbs/SY		
Interest Rate =	2.5	%		
Inflation Rate =	0	%		

***Note:** Aggregate and shoulder quantities were not included in each option.
***Note:** Calculations are based on 35 yr. life cycle.

MILL 2"& 3.5" Bituminous Overlay(15 years)

Item	Course	Unit	Price/Unit	Total Cost
2" MILL BITUMINOUS		SY	0.80	$101,150.72
PATCH		TON	100.00	$35,920.00
TACK COAT		GAL	1.00	$25,287.68
1.5" SPWEB340B	Wear	TON	55.00	$589,360.99
2" SPWEB340B	Wear	TON	55.00	$785,814.66
		Total Cost:		**$1,537,534**
		Cost/Mile:		**$171,218**

Strategy	Year	Cost/Mile	Present Worth	Annual Cost
Initial Cost	0	$171,218	$171,218	$7,398
Rout & seal	2	$2,000	$1,904	$82
Chipseal	4	$20,000	$18,119	$783
Mill & 3" Overlay	17	$170,279	$111,907	$4,835
Rout & seal	19	$2,000	$1,251	$54
Chipseal	21	$20,000	$11,908	$514
Mill & 3" Overlay	33	$170,279	$75,383	$3,257
Remaining Life Value	35	($147,575)	-$62,184	-$2,687
		Total Present Worth:	**$329,505**	$14,236
		Equivalent Annual Cost:	**$14,236**	

6" Unbonded Concrete Overlay-Doweled(20 years)

Item	Course	Unit	Price/Unit	Total Cost
4" MILL BITUMINOUS		SY	1.60	$202,301.44
PASSRC		Ton	44.57	$1,067,540.64
Conc Std Width 6		SY	3.35	$423,568.64
Structural Concrete		CY	75.17	$1,584,062.42
Reinforcement Bars	Epoxy	lb	0.86	$128,380.80
Dowel Bars	Epoxy	each	8.19	$621,318.30
		Total Cost:		**$4,027,172**
		Cost/Mile:		**$448,460**

Strategy	Year	Cost/Mile	Present Worth	Annual Cost
Initial Cost	0	$448,460	$448,460	$19,376
Minor CPR	20	$150,000	$91,541	$3,955
Remaining Life Value	35	$0	$0	$0
		Total Present Worth:	**$540,001**	$23,331
		Equivalent Annual Cost:	**$23,331**	$23,331

MILL & 4.5" Bituminous Overlay(20 years)

Item	Course	Unit	Price/Unit	Total Cost
2" MILL BITUMINOUS		SY	0.80	$101,150.72
PATCH		Ton	100.00	$35,920.00
TACK COAT		GAL	1.00	$37,931.52
4.5" SPWEB340B	Wear	TON	55.00	$1,768,082.98
		Total Cost:		**$1,943,085**
		Cost/Mile:		**$216,379**

Strategy	Year	Cost/Mile	Present Worth	Annual Cost
Initial Cost	0	$216,379	$216,379	$9,349
Rout & seal	3	$2,000	$1,857	$80
Chipseal	5	$20,000	$17,677	$764
Mill & 3" Overlay	22	$170,279	$98,909	$4,273
Rout & seal	24	$2,000	$1,106	$48
Chipseal	26	$20,000	$10,525	$455
Remaining Life Value	35	($40,066)	-$16,883	-$729
		Total Present Worth:	**$329,570**	$14,239
		Equivalent Annual Cost:	**$14,239**	$14,239

1. Preventive Maintenance adds 1 year of life to thin overlays and 2 years to medium overlays and Reclaimed pavements
2. Each successive overlay has 1 year less life than previous one on a section.
3. Medium overlay-15 years ,Thin unbonded and thick overlays-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.

District	Metro
Performed By	D. Nelson
Analysis Period	35
Discount Rate	2.5

Project Number	2722-81
Date	11/28/2012
Funding Category	2
Low Cost Option #	1
Chosen Option #	1

RS

BIT PCC

OPTION #1

DESCRIPTION				
4.5" Mill and Overlay (1.5" shld.)				
			DESIGN LIFE	TYPE
			15	1
Year	#	Life	Description	Cost/Mile
0			4.5" Mill and Overlay (1.5" shld.)	$ 242,495
1				$ -
2				$ -
3	aa		Crack Treatment	$ 3,000
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15	ba		3.5" Mill & Overlay (2" shdr)	$ 190,238
16				$ -
17				$ -
18	aa		Crack Treatment	$ 3,000
19				$ -
20				$ -
21				$ -
22	ab		Surface Treatment	$ 20,000
23				$ -
24				$ -
25				$ -
26				$ -
27				$ -
28				$ -
29	bb		4.5" Mill and Overlay (1.5" shdr)	$ 242,495
30				$ -
31				$ -
32	aa		Crack Treatment	$ 3,000
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (114,469)
			Total Present Worth	$ 461,799
			Eq. Annual Cost*	$19,952
			% of Low Cost	100%

BIT PCC

OPTION #2

DESCRIPTION				
5.5" Mill, 7.0" pcc, 1.5" OL shld				
			DESIGN LIFE	TYPE
			20	2
Year	#	Life	Description	Cost/Mile
0			5.5" Mill, 7.0" pcc, 1.5" OL shld	$ 352,412
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13	bc		Reseal and partials (15')	$ 72,126
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25	bd		Major CPR (2" shdr)	$ 278,767
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ -
			Total Present Worth	$ 555,098
			Eq. Annual Cost*	$23,983
			% of Low Cost	120%

PCC

OPTION #3

DESCRIPTION				
6.0" Mill and Overlay (1.5" shdr)				
			DESIGN LIFE	TYPE
			20	1
Year	#	Life	Description	Cost/Mile
0			6.0" Mill and Overlay (1.5" shdr)	$ 298,977
1				$ -
2				$ -
3	aa		Crack Treatment	$ 3,000
4				$ -
5				$ -
6				$ -
7	ab		Surface Treatment	$ 20,000
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20	ba		3.5" Mill & Overlay (2" shdr)	$ 190,238
21				$ -
22				$ -
23	aa		Crack Treatment	$ 3,000
24				$ -
25				$ -
26				$ -
27				$ -
28	ab		Surface Treatment	$ 20,000
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34	bb		4.5" Mill and Overlay (1.5" shdr)	$ 242,495
35			Remaining Service Life Value**	$ (207,853)
			Total Present Worth	$ 463,554
			Eq. Annual Cost*	$20,028
			% of Low Cost	100%

* Equivalent Annual Cost is included for information only.

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

District	Metro	Draft
Performed By	A. Azarshin	Draft
Analysis Period	35	Draft
Discount Rate	2.7	Draft
		Draft

Project Number	2774-21	Draft
Date	10/31/2011	Draft
Funding Category	RS	Draft
Low Cost Option #	1	Draft
Chosen Option #	1	Draft

Option #1

Description	3.5" Mill & Overlay	
Design Life (Years)	15	BITUMINOUS

Year	Description	Cost/Mile	PW/Mile
0	3.5 Mill and Overlay	$ 231,300	$ 231,300
1			$ -
2			$ -
3	Crack Seal	$ 5,000	$ 4,616
4			$ -
5			$ -
6			$ -
7	Micro Surfacing	$ 35,000	$ 29,045
8			$ -
9			$ -
10			$ -
11			$ -
12			$ -
13			$ -
14			$ -
15	3.5" Mill and Overlay (3.5" on	$ 231,300	$ 155,103
16			$ -
17			$ -
18	Crack Seal	$ 5,000	$ 3,095
19			$ -
20			$ -
21			$ -
22	Micro Surfacing	$ 35,000	$ 19,477
23			$ -
24			$ -
25			$ -
26			$ -
27			$ -
28	3.5" Mill and Overlay (3.5" on	$ 231,300	$ 109,699
29			$ -
30			$ -
31	Crack Seal	$ 5,000	$ 2,189
32			$ -
33			$ -
34			$ -
35	Remaining Life	$ (76,329)	$ (30,042)
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
	Total Present Worth		$ 524,483
	% of Low Cost		100%

Option #2

Description	1.5" Bit. Mill & 6.5" Unbonded PCC	
Design Life (Years)	15	PCC

Year	Description	Cost/Mile	PW/Mile
0	1.5" Bit. Mill & 6.5" Unbonded	$ 396,000	$ 396,000
1			$ -
2			$ -
3			$ -
4			$ -
5			$ -
6			$ -
7			$ -
8			$ -
9			$ -
10			$ -
11			$ -
12	Minor CPR	$ 29,283	$ 21,270
13			$ -
14			$ -
15			$ -
16			$ -
17			$ -
18			$ -
19			$ -
20	Major CPR & Surface Planing	$ 195,100	$ 114,511
21			$ -
22			$ -
23			$ -
24			$ -
25			$ -
26			$ -
27			$ -
28			$ -
29			$ -
30	Remove and Replace	$ 426,600	$ 191,826
31			$ -
32			$ -
33			$ -
34			$ -
35	Remaining Life	$ (285,822)	$ (112,494)
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
	Total Present Worth		$ 611,113
	% of Low Cost		117%

District	Metro
Performed By	D. Nelson
Analysis Period	35
Discount Rate	2.7

Project Number	2785-367
Date	2/10/2012
Funding Category	RS
Low Cost Option #	1
Chosen Option #	1

OPTION #1					OPTION #2					OPTION #3				
DESCRIPTION					DESCRIPTION					DESCRIPTION				
4" Mill and Overlay (2" shdr)					4.0" mill, 7.0" pcc, 4" OL shld									
			DESIGN LIFE	TYPE				DESIGN LIFE	TYPE				DESIGN LIFE	TYPE
			15	BIT				15	PCC				20	PCC
Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile
0			4" Mill and Overlay (2" shdr)	$ 288,627	0			4.0" mill, 7.0" pcc, 4" OL shld	$ 575,068	0				
1				$ -	1				$ -	1				$ -
2				$ -	2				$ -	2				$ -
3	aa		Crack Treatment	$ 5,000	3				$ -	3				$ -
4				$ -	4				$ -	4				$ -
5				$ -	5				$ -	5				$ -
6				$ -	6				$ -	6				$ -
7	ab		Surface Treatment	$ 20,000	7				$ -	7				$ -
8				$ -	8				$ -	8				$ -
9				$ -	9				$ -	9				$ -
10				$ -	10				$ -	10				$ -
11				$ -	11				$ -	11				$ -
12				$ -	12	bc		Reseal and partials (12')	$ 29,283	12				$ -
13				$ -	13				$ -	13				$ -
14				$ -	14				$ -	14				$ -
15	ba		3.5" Mill & Overlay (2" shdr)	$ 195,104	15				$ -	15				$ -
16				$ -	16				$ -	16				$ -
17				$ -	17				$ -	17				$ -
18	aa		Crack Treatment	$ 5,000	18				$ -	18				$ -
19				$ -	19				$ -	19				$ -
20				$ -	20	bd		Major CPR (2" shdr)	$ 177,553	20				$ -
21				$ -	21				$ -	21				$ -
22	ab		Surface Treatment	$ 20,000	22				$ -	22				$ -
23				$ -	23				$ -	23				$ -
24				$ -	24				$ -	24				$ -
25				$ -	25				$ -	25				$ -
26				$ -	26				$ -	26				$ -
27				$ -	27				$ -	27				$ -
28				$ -	28				$ -	28				$ -
29	bb		4" Mill and Overlay (2" shdr)	$ 288,627	29				$ -	29				$ -
30				$ -	30	bj		rem/replace 7.0" pcc	$ 661,449	30				$ -
31				$ -	31				$ -	31				$ -
32	aa		Crack Treatment	$ 5,000	32				$ -	32				$ -
33				$ -	33				$ -	33				$ -
34				$ -	34				$ -	34				$ -
35			Remaining Service Life Value**	$ (104,868)	35			Remaining Service Life Value**	$ (440,966)	35			Remaining Service Life Value**	$ -
			Total Present Worth	$ 549,042				Total Present Worth	$ 824,423				Total Present Worth	
			Eq. Annual Cost*	$24,445				Eq. Annual Cost*	$36,706				Eq. Annual Cost*	
			% of Low Cost	100%				% of Low Cost	150%				% of Low Cost	

* Equivalent Annual Cost is included for information only.

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

Cost Analysis/ S.P. 2804-33/TH 44 From CSAH 12(Caledonia) to Butterfield Rd.

Givens:

Length =	12.551 miles		
Width of Road =	24 feet(Conc.)	24 feet(Bit.)	9/12/11-TRM
1" Bituminous =	113 lbs/SY		
Interest Rate =	2.7 %		
Inflation Rate =	0 %		

MILL & 3" min. Bituminous Overlay(15 Year Fix)

Item	Course	Unit	Price/Unit	Total Cost
1.5" MILL BITUMINOUS		SY	0.50	$88,359.04
PATCH		Ton	100.00	$50,204.00
TACK COAT		GAL	$1.00	$35,343.62
3" SPWEB340B	Wear	TON	50.00	$1,497,685.73
		Total Cost:		**$1,671,592**
		Cost/Mile:		**$133,184**

Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
Initial Cost	0	$133,184	1.000	$133,184	$5,930
Rout & seal	2	$2,000	0.948	$1,896	$84
Chipseal	4	$20,000	0.899	$17,978	$800
Mill & 3" Overlay	17	$133,184	0.636	$84,675	$3,770
Rout & seal	19	$2,000	0.603	$1,206	$54
Chipseal	21	$20,000	0.572	$11,430	$509
Mill & 3" Overlay	33	$133,184	0.415	$55,288	$2,462
Rout & seal	35	$2,000	0.394	$787	$35
Remaining Life Value	35	($115,426)	0.394	-$45,430	-$2,023
		Total Present Worth:		**$261,014**	$11,621
		Equivalent Annual Cost:		**$11,621**	$11,621

6.5" Unbonded Overlay(20 Year Fix)

Item	Course	Unit	Price/Unit	Total Cost
4" MILL BITUMINOUS		SY	1.50	$265,077.12
PASSRC		Ton	58.54	$733,266.07
Conc Std Width 6.5		SY	5.00	$883,590.40
Structural Concrete		CY	65.77	$2,098,680.89
Reinforcement Bars	Epoxy	lb	0.80	$62,453.78
Dowel Bars	Epoxy	each	5.20	$551,360.41
		Total Cost:		**$4,594,429**
		Cost/Mile:		**$366,061**

Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
Initial Cost	0	$366,061	1.000	$366,061	$16,298
Minor CPR	20	$150,000	0.587	$88,040	$3,920
3.5" Bit. Overlay	32	$153,072	0.426	$65,259	$2,906
Rout & seal	34	$2,000	0.404	$808	$36
Remaining Life Value	35	($126,059)	0.394	-$49,615	-$2,209
		Total Present Worth:		**$470,554**	$20,951
		Equivalent Annual Cost:		**$20,951**	$20,951

MILL & 5" min. Bituminous Overlay(20 Year Fix)

Item	Course	Unit	Price/Unit	Total Cost
1.5" MILL BITUMINOUS		SY	0.50	$88,359.04
PATCH		Ton	100.00	$50,204.00
TACK COAT		GAL	$1.00	$35,343.62
5" SPWEB340B	Wear	TON	50.00	$2,496,142.88
		Total Cost:		**$2,670,050**
		Cost/Mile:		**$212,736**

Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
Initial Cost	0	$212,736	1.000	$212,736	$9,472
Rout & seal	2	$2,000	0.948	$1,896	$84
Chipseal	4	$20,000	0.899	$17,978	$800
Mill & 3" Overlay	22	$133,184	0.556	$74,114	$3,300
Rout & seal	24	$2,000	0.528	$1,055	$47
Chipseal	26	$20,000	0.500	$10,005	$445
Remaining Life Value	35	($31,337)	0.394	-$12,334	-$549
		Total Present Worth:		**$305,451**	$13,600
		Equivalent Annual Cost:		**$13,600**	$13,600

1. Preventive Maintenance adds 1 year of life to thin overlays and 2 years to medium 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, whitetopping-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.

District	7
Performed By	K. Vogt
Analysis Period	35
Discount Rate	2.5

Project Number	3280-117
Date	11/15/2012
Funding Category	RD
Low Cost Option #	1
Chosen Option #	

OPTION #1

DESCRIPTION	DESIGN LIFE	TYPE
3" Mill & 3" Bit. Overlay	14 year	BIT

Year	#	Life	Description	Cost/Mile
0	AK	14	3" Mill & 3" Overlay	$ 113,263
1				$ -
2				$ -
3	AA		Crack Treatment	$ 3,000
4				$ -
5				$ -
6				$ -
7	AB		Chipseal	$ 20,000
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14	BF	13	2" Mill & 3.5" Bit. Overlay	$ 180,568
15				$ -
16				$ -
17	AA		Crack Treatment	$ 3,000
18				$ -
19				$ -
20				$ -
21	AB		Chipseal	$ 20,000
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27	BF	12	2" Mill & 3.5" Bit. Overlay	$ 180,568
28				$ -
29				$ -
30	AA		Crack Treatment	$ 3,000
31				$ -
32				$ -
33				$ -
34	AB		Chipseal	$ 20,000
35		4	Remaining Service Life (4/12)	$ (60,189.33)
			Total Present Worth	$ 351,956
			Eq. Annual Cost*	$15,206
			% of Low Cost	100%

OPTION #2

DESCRIPTION	DESIGN LIFE	TYPE
6" Unbonded Overlay	20 year	PCC

Year	#	Life	Description	Cost/Mile
0	AY	20	Unbonded Concrete Overlay	$ 668,912
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13	BB	12	Reseal Joints & Partial Depth Repair (13 yr.)	$ 93,496
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25	BC	10	Major CPR (25 yr.)	$ 301,208
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			No Remaining Service Life	$ -
			Total Present Worth	$ 899,205
			Eq. Annual Cost*	$38,851
			% of Low Cost	255%

OPTION #3

DESCRIPTION	DESIGN LIFE	TYPE
3" CIR & 4" Bituminous Overlay	20 years	BIT

Year	#	Life	Description	Cost/Mile
0	BA	20	3" CIR & 4" Overlay	$ 451,135
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8	BD		Light Crack Treatment	$ 1,500
9				$ -
10				$ -
11				$ -
12	AB		Chipseal	$ 20,000
13				$ -
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20	BE	15	2.5" Mill & 3.5" Bit. Overlay	$ 200,049
21				$ -
22				$ -
23	AA		Crack Treatment	$ 3,000
24				$ -
25				$ -
26				$ -
27	AB		Chipseal	$ 20,000
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			No Remaining Service Life	$ -
			Total Present Worth	$ 601,290
			Eq. Annual Cost*	$25,979
			% of Low Cost	171%

* Equivalent Annual Cost is included for information only.

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

District	3	Draft
Performed By	C. DeMenge	Draft
Analysis Period	35	Draft
Discount Rate	2.84	Draft
		Draft

Project Number	3309-14
Date	1/12/2011
Funding Category	Other
Low Cost Option #	1
Chosen Option #	1

Option #1

Description	3.0" Mill and 4.0" Bit Overlay
Design Life (Years)	15 BITUMINOUS

Year	Description	Cost/Mile	PW/Mile
0	3.0" Mill and 4.0" Bit Overlay	$ 191,000	$ 191,000
1			$ -
2			$ -
3			$ -
4			$ -
5	Seal Coat	$ 25,000	$ 21,733
6			$ -
7			$ -
8			$ -
9			$ -
10			$ -
11			$ -
12			$ -
13			$ -
14			$ -
15	2.0" Mill and 2.0" Overlay	$ 119,000	$ 78,184
16			$ -
17			$ -
18			$ -
19			$ -
20	Seal Coat	$ 25,000	$ 14,279
21			$ -
22			$ -
23			$ -
24			$ -
25			$ -
26			$ -
27	3.0" Mill and 3.0" Overlay	$ 174,000	$ 81,691
28			$ -
29			$ -
30			$ -
31			$ -
32	Seal Coat	$ 25,000	$ 10,204
33			$ -
34			$ -
35	Remaining Life	$ (80,040)	$ (30,035)
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
	Total Present Worth		$ 367,055
	% of Low Cost		100%

Option #2

Description	5.5" Whitetopping
Design Life (Years)	20 PCC

Year	Description	Cost/Mile	PW/Mile
0	5.5" Whitetopping	$ 380,000	$ 380,000
1			$ -
2			$ -
3			$ -
4			$ -
5			$ -
6			$ -
7			$ -
8			$ -
9			$ -
10			$ -
11			$ -
12			$ -
13	Minor CPR	$ 40,000	$ 27,794
14			$ -
15			$ -
16			$ -
17			$ -
18			$ -
19			$ -
20			$ -
21			$ -
22			$ -
23			$ -
24			$ -
25	Major CPR	$ 150,000	$ 74,480
26			$ -
27			$ -
28			$ -
29			$ -
30			$ -
31			$ -
32			$ -
33			$ -
34			$ -
35	Remaining Life		$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
	Total Present Worth		$ 482,274
	% of Low Cost		131%

Option #3

Description	Mill 4", Reclaim 6", Pave 5"
Design Life (Years)	20 BITUMINOUS

Year	Description	Cost/Mile	PW/Mile
0	Mill 4", Reclaim 6", Pave 5"	$ 297,000	$ 297,000
1			$ -
2			$ -
3			$ -
4			$ -
5	Seal Coat	$ 25,000	$ 21,733
6			$ -
7			$ -
8			$ -
9			$ -
10			$ -
11			$ -
12			$ -
13			$ -
14			$ -
15			$ -
16			$ -
17			$ -
18			$ -
19			$ -
20	Mill 3.0" and Overlay 3.0"	$ 174,000	$ 99,382
21			$ -
22			$ -
23			$ -
24			$ -
25	Seal Coat	$ 25,000	$ 12,413
26			$ -
27			$ -
28			$ -
29			$ -
30			$ -
31			$ -
32			$ -
33			$ -
34			$ -
35	Remaining Life		$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
			$ -
	Total Present Worth		$ 430,529
	% of Low Cost		117%

Mn/DOT DISTRICT 2 REHABILITATION WORKSHEET

(General Pre-Scoping / Planning Estimate)

TH 1 State Project 3602-25 - 2 different sections, 2 different fixes- 3rd section not included

Funding category	RD			Alternate #1		Alternate #2		Alternate #3		Alternate #4
	Description ---->			3.0" MILL & OL 1" mill 3" ol		5" whitetopping & 6" new				
		YR								
	First Cost $ / Mile			$134,270		$372,192				
	Rehab Life in Yrs			35		35		35		35
	Interest %			2.70%		2.70%		2.84%		2.84%
				20 year		20 year				
		1		$0		$0		$0		$0
		2		$0		$0		$0		$0
		3		$0		$0		$0		$0
		4		$0		$0		$0		$0
		5		$0		$0		$0		$0
		6		$0		$0		$0		$0
		7	F	$7,000		$0		$0		$0
		8		$0		$0		$0		$0
		9		$0		$0		$0		$0
		10		$0		$0		$0		$0
		11		$0		$0		$0		$0
		12	G	$23,000		$0		$0		$0
		13		$0	H	$97,945		$0		$0
		14		$0		$0		$0		$0
		15		$0		$0		$0		$0
		16		$0		$0		$0		$0
		17		$0		$0		$0		$0
		18		$0		$0		$0		$0
		19		$0		$0		$0		$0
		20	C	$77,750		$0		$0		$0
		21		$0		$0		$0		$0
		22		$0		$0		$0		$0
		23	F	$7,000		$0		$0		$0
		24		$0		$0		$0		$0
		25		$0	J	$271,097		$0		$0
		26		$0		$0		$0		$0
		27	G	$23,000		$0		$0		$0
		28		$0		$0		$0		$0
		29		$0		$0		$0		$0
		30		$0		$0		$0		$0
		31		$0		$0		$0		$0
		32		$0		$0		$0		$0
		33		$0		$0		$0		$0
		34		$0		$0		$0		$0
		35		$0		$0				
		36		$0		$0		$0		$0
		37		$0		$0		$0		$0
		38		$0		$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
		44		$0		$0		$0		$0
		45		$0		$0		$0		$0
		46		$0		$0		$0		$0
		47		$0		$0		$0		$0
		48		$0		$0		$0		$0
		49		$0		$0		$0		$0
	Total Cost (Present Worth)			$217,415		$580,737		$0		$0
	Annual Cost (Present Worth)			$9,680		$25,857		$1,000,000		$1,000,000
	% Above Low Option			100%		267%		10330%		10330%

Notes:
Last Revised 11/25/08 (A, F, G, H, I, J, K, L)
Last Revised 3/31/10 (B, C, D, E)

2-Lane Highway

Improvements		Cost / mile
A	Reclaim	$287,589
B	1 1/2" Overlay	$60,000
C	1 1/2" Mill & 1 1/2" Overlay	$77,750
D	2" Mill & Overlay	$100,000
E	3" Mill & 3" Overlay	$136,341
F	Route and Seal	$7,000
G	Chip seal	$23,000
H	Joint seal & minor CPR	$97,945
I	Minor CPR w/ full depth repair	$201,000
J	Major CPR & griding	$271,097
K	Microsurface	$45,500
L	New Concrete	$300,553
M	5.5" mill, conc rehab, 5" new	$425,510
N	3" overlay	$131,277

Data Furnished By:		3" mill & 3 ol	
Completed By:	KO	1" mill 3" ol	5" whitetopping and
Date:	11/21/2011		a 6" new concrete

Mn/DOT DISTRICT 2 REHABILITATION WORKSHEET

(General Pre-Scoping / Planning Estimate)

TH 11 State Project 3604-72

Funding category	RD		Alternate #1		Alternate #2		Alternate #3		Alternate #4
	Description ---->		1.5" MILL & 3"OVERLAY		5" whitetopping		New bit		Reclaim
		YR							
First Cost $ / Mile			$245,310		$332,814		$678,982		$414,363
Rehab Life in Yrs			35		35		35		35
Interest %			2.84%		2.84%		2.84%		2.84%
		1		$0		$0		$0		$0
		2		$0		$0		$0		$0
		3		$0		$0		$0		$0
		4		$0		$0		$0		$0
		5	G	$23,000		$0	G	$23,000		$0
		6		$0		$0		$0	F	$7,000
		7		$0		$0		$0		$0
		8		$0		$0		$0		$0
		9		$0		$0		$0		$0
		10	F	$7,000	H	$91,120	F	$7,000	G	$23,000
		11		$0		$0		$0		$0
		12		$0		$0		$0		$0
		13		$0		$0		$0		$0
		14		$0		$0		$0		$0
		15		$0		$0		$0		$0
		16		$0		$0		$0		$0
		17	E	$141,200		$0		$0		$0
		18		$0		$0		$0		$0
		19		$0		$0		$0		$0
		20		$0		$0	D	$100,000	C	$68,000
		21	G	$23,000		$0		$0		$0
		22		$0	J	$284,750		$0		$0
		23		$0		$0	F	$7,000	F	$7,000
		24		$0		$0		$0		$0
		25		$0		$0		$0		$0
		26		$0		$0		$0		$0
		27	F	$7,000		$0	G	$23,000	G	$23,000
		28		$0		$0		$0		$0
		29		$0		$0		$0		$0
		30		$0		$0		$0		$0
		31		$0		$0		$0		$0
		32		$0	N	$131,277		$0		$0
		33	E	$141,200		$0	E	$141,200	E	$141,200
		34		$0		$0		$0		$0
		35		($118,477)		($105,623)		($118,477)		($118,477)
		36		$0		$0		$0		$0
		37		$0		$0		$0		$0
		38		$0		$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
		44		$0		$0		$0		$0
		45		$0		$0		$0		$0
		46		$0		$0		$0		$0
		47		$0		$0		$0		$0
		48		$0		$0		$0		$0
		49		$0		$0		$0		$0
Total Cost (Present Worth)				$385,951		$569,402		$787,437		$502,555
Annual Cost (Present Worth)				$17,545		$25,884		$35,796		$22,845
% Above Low Option				100%		148%		204%		130%

Notes:
Last Revised 11/25/08 (A, F, G, H, I, J, K, L)
Last Revised 3/31/10 (B, C, D, E)

2-Lane Highway

Improvements		Cost / mile
A	Reclaim	$287,589
B	1 1/2" Overlay	$60,000
C	1 1/2" Mill & 1 1/2" Overlay	$68,000
D	2" Mill & Overlay	$100,000
E	3" Mill & 3" Overlay	$141,200
F	Route and Seal	$7,000
G	Chip seal	$23,000
H	Joint seal & minor CPR	$91,120
I	Minor CPR w/ full depth repair	$201,000
J	Major CPR & griding	$284,750
K	Microsurface	$45,500
L	New Concrete	$300,553
M	5.5" mill, conc rehab, 5" new	$425,510
N	3" overlay	$131,277

Data Furnished By:
Completed By: KO
Date: 6/7/2010

District	8
Performed By	S. Pedersen
Analysis Period	35
Discount Rate	2.84

Project Number	1212-30
Date	4/12/2011
Funding Category	2
Low Cost Option #	1
Chosen Option #	0

OPTION #1			OPTION #2			OPTION #3		
DESCRIPTION			DESCRIPTION			DESCRIPTION		
BAB Reconstruction			Whitetopping			Whitetopping		
	DESIGN LIFE	TYPE		DESIGN LIFE	TYPE		DESIGN LIFE	TYPE
	20	1		20	2		35	2
Year	Description	Cost/Mile	Year	Description	Cost/Mile	Year	Description	Cost/Mile
0	BAB Construction	$ 525,618	0	7" Whitetopping (20 yr)	$ 986,574	0	8" Whitetopping (35 yr)	$ 889,953
1		$ -	1		$ -	1		$ -
2		$ -	2		$ -	2		$ -
3		$ -	3		$ -	3		$ -
4		$ -	4		$ -	4		$ -
5		$ -	5		$ -	5		$ -
6	Crack Treatment	$ 5,000	6		$ -	6		$ -
7	Surface Treatment	$ 25,000	7		$ -	7		$ -
8		$ -	8		$ -	8		$ -
9		$ -	9		$ -	9		$ -
10		$ -	10		$ -	10		$ -
11		$ -	11		$ -	11		$ -
12		$ -	12		$ -	12		$ -
13		$ -	13	Minor CPR + Seal	$ 29,000	13		$ -
14		$ -	14		$ -	14		$ -
15		$ -	15		$ -	15		$ -
16		$ -	16		$ -	16		$ -
17		$ -	17		$ -	17	Minor CPR	$ 21,500
18		$ -	18		$ -	18		$ -
19		$ -	19		$ -	19		$ -
20	2"Mill & 2" Overlay	$ 124,626	20		$ -	20		$ -
21		$ -	21		$ -	21		$ -
22		$ -	22		$ -	22		$ -
23	Crack Treatment	$ 5,000	23		$ -	23		$ -
24	Surface Treatment	$ 25,000	24		$ -	24		$ -
25		$ -	25	Major CPR + Grind	$ 130,000	25		$ -
26		$ -	26		$ -	26		$ -
27		$ -	27		$ -	27	Minor CPR + Seal	$ 29,000
28		$ -	28		$ -	28		$ -
29		$ -	29		$ -	29		$ -
30		$ -	30		$ -	30		$ -
31		$ -	31		$ -	31		$ -
32		$ -	32		$ -	32		$ -
33		$ -	33		$ -	33		$ -
34		$ -	34		$ -	34		$ -
35	End of Analysis	$ -	35	End of Analysis	$ -	35	Remaining Service Life Value**	$ (11,020)
	Total Present Worth	$ 636,968		Total Present Worth	$ 1,071,274		Total Present Worth	$ 912,789
	Eq. Annual Cost*	$28,956		Eq. Annual Cost*	$48,699		Eq. Annual Cost*	$41,494
	% of Low Cost	100%		% of Low Cost	168%		% of Low Cost	143%

* Equivalent Annual Cost is included for information only.

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

APPENDIX 3

Scoping Cost Analysis T.H. 113
(SP 4405-26)

Givens:

Length =	**11.823**	**miles**
Width of Road =	**24**	**feet**
1" Bituminous =	**110**	**lbs/SY**
Discount Rate =	**2.84**	**%**

INPUTS

***Note:** Aggregate and shoulder quantities were not included in each option.
Calculations are based on 35 yr. life cycle.
Unit Prices are based off the 2009 Mn/DOT Avg. Bid Prices and the 2009 District 4 Contract Prices, as applicable.

2" Mill and 3" Overlay

Thickness	Item	Course	Unit	Price/Unit	Total Cost
	Mill Bituminous 2"		SY	**0.75**	$124,850.88
1.5	SPWEB340B	Wear	TON	**38.67**	$531,078.19
1.5	SPWEB340B	Wear	TON	**38.67**	$531,078.19
			Total Cost:		**$1,187,007**
			Cost/Mile:		**$100,398**

Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
Initial Cost	0	$100,398	1.000	$100,398	$4,564
rout & seal	3	$2,000	0.919	$1,839	$84
chip seal	6	$20,000	0.845	$16,907	$769
Bit. Reconstruct	15	$296,000	0.657	$194,474	$8,841
rout & seal	18	$2,000	0.604	$1,208	$55
chip seal	20	$20,000	0.571	$11,423	$519
RSL	35	$0	0.375	$0	$0
			Total Present Worth:	**$326,249**	$14,831
			Equivalent Annual Cost:	**$14,831**	

5" Whitetopping

	Item	Type	Unit	Price/Unit	Total Cost
	Mill Bituminous 2"		SY	**0.75**	$124,850.88
	Concrete Pvmt. Std. Width		SY	**4.50**	$749,105.28
5	Concrete Mat'l Cost		CY	**76.08**	$1,759,010.18
			Total Cost:		**$2,632,966**
			Cost/Mile:		**$222,699**

Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
Initial Cost	0	$222,699	1.000	$222,699	$10,124
Major CPR & plane	15	$200,000	0.657	$131,401	$5,973
Bit. Reconstruct	23	$296,000	0.525	$155,440	$7,066
RSL	35	($118,400)	0.375	($44,430)	-$2,020
			Total Present Worth:	**$465,110**	$21,143
			Equivalent Annual Cost:	**$21,143**	

Bituminous Reconstruct

	Item	Type	Unit	Price/Unit	Total Cost
	Remove Bit. Pavement		SY	**2.10**	$349,582.46
2	SPWEB340C	Wear	TON	**43.00**	$787,392.88
2.5	SPWEB340C	Wear	TON	**43.00**	$984,241.10
6	Agg Base Class 5		CY	**17.34**	$481,092.06
20	Select Granular		CY	**9.63**	$890,602.94
			Total Cost:		**$3,492,911**
			Cost/Mile:		**$295,434**

Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
Initial Cost	0	$295,434	1.000	$295,434	$13,430
rout & seal	6	$2,000	0.845	$1,691	$77
chip seal	10	$20,000	0.756	$15,115	$687
mill & 3" Overlay	20	$106,000	0.571	$60,543	$2,752
rout & seal	23	$2,000	0.525	$1,050	$48
chip seal	27	$20,000	0.469	$9,390	$427
mill & 3" Overlay	35	$106,000	0.375	$39,777	$1,808
RSL	35	($106,000)	0.375	($39,777)	($1,808)
			Total Present Worth:	**$383,222**	$17,421
			Equivalent Annual Cost:	**$17,421**	

6" Concrete Reconstruction

	Item	Course	Unit	Price/Unit	Total Cost
	Remove Bit. Pavement		SY	**2.10**	$349,582.46
5	Agg Base Class 5		CY	**17.34**	$400,910.05
12	Select Granular		CY	**9.63**	$534,361.77
	Concrete Pvmt. Std. Width		SY	**4.50**	$749,105.28
6	Structural Concrete		CY	**76.08**	$2,110,812.21
	Reinforcement Bars	Epoxy	lb	**0.97**	$67,415.31
	Dowel Bars	Epoxy	each	**5.71**	$1,109,475.84
			Total Cost:		**$5,321,663**
			Cost/Mile:		**$450,111**

Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
Initial Cost	0	$450,111	1.000	$450,111	$20,461
Joint Reseal and Minor CPR	17	$100,000	0.621	$62,122	$2,824
Minor CPR	27	$150,000	0.469	$70,423	$3,201
RSL	35	($58,000)	0.375	($21,765)	($989)
		Total Present Worth:		**$560,891**	$25,497
		Equivalent Annual Cost:		**$25,497**	

District	2
Performed By	K.Olson
Analysis Period	35
Discount Rate	2.7

Project Number	4507-48
Date	11/17/2011
Funding Category	RS
Low Cost Option #	1
Chosen Option #	ALT BID 1& 3

District	2
Performed By	K.Olson
Analysis Period	35
Discount Rate	2.7

OPTION #1

DESCRIPTION: 5.0" mill 5" bit

DESIGN LIFE: 20 — **TYPE**: BIT

Year	#	Life	Description	Cost/Mile
0				$ 278,154
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8	AA		Crack Treatment	$ 5,000
9				$ -
10				$ -
11				$ -
12	AB		Surface Treatment	$ 23,000
13				$ -
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20	AH	15	2" Mill & 2" Overlay	$ 97,122
21				$ -
22				$ -
23	AA		Crack Treatment	$ 5,000
24				$ -
25				$ -
26				$ -
27	AB		Surface Treatment	$ 23,000
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ -

Total Present Worth	$ 369,817
Eq. Annual Cost*	$16,466
% of Low Cost	100%

OPTION #2

DESCRIPTION: 6" unbonded

DESIGN LIFE: 20 — **TYPE**: PCC

Year	#	Life	Description	Cost/Mile
0				$ 521,000
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13	AP		Minor CPR (12')	$ 34,163
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25	AR		Major CPR (12')	$ 277,870
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ -

Total Present Worth	$ 687,913
Eq. Annual Cost*	$30,628
% of Low Cost	186%

OPTION #3

DESCRIPTION: 6.5" unbonded

DESIGN LIFE: 35 — **TYPE**: PCC

Year	#	Life	Description	Cost/Mile
0				$ 545,119
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15				$ -
16				$ -
17	BB		Minor CPR (12')	$ 27,184
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27	BC		Minor CPR& full Depth(12')	$ 100,868
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35	##		Remaining Service Life Value**	$ (38,330)

Total Present Worth	$ 596,447
Eq. Annual Cost*	$26,556
% of Low Cost	161%

OPTION #4

DESCRIPTION: 5.0" mill 4. 5" bit

DESIGN LIFE: 15 — **TYPE**: BIT

Year	#	Life	Description	Cost/Mile
0				$ 228,555
1				$ -
2				$ -
3	AA		Crack Treatment	$ 5,000
4				$ -
5				$ -
6				$ -
7	AB		Surface Treatment	$ 23,000
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15	AL		2" Mill & 3.5" Overlay	$ 161,200
16				$ -
17				$ -
18	AA		Crack Treatment	$ 5,000
19				$ -
20				$ -
21				$ -
22	AB		Surface Treatment	$ 23,000
23				$ -
24				$ -
25				$ -
26				$ -
27				$ -
28				$ -
29	AH		2" Mill & 2" Overlay	$ 97,122
30				$ -
31				$ -
32	AA		Crack Treatment	$ 5,000
33				$ -
34				$ -
35	##		Remaining Service Life Value**	$ (52,446)

Total Present Worth	$ 402,589
Eq. Annual Cost*	$17,925
% of Low Cost	109%

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

* Equivalent Annual Cost is included for informatio

20 yr design based on roadway history,
the extend fix of full depth repairs and tightblading
and using C oil.

3 dowels in each wheelpaths

3 dowels in each wheelpaths

15 YR DESIGN, No PASB, B oil

District	8
Performed By	K. Voss
Analysis Period	35
Discount Rate	2.7

Project Number	4705-42
Date	2/10/2012
Funding Category	RC
Low Cost Option #	1
Chosen Option #	

OPTION #1					OPTION #2					OPTION #3				
DESCRIPTION					DESCRIPTION					DESCRIPTION				
3" mill & 3" overlay					3" mill & 4.5" overlay					6.5 " Whitetopping				
			DESIGN LIFE	TYPE				DESIGN LIFE	TYPE				DESIGN LIFE	TYPE
			13 years	BIT				15 years	BIT				15 years	PCC
Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile
0			Initial construction	$ 247,000	0			Initial Construction	$ 352,000	0			Initial Construction	$ 409,939
1				$ -	1				$ -	1				$ -
2				$ -	2				$ -	2				$ -
3	aa		Crack Treatment	$ 5,000	3	aa		Crack Treatment	$ 5,000	3				$ -
4				$ -	4				$ -	4				$ -
5	ab		Surface Treatment	$ 20,000	5				$ -	5				$ -
6				$ -	6				$ -	6				$ -
7				$ -	7	ab		Surface Treatment	$ 20,000	7				$ -
8				$ -	8				$ -	8				$ -
9				$ -	9				$ -	9				$ -
10				$ -	10				$ -	10				$ -
11				$ -	11				$ -	11				$ -
12				$ -	12				$ -	12	bk		1st CPR 12' Jt @ 15 yr	$ 32,943
13	bg	12	3" Mill & OL w/o Shld	$ 136,456	13				$ -	13				$ -
14				$ -	14				$ -	14				$ -
15				$ -	15	bi		2" Mill & 3.5" OL	$ 179,434	15				$ -
16	aa		Crack Treatment	$ 5,000	16				$ -	16				$ -
17				$ -	17				$ -	17				$ -
18	ab		Surface Treatment	$ 20,000	18	aa		Crack Treatment	$ 5,000	18				$ -
19				$ -	19				$ -	19				$ -
20				$ -	20				$ -	20	bl		2nd CPR 12' Jt @ 15 yr	$ 251,151
21				$ -	21				$ -	21				$ -
22				$ -	22	ab		Surface Treatment	$ 20,000	22				$ -
23				$ -	23				$ -	23				$ -
24				$ -	24				$ -	24				$ -
25	bu	11	3" Mill & OL Alt Bid Costs	$ 220,001	25				$ -	25				$ -
26				$ -	26				$ -	26				$ -
27				$ -	27				$ -	27				$ -
28	aa		Crack Treatment	$ 5,000	28				$ -	28				$ -
29				$ -	29	bi		2" Mill & 3.5" OL	$ 179,434	29				$ -
30	ab		Surface Treatment	$ 20,000	30				$ -	30	ax		Concrete Whitetopping	$ 492,307
31				$ -	31				$ -	31				$ -
32				$ -	32	aa		Crack Treatment	$ 5,000	32				$ -
33				$ -	33				$ -	33				$ -
34				$ -	34				$ -	34				$ -
35			Remaining Service Life Value**	$ (20,000)	35			Remaining Service Life Value**	$ (96,618)	35			Remaining Service Life Value**	$ (328,205)
			Total Present Worth	$ 497,794				Total Present Worth	$ 554,729				Total Present Worth	$ 673,474
			Eq. Annual Cost*	$22,164				Eq. Annual Cost*	$24,699				Eq. Annual Cost*	$29,986
			% of Low Cost	100%				% of Low Cost	111%				% of Low Cost	135%

* Equivalent Annual Cost is included for information only.

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

District	3 - Baxter
Performed By	D. Nelson
Analysis Period	35
Discount Rate	2.7

Project Number	4812-83 TH 169
Date	4/11/2012
Funding Category	RS
Low Cost Option #	1
Chosen Option #	1

OPTION #1					OPTION #2					OPTION #3				
DESCRIPTION					DESCRIPTION					DESCRIPTION				
2" Bituimous Mill and 3.5" Overlay (Full Width)					8.5" Concrete Whitetopping ML, 3" Bit Shldrs					2.0" Mill and Fill, ML Only				
			DESIGN LIFE	TYPE				DESIGN LIFE	TYPE				DESIGN LIFE	TYPE
			15 Years	BIT				15 Years	PCC				9 Years	BIT
Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile
0	BB		2" Mill 3.5" OL, ML & Shldr	$ 234,480	0	AX		8.5" Concrete Whitetopping	$ 358,364	0	BA		2.0" Mill and Fill, ML Only	$ 99,686
1				$ -	1				$ -	1				$ -
2				$ -	2				$ -	2				$ -
3				$ -	3				$ -	3				$ -
4	AA		Crack Treatment	$ 5,000	4				$ -	4	AB		Surface Treatment	$ 25,000
5				$ -	5				$ -	5				$ -
6				$ -	6				$ -	6				$ -
7				$ -	7				$ -	7				$ -
8				$ -	8				$ -	8				$ -
9	AB		Surface Treatment	$ 25,000	9				$ -	9	BB		2" Mill 3.5" OL, ML & Shldr	$ 234,480
10				$ -	10				$ -	10				$ -
11				$ -	11				$ -	11				$ -
12				$ -	12				$ -	12				$ -
13				$ -	13				$ -	13	AA		Crack Treatment	$ 5,000
14				$ -	14				$ -	14				$ -
15	BC		3.0" Mill & Fill - ML Only	$ 143,405	15	AR		Major CPR (6'X6')	$ 150,000	15				$ -
16				$ -	16				$ -	16				$ -
17				$ -	17				$ -	17	AB		Surface Treatment	$ 25,000
18				$ -	18				$ -	18				$ -
19	AA		Crack Treatment	$ 5,000	19				$ -	19				$ -
20				$ -	20				$ -	20				$ -
21				$ -	21				$ -	21				$ -
22				$ -	22				$ -	22	BC		3.0" Mill & Fill - ML Only	$ 143,405
23				$ -	23				$ -	23				$ -
24	AB		Surface Treatment	$ 25,000	24				$ -	24				$ -
25				$ -	25	BF		Rem and Rep Conc Surf	$ 430,393	25	AA		Crack Treatment	$ 5,000
26				$ -	26				$ -	26				$ -
27				$ -	27				$ -	27				$ -
28				$ -	28				$ -	28				$ -
29	BD		1.5" ML Mill & Fill, 1.5" OL	$ 168,023	29				$ -	29	AB		Surface Treatment	$ 25,000
30				$ -	30				$ -	30				$ -
31				$ -	31				$ -	31				$ -
32				$ -	32				$ -	32				$ -
33	AA		Crack Treatment	$ 5,000	33				$ -	33				$ -
34				$ -	34				$ -	34	BD		1.5" ML Mill & Fill, 1.5" OL	$ 168,023
35			Remaining Service Life Value**	$ (90,474)	35			Remaining Service Life Value**	$ (143,464)	35			Remaining Service Life Value**	$ (152,748.18)
			Total Present Worth	$ 415,072				Total Present Worth	$ 623,592				Total Present Worth	$ 427,792
			Eq. Annual Cost*	$18,481				Eq. Annual Cost*	$27,765				Eq. Annual Cost*	$19,047
			% of Low Cost	100%				% of Low Cost	150%				% of Low Cost	103%

* Equivalent Annual Cost is included for information only.

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

District	8
Performed By	SJP
Analysis Period	35
Discount Rate	2.7

Project Number	5105-21
Date	10/31/2011
Funding Category	RS
Low Cost Option #	1
Chosen Option #	ALT BID

OPTION #1					OPTION #2					OPTION #3				
DESCRIPTION					DESCRIPTION					DESCRIPTION				
4.5" Bituminous Mill & Overlay (no widening)					4" Unbonded Concrete Overlay +PASSRC (no widening)					6" Unbonded Concrete Overlay + PASSRC (no widening)				
			DESIGN LIFE	TYPE				DESIGN LIFE	TYPE				DESIGN LIFE	TYPE
			15	BIT				15	PCC				35	PCC
Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile
0			4.5" Bit. M&OL	$ 257,852	0			4" UBOL	$ 789,956	0			6" UBOL	$ 941,614
1				$ -	1				$ -	1				$ -
2				$ -	2				$ -	2				$ -
3	aa		Crack Treatment	$ 7,000	3				$ -	3				$ -
4				$ -	4				$ -	4				$ -
5				$ -	5				$ -	5				$ -
6				$ -	6				$ -	6				$ -
7	ab		Surface Treatment	$ 21,000	7				$ -	7				$ -
8				$ -	8				$ -	8				$ -
9				$ -	9				$ -	9				$ -
10				$ -	10				$ -	10				$ -
11				$ -	11				$ -	11				$ -
12				$ -	12				$ -	12				$ -
13				$ -	13				$ -	13				$ -
14				$ -	14				$ -	14				$ -
15	be		2" Mill & 3.5" Overlay	$ 176,769	15	bj		1st CPR	$ 49,316	15				$ -
16				$ -	16				$ -	16				$ -
17				$ -	17				$ -	17				$ -
18	aa		Crack Treatment	$ 7,000	18				$ -	18				$ -
19				$ -	19				$ -	19				$ -
20				$ -	20				$ -	20				$ -
21				$ -	21				$ -	21	bg		1st CPR	$ 5,983
22	ab		Surface Treatment	$ 21,000	22				$ -	22				$ -
23				$ -	23				$ -	23				$ -
24				$ -	24				$ -	24				$ -
25				$ -	25	bd		Remove & Replace (4" UBOL)	$ 761,356	25				$ -
26				$ -	26				$ -	26				$ -
27				$ -	27				$ -	27	bh		2nd CPR	$ 69,340
28				$ -	28				$ -	28				$ -
29	be		2" Mill & 3.5" Overlay	$ 176,769	29				$ -	29				$ -
30				$ -	30				$ -	30				$ -
31				$ -	31				$ -	31				$ -
32	aa		Crack Treatment	$ 7,000	32				$ -	32				$ -
33				$ -	33				$ -	33				$ -
34				$ -	34				$ -	34				$ -
35			End of Analysis Period	$ (95,183.06)	35			End of Analysis Perios	$ (507,570.64)	35			End of Analysis Period	$ (26,669)
			Total Present Worth	$ 463,450				Total Present Worth	$ 1,014,390				Total Present Worth	$ 968,310
			Eq. Annual Cost*	$20,635				Eq. Annual Cost*	$45,164				Eq. Annual Cost*	$43,113
			% of Low Cost	100%				% of Low Cost	219%				% of Low Cost	209%

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

Discount Rate of 2.5% effective until 7/1/13

Prices effective until July 1, 2013

District	7
Performed By/ Review By:	A. Noble/ Vogt
Analysis Period	35
Discount Rate	2.5

Project Number	5204-112
Date	12/13/2011
Funding Category	RD
Low Cost Option #	1
Chosen Option #	1

#	Description	Cost/Mile
AA	Crack Treatment	$ 3,000
AB	Chip Seal	$ 20,000
AC	3" Bituminous Overlay (Mainline + Shld.)	$ 244,276
AD	2" Mill & 3.5" Overlay + 1.5" Shld. Overlay	$ 286,559
AE	Light Crack Treatment	$ 1,500
AF	Mill 3.5" & Overlay 5" + Overlay shld. 1.5"	$ 308,593
AG	Reseal Joints & Partial Depth Repair	$ 33,533
AH	Major CPR	$ 263,948
AI		
AJ		
AK		
AL		
AM		
AN		
AO		
AP		
AQ		
AR		
AS		
AT		
AU		
AV		
AW		
AX		
AY		
AZ		
BA		
BB		
BC		
BD		
BE		
BF		
BG		
BH		
BI		
BJ		
BK		
BL		
BM		
BN		
BP		
BQ		
BR		
BS		
BT		
BU		
BV		
BW		
BX		
BY		
BZ		

OPTION #1

DESCRIPTION

3" Bituminous overlay with a Ultrathin Bonded Wearing Course

DESIGN LIFE	TYPE
15	BIT

Year	#	Life	Description	Cost/Mile
0		15	Initial Construction	$465,383
1				$0
2				$0
3	AA		Crack Treatment	$3,000
4				$0
5				$0
6				$0
7	AB		Chip Seal	$20,000
8				$0
9				$0
10				$0
11				$0
12				$0
13				$0
14				$0
15	AD	14	2" Mill & 3.5" Overlay + 1.5" Shld. Overlay	$286,559
16				$0
17				$0
18	AA		Crack Treatment	$3,000
19				$0
20				$0
21				$0
22	AB		Chip Seal	$20,000
23				$0
24				$0
25				$0
26				$0
27				$0
28				$0
29	AD	13	2" Mill & 3.5" Overlay + 1.5" Shld. Overlay	$286,559
30				$0
31				$0
32	AA		Crack Treatment	$3,000
33				$0
34				$0
35			7 years remaining life	-$154,300.84
			Total Present Worth	$ 772,767
			Eq. Annual Cost*	$33,388
			% of Low Cost	100%

* Equivalent Annual Cost is included for information only.

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

OPTION #2

DESCRIPTION

Rubblize Inplace Concrete, Construct Bituminous Pavement

DESIGN LIFE	TYPE
20	BIT

Year	#	Life	Description	Cost/Mile
0			Initial Construction	$722,824
1				$0
2				$0
3				$0
4				$0
5				$0
6				$0
7				$0
8	AE		Light Crack Treatment	$1,500
9				$0
10				$0
11				$0
12	AB		Chip Seal	$20,000
13				$0
14				$0
15				$0
16				$0
17				$0
18				$0
19				$0
20	AF		Mill 3.5" & Overlay 5" + Overlay shld. 1.5"	$308,593
21				$0
22				$0
23	AA		Crack Treatment	$3,000
24				$0
25				$0
26				$0
27	AB		Chip Seal	$20,000
28				$0
29				$0
30				$0
31				$0
32				$0
33				$0
34				$0
35			No Remaining Service Life Value	$0
			Total Present Worth	$ 939,220
			Eq. Annual Cost*	$40,580
			% of Low Cost	122%

OPTION #3

DESCRIPTION

6"Unbonded Concrete Overlay

DESIGN LIFE	TYPE
20	PCC

Year	#	Life	Description	Cost/Mile
0			Initial Construction	$624,803
1				$0
2				$0
3				$0
4				$0
5				$0
6				$0
7				$0
8				$0
9				$0
10				$0
11				$0
12				$0
13	AG		Reseal Joints & Partial Depth Repair	$33,533
14				$0
15				$0
16				$0
17				$0
18				$0
19				$0
20				$0
21				$0
22				$0
23				$0
24				$0
25	AH		Major CPR	$263,948
26				$0
27				$0
28				$0
29				$0
30				$0
31				$0
32				$0
33				$0
34				$0
35			No Remaining Service Life Value	$0
			Total Present Worth	$ 791,500
			Eq. Annual Cost*	$34,197
			% of Low Cost	102%

Cost Analysis S.P. 5501-35/TH 14(BYRON to ROCHESTER)

Givens:

Length =	16.12 miles		
Width of Road =	24 feet	24 feet	4/11/08-TRM
1" Bituminous =	113 lbs/SY		
Interest Rate =	2.7 %		
Inflation Rate =	0 %		

***Note:** Aggregate and shoulder quantities were not included in each option.
***Note:** Calculations are based on 35 yr. life cycle.

4.5" Bituminous Overlay(17 Year Fix)

Item	Course	Unit	Price/Unit	Total Cost
PATCH		TON	100.00	$64,480.00
TACK COAT		GAL	1	$68,090.88
1.5" SPWEB440E	Wear	TON	55.00	$1,057,962.05
1.5" SPWEB440E	Wear	TON	55.00	$1,057,962.05
1.5" SPNWB430B	Wear	TON	53.00	$1,019,490.70
		Total Cost:		**$3,267,986**
		Cost/Mile:		**$202,729**

Strategy	Year	Cost/Mile	Present Worth	Annual Cost
Initial Cost	0	$202,729	$202,729	$9,026
Rout & seal	2	$2,000	$1,896	$84
Mill & 3" Overlay	17	$134,428	$85,466	$3,805
Rout & seal	19	$2,000	$1,206	$54
Mill & 3" Overlay	32	$134,428	$57,311	$2,552
Rout & seal	34	$2,000	$808	$36
Salvage Value	35	($116,504)	-$45,854	-$2,042
		Total Present Worth:	**$303,561**	$13,516
		Equivalent Annual Cost:	**$13,516**	$13,516

6" Unbonded Concrete Overlay(20 Year Fix)

Item	Course	Unit	Price/Unit	Total Cost
PASSRC		Ton	46.42	$746,793.82
Conc Std Width 6		SY	5.00	$1,134,848.00
Structural Concrete		CY	65.77	$2,487,965.10
Reinforcement Bars	Epoxy	lb	0.80	$80,213.12
Dowel Bars	Epoxy	each	6.72	$915,141.43
		Total Cost:		**$5,364,961**
		Cost/Mile:		**$332,814**

Strategy	Year	Cost/Mile	Present Worth	Annual Cost
Initial Cost	0	$332,814	$332,814	$14,818
Major CPR	20	$150,000	$88,040	$3,920
Salvage Value	35	$0	$0	$0
		Total Present Worth:	**$420,854**	$18,738
		Equivalent Annual Cost:	**$18,738**	$18,738

5.5" min. Bituminous Overlay(20 Year Fix)

Item	Course	Unit	Price/Unit	Total Cost
1.5" MILL BITUMINOUS		SY	$0.50	$113,484.80
PATCH		Ton	$100.00	$64,480.00
TACK COAT		GAL	$1.00	$68,090.88
1.5" SPWEB440E	Wear	TON	55.00	$1,057,962.05
1.5" SPWEB440E	Wear	TON	55.00	$1,057,962.05
2.5" SPNWB430B	Wear	TON	53.00	$1,699,151.17
		Total Cost:		**$4,061,131**
		Cost/Mile:		**$251,931**

Strategy	Year	Cost/Mile	Present Worth	Annual Cost
Initial Cost	0	$251,931	$251,931	$11,217
Rout & seal	2	$2,000	$1,896	$84
Chipseal	4	$20,000	$17,978	$800
Mill & 3" Overlay	22	$133,184	$74,114	$3,300
Rout & seal	24	$2,000	$1,055	$47
Chipseal	26	$20,000	$10,005	$445
Remaining Life Value	35	($31,337)	-$12,334	-$549
		Total Present Worth:	**$344,646**	$15,345
		Equivalent Annual Cost:	**$15,345**	$15,345

Assumptions-
1. Preventive Maintenance adds 1 year of life to thin overlays and 2 years to medium overlays and Reclaimed pavements
2. Each successive overlay has 1 year less life than previous one on a section.
3. Heavy bit. overlay-17 years & 20 years, unbonded overlay-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.

APPENDIX 2

Scoping Cost Analysis T.H. 59

(SP 5618-26)

Revised 02/22/10
5/12/2010 SKM
9/21/2010 SKM

Givens:

Length =	**13.33**	**miles**		
Width of Road =	**26**	**feet**	27	WT
1" Bituminous =	**110**	**lbs/SY**		
Discount Rate =	**2.84**	**%**		

INPUTS

***Note:** Shoulder quantities were not included in each option.
Calculations are based on 35 yr. life cycle.
Unit Costs are based from 2009 Mn/DOT bid tabs and 2009 District 4 Contract Costs.

Thickness	2" Mill and 4" Overlay					Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
	Item	**Course**	**Unit**	**Price/Unit**	**Total Cost**	Initial Cost	0	$137,448	1.000	$137,448	$6,248
	Mill Bituminous 2"		SY	**0.75**	$152,495.20	rout & seal	3	$2,000	0.919	$1,839	$84
2.00	SPWEB340B	Wear	TON	**37.55**	$839,841.90	chip seal	6	$20,000	0.845	$16,907	$769
2.00	SPWEB340B	Wear	TON	**37.55**	$839,841.90	3" mill & overlay	15	$111,000	0.657	$72,928	$3,315
						rout & seal	24	$2,000	0.511	$1,021	$46
						chip seal	26	$20,000	0.483	$9,656	$439
						2" mill & overlay	29	$75,000	0.444	$33,294	1513.482919
						RSL	35	($30,000)	0.375	($11,258)	($512)
			Total Cost:		**$1,832,179**				**Total Present Worth:**	**$261,835**	$11,903
			Cost/Mile:		**$137,448**				**Equivalent Annual Cost:**	**$11,903**	

	1.5" Mill and 3" Overlay					Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
	Item	**Course**	**Unit**	**Price/Unit**	**Total Cost**	Initial Cost	0	$103,353	1.000	$103,353	$4,698
	Mill Bituminous 1.5"		SY	**0.58**	$117,929.62	rout & seal	3	$2,000	0.919	$1,839	$84
1.50	SPWEB340B	Wear	TON	**37.55**	$629,881.42	chip seal	6	$20,000	0.845	$16,907	$769
1.50	SPWEB340B	Wear	TON	**37.55**	$629,881.42	3" mill & overlay	13	$111,000	0.695	$77,129	$3,506
						rout & seal	22	$2,000	0.540	$1,080	$49
						2" mill & overlay	25	$75,000	0.497	$37,240	$1,693
						RSL	35	$0	0.375	$0	$0
									Total Present Worth:	**$237,547**	$10,799
			Total Cost:		**$1,377,692**				**Equivalent Annual Cost:**	**$10,799**	
			Cost/Mile:		**$103,353**						

	5.5" Whitetopping, 27' wide					Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
	Item	**Type**	**Unit**	**Price/Unit**	**Total Cost**	Initial Cost	0	$257,815	1.000	$257,815	$11,720
	Mill Bituminous 2"		SY	**0.75**	$158,360.40	Major CPR & plane	15	$200,000	0.657	$131,401	$5,973
	Conc Pvmt Std Width		SY	**4.50**	$914,971.20	Bituminous Reconstruct	23	$ 338,000	0.525	$177,496	$8,069
5.5	Structural Concrete		CY	**76.08**	$2,363,336.72	RSL	35	($176,000)	0.375	($66,045)	($3,002)
			Total Cost:		**$3,436,668**				**Total Present Worth:**	**$500,667**	$22,760
			Cost/Mile:		**$257,815**				**Equivalent Annual Cost:**	**$22,760**	

	Bituminous Reconstruct					Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
	Item	**Type**	**Unit**	**Price/Unit**	**Total Cost**	Initial Cost	0	$337,798	1.000	$337,798	$15,356
1.5	SPWEB340C	Wear	TON	**44.97**	$754,348.01	rout & seal	3	$2,000	0.919	$1,839	$84
2	SPWEB340C	Wear	TON	**44.97**	$1,005,797.34	chip seal	5	$20,000	0.869	$17,387	$790
2	SPWEB340B	Wear	TON	**37.55**	$839,841.90	3" mill & overlay	25	$111,000	0.497	$55,115	$2,505
12	Agg Base Class 5		CY	**17.34**	$1,175,229.67	rout & seal	27	$2,000	0.469	$939	$43
13	Select Granular		CY	**9.91**	$727,628.02	chip seal	29	$20,000	0.444	$8,878	$404
			Total Cost:		**$4,502,845**	RSL	35	($55,500)	0.375	($20,827)	($947)
			Cost/Mile:		**$337,797.82**				**Total Present Worth:**	**$401,129**	$18,235
									Equivalent Annual Cost:	**$18,235**	

	3" Mill and 4.5" Overlay					Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
	Item	**Course**	**Unit**	**Price/Unit**	**Total Cost**	Initial Cost	0	$158,232	1.000	$158,232	$7,193
	Mill Bituminous 3"		SY	**1.08**	$219,593.09	rout & seal	3	$2,000	0.919	$1,839	$84
1.50	SPWEB340B	Wear	TON	**37.55**	$629,881.42	chip seal	6	$20,000	0.845	$16,907	$769
1.50	SPWEB340B	Wear	TON	**37.55**	$629,881.42	3" mill & overlay	15	$111,000	0.657	$72,928	$3,315
1.50	SPWEB340B	Wear	TON	**37.55**	$629,881.42	rout & seal	22	$2,000	0.540	$1,080	$49
						chip seal	25	$20,000	0.497	$9,931	$451
						2" mill & overlay	29	$75,000	0.444	$33,294	$1,513
						RSL	35	($30,000)	0.375	($11,258)	($512)
			Total Cost:		**$2,109,237**				**Total Present Worth:**	**$282,952**	$12,863
			Cost/Mile:		**$158,232**				**Equivalent Annual Cost:**	**$12,863**	

District	2
Performed By	K.Olson
Analysis Period	35
Discount Rate	2.7

Project Number	6016-37
Date	9/27/2011
Funding Category	RS
Low Cost Option #	1
Chosen Option #	

OPTION #1					OPTION #2				
DESCRIPTION					DESCRIPTION				
3" mill & 3" fill					4.5" mill, 5" unbonded concrete				
			DESIGN LIFE	TYPE				DESIGN LIFE	TYPE
			20	BIT				20	PCC
Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile
0				$ 153,010	0				$ 490,919
1				$ -	1				$ -
2				$ -	2				$ -
3				$ -	3				$ -
4	aa		Crack Treatment	$ 4,000	4				$ -
5				$ -	5				$ -
6				$ -	6				$ -
7				$ -	7				$ -
8				$ -	8				$ -
9				$ -	9				$ -
10	ab		Surface Treatment	$ 23,000	10				$ -
11				$ -	11				$ -
12				$ -	12	AP	5	Minor CPR (6'X6')	$ 95,093
13				$ -	13				$ -
14				$ -	14				$ -
15	AA		Crack Treatment	$ 4,000	15				$ -
16				$ -	16				$ -
17				$ -	17				$ -
18				$ -	18				$ -
19				$ -	19				$ -
20	AI	15	1.5" Mill & 3" Overlay	$ 153,500	20				$ -
21				$ -	21				$ -
22				$ -	22				$ -
23				$ -	23				$ -
24	AA		Crack Treatment	$ 4,000	24				$ -
25				$ -	25	AR	10	Major CPR (6'X6')	$ 215,202
26				$ -	26				$ -
27				$ -	27				$ -
28				$ -	28				$ -
29				$ -	29				$ -
30	AB		Surface Treatment	$ 23,000	30				$ -
31				$ -	31				$ -
32				$ -	32				$ -
33				$ -	33				$ -
34				$ -	34				$ -
35			Remaining Service Life Value**	$ -	35			Remaining Service Life Value**	$ -
			Total Present Worth	$ 279,456				Total Present Worth	$ 670,548
			Eq. Annual Cost*	$12,442				Eq. Annual Cost*	$29,855
			% of Low Cost	100%				% of Low Cost	240%

* Equivalent Annual Cost is included for information only.

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

APPENDIX 2

District	4
Performed By	SM
Analysis Period	35
Discount Rate	2.84

Project Number	6104-11
Date	4/21/2011
Funding Category	RS
Low Cost Option #	1
Chosen Option #	1

OPTION #1					OPTION #2				
DESCRIPTION					DESCRIPTION				
3" Mill and 4.5" Bituminous Overlay					6" Whitetopping				
DESIGN LIFE				TYPE	DESIGN LIFE				TYPE
15				BIT	15				PCC
Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile
0			Initial Cost	$ 165,000	0			Initial Cost	$ 216,000
1				$ -	1				$ -
2				$ -	2				$ -
3	AA	3	Crack Treatment	$ 2,000	3				$ -
4				$ -	4				$ -
5				$ -	5				$ -
6	AB	9	Surface Treatment	$ 20,000	6				$ -
7				$ -	7				$ -
8				$ -	8				$ -
9				$ -	9				$ -
10				$ -	10				$ -
11				$ -	11				$ -
12				$ -	12				$ -
13				$ -	13				$ -
14				$ -	14				$ -
15	AH	14	2" Mill & 2" Overlay	$ 71,000	15	AR	8	Major CPR (6'X6')	$ 200,000
16				$ -	16				$ -
17				$ -	17				$ -
18	AA	3	Crack Treatment	$ 2,000	18				$ -
19				$ -	19				$ -
20				$ -	20				$ -
21	AB	8	Surface Treatment	$ 20,000	21				$ -
22				$ -	22				$ -
23				$ -	23	AZ	20	New Bituminous Structure	$ 320,000
24				$ -	24				$ -
25				$ -	25				$ -
26				$ -	26				$ -
27				$ -	27				$ -
28				$ -	28				$ -
29	AK	13	3" Mill & 3" Overlay	$ 106,000	29				$ -
30				$ -	30				$ -
31				$ -	31				$ -
32	AA	3	Crack Treatment	$ 2,000	32				$ -
33				$ -	33				$ -
34				$ -	34				$ -
35			Remaining Service Life Value**	$ (58,000)	35			Remaining Service Life Value**	$ (128,000)
			Total Present Worth	$ 268,815				Total Present Worth	$ 467,412
			Eq. Annual Cost*	$12,220				Eq. Annual Cost*	$21,248
			% of Low Cost	100%				% of Low Cost	174%

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

District	4
Performed By	SM
Analysis Period	35
Discount Rate	2.7

Project Number	6105-20
Date	11/8/2011
Funding Category	RS
Low Cost Option #	1
Chosen Option #	1

OPTION #1

DESCRIPTION	DESIGN LIFE	TYPE
3" Mill and Inlay	15	BIT

Year	#	Life	Description	Cost/Mile
0			Initial Cost	$ 107,008
1				$ -
2				$ -
3	AA	3	Crack Treatment	$ 2,000
4				$ -
5				$ -
6	AB	9	Surface Treatment	$ 20,000
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15	AK	14	3" Mill & 3" Overlay	$ 107,000
16				$ -
17				$ -
18	AA	3	Crack Treatment	$ 2,000
19				$ -
20				$ -
21	AB	8	Surface Treatment	$ 20,000
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27				$ -
28				$ -
29	AK	13	3" Mill & 3" Overlay	$ 107,000
30				$ -
31				$ -
32	AA	3	Crack Treatment	$ 2,000
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (58,000)
			Total Present Worth	$ 237,757
			Eq. Annual Cost*	$10,586
			% of Low Cost	100%

OPTION #2

DESCRIPTION	DESIGN LIFE	TYPE
5.5" Whitetopping	15	PCC

Year	#	Life	Description	Cost/Mile
0			Initial Cost	$ 216,480
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15	AR	8	Major CPR (6'X6')	$ 200,000
16				$ -
17				$ -
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23	AZ	20	New Bituminous Structure	$ 355,000
24				$ -
25				$ -
26	AA	3	Crack Treatment	$ 2,000
27				$ -
28				$ -
29	AB	14	Surface Treatment	$ 20,000
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (142,000)
			Total Present Worth	$ 497,299
			Eq. Annual Cost*	$22,142
			% of Low Cost	209%

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

LIFE CYCLE COST ANALYSIS

District	Metro
Performed By	C. Kufner
Analysis Period	35
Discount Rate	2.7

Project Number	6222-165
Date	12/1/2011
Funding Category	RS
Low Cost Option #	1
Chosen Option #	1

OPTION #1					OPTION #2					OPTION #3				
DESCRIPTION					DESCRIPTION					DESCRIPTION				
3.5" Bituminous Mill and Overlay					4" mill and 6" Bituminous Overlay					5" mill and 7" Concrete Overlay				
			DESIGN LIFE	TYPE				DESIGN LIFE	TYPE				DESIGN LIFE	TYPE
			12	BIT				13	BIT				15	PCC
Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile
0			3.5" Bit m/o, 1.5" shldr m/o	$ 198,519	0			4" mill and 6" Bit, 2" shldr	$ 292,963	0			5" mill and 7" pcc (2" shldr)	$ 387,222
1				$ -	1				$ -	1				$ -
2				$ -	2				$ -	2				$ -
3				$ -	3				$ -	3				$ -
4				$ -	4				$ -	4				$ -
5				$ -	5				$ -	5				$ -
6				$ -	6				$ -	6				$ -
7				$ -	7				$ -	7				$ -
8				$ -	8				$ -	8				$ -
9				$ -	9				$ -	9				$ -
10				$ -	10				$ -	10				$ -
11				$ -	11				$ -	11				$ -
12	bb		4" Mill and Overlay (2" shdr)	$ 229,789	12				$ -	12				$ -
13				$ -	13	bb		4" Mill and Overlay (2" shdr)	$ 229,789	13	aq		Minor CPR (15')	$ 63,985
14				$ -	14				$ -	14				$ -
15				$ -	15				$ -	15				$ -
16				$ -	16				$ -	16				$ -
17				$ -	17				$ -	17				$ -
18				$ -	18				$ -	18				$ -
19				$ -	19				$ -	19				$ -
20				$ -	20				$ -	20	bj		Major CPR (15') (2" shldr)	$ 184,084
21				$ -	21				$ -	21				$ -
22	bb		4" Mill and Overlay (2" shdr)	$ 229,789	22				$ -	22				$ -
23				$ -	23				$ -	23				$ -
24				$ -	24				$ -	24				$ -
25				$ -	25	bb		4" Mill and Overlay (2" shdr)	$ 229,789	25				$ -
26				$ -	26				$ -	26				$ -
27				$ -	27				$ -	27				$ -
28				$ -	28				$ -	28				$ -
29				$ -	29				$ -	29				$ -
30				$ -	30				$ -	30	af		4" Overlay	$ 292,818
31	bb		4" Mill and Overlay (2" shdr)	$ 229,789	31				$ -	31				$ -
32				$ -	32				$ -	32				$ -
33				$ -	33				$ -	33				$ -
34				$ -	34				$ -	34				$ -
35			Remaining Service Life Value**	$ (114,895)	35			Remaining Service Life Value**	$ -	35			Remaining Service Life Value**	$ (246,839)
			Total Present Worth	$ 548,693				Total Present Worth	$ 573,536				Total Present Worth	$ 575,040
			Eq. Annual Cost*	$24,430				Eq. Annual Cost*	$25,536				Eq. Annual Cost*	$25,603
			% of Low Cost	100%				% of Low Cost	105%				% of Low Cost	105%

* Equivalent Annual Cost is included for information only.

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

LIFE CYCLE COST ANALYSIS

District	Metro
Performed By	C. Kufner
Analysis Period	35
Discount Rate	2.7

Project Number	6222-165
Date	12/1/2011
Funding Category	RS
Low Cost Option #	1/1/1900
Chosen Option #	1/1/1900

OPTION #4					OPTION #5					OPTION #6				
DESCRIPTION					DESCRIPTION					DESCRIPTION				
6" mill, 4" reclaim + 6" Bituminous					6" mill, 4" reclaim + 6" Concrete (tied shoulder)									
			DESIGN LIFE	TYPE				DESIGN LIFE	TYPE				DESIGN LIFE	TYPE
			20	BIT				20	PCC					BIT
Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile
0			6" mill, 4" reclaim + 6" Bit	$ 475,765	0			6" mill, 4" reclaim + 6" pcc	$ 566,485	0				
1				$ -	1				$ -	1				$ -
2				$ -	2				$ -	2				$ -
3				$ -	3				$ -	3				$ -
4				$ -	4				$ -	4				$ -
5				$ -	5				$ -	5				$ -
6				$ -	6				$ -	6				$ -
7				$ -	7				$ -	7				$ -
8	aa		Crack Treatment	$ 5,000	8				$ -	8				$ -
9				$ -	9				$ -	9				$ -
10				$ -	10				$ -	10				$ -
11				$ -	11				$ -	11				$ -
12	ab		Surface Treatment	$ 20,000	12				$ -	12				$ -
13				$ -	13	bc		Reseal and partials (12')	$ 29,283	13				$ -
14				$ -	14				$ -	14				$ -
15				$ -	15				$ -	15				$ -
16				$ -	16				$ -	16				$ -
17				$ -	17				$ -	17				$ -
18				$ -	18				$ -	18				$ -
19				$ -	19				$ -	19				$ -
20	bl		2.5" mill + 4" Bit (1.5" shdr)	$ 207,396	20				$ -	20				$ -
21				$ -	21				$ -	21				$ -
22				$ -	22				$ -	22				$ -
23	aa		Crack Treatment	$ 5,000	23				$ -	23				$ -
24				$ -	24				$ -	24				$ -
25				$ -	25	bd		Major CPR (12') (2" shdr)	$ 177,552	25				$ -
26				$ -	26				$ -	26				$ -
27	ab		Surface Treatment	$ 20,000	27				$ -	27				$ -
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 Value**	$ -	35			Remaining Service Life Value**	$ -	35			Remaining Service Life Value**	$ -
			Total Present Worth	$ 628,512				Total Present Worth	$ 678,411				Total Present Worth	
			Eq. Annual Cost*	$27,984				Eq. Annual Cost*	$30,205				Eq. Annual Cost*	
			% of Low Cost	115%				% of Low Cost	124%				% of Low Cost	

* Equivalent Annual Cost is included for information only.

Cost Analysis/ T.H. 19/S.P. 6602-29(Lonsdale to I-35)

Givens:

Length =	6.68 miles		
Width of Road =	24 feet(Conc.)	24 feet(Bit.)	10/25/12-TRM
1" Bituminous =	113 lbs/SY		
Interest Rate =	2.5 %		
Inflation Rate =	0 %		

3.5" Bituminous Overlay(15 Year Fix)

Item	Course	Unit	Price/Unit	Total Cost
PATCH		Ton	120.00	$32,064.00
TACK COAT		GAL	$1.00	$18,810.88
3.5" SPWEB340B	Wear	TON	55.00	$1,022,959.17
		Total Cost:		**$1,073,834**
		Cost/Mile:		**$160,754**

Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
Initial Cost	0	$160,754	1.000	$160,754	$6,945
Rout & seal	2	$2,000	0.952	$1,904	$82
Chipseal	4	$20,000	0.906	$18,119	$783
Mill & 3" Overlay	17	$145,117	0.657	$95,370	$4,121
Rout & seal	19	$2,000	0.626	$1,251	$54
Chipseal	21	$20,000	0.595	$11,908	$514
Mill & 3" Overlay	33	$145,117	0.443	$64,244	$2,776
Remaining Life Value	35	($125,768)	0.421	-$52,995	-$2,290
		Total Present Worth:		**$300,554**	$12,986
		Equivalent Annual Cost:		**$12,986**	$12,986

6" Unbonded Overlay(15 Year Fix)

Item	Course	Unit	Price/Unit	Total Cost
PASSRC		Ton	58.54	$390,265.11
Conc Std Width 6		SY	5.00	$470,272.00
Structural Concrete		CY	65.77	$1,030,992.98
Reinforcement Bars	Epoxy	lb	0.80	$33,239.68
Dowel Bars	Epoxy	each	5.20	$293,449.73
		Total Cost:		**$2,218,219**
		Cost/Mile:		**$332,069**

Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
Initial Cost	0	$332,069	1.000	$332,069	$14,347
Major CPR	15	$150,000	0.690	$103,570	$4,475
3.5" Bit. Overlay	25	$160,754	0.539	$86,709	$3,746
Rout & seal	27	$2,000	0.513	$1,027	$44
Remaining Life Value	35	($53,585)	0.421	-$22,579	-$976
		Total Present Worth:		**$500,796**	$21,637
		Equivalent Annual Cost:		**$21,637**	$21,637

1. Preventive Maintenance adds 1 year of life to thin overlays and 2 years to medium overlays and Reclaimed pavements.
2. Each successive overlay has 1 year less life than previous one on a section.
3. Medium overlay-15 years,unbonded-15 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.

AT LEAST ONE BITUMINOUS & ONE PCC OPTION WITH EQUAL DESIGN LIVES IS REQUIRED

District	7
Performed By	C. Bower
Analysis Period	35
Discount Rate	2.7

Project Number	6703-23
Date	4/27/2012
Funding Category	4
Low Cost Option #	3
Chosen Option #	

District	7
Performed By	C. Bower
Analysis Period	35
Discount Rate	2.7

Project Number	6703-23
Date	4/27/2012
Funding Category	3
Low Cost Option #	1/3/1900
Chosen Option #	

OPTION #1

DESCRIPTION: 4" Mill and Overlay

DESIGN LIFE: 16 — TYPE: 1

Year	#	Life	Description	Cost/Mile
0			Initial Construction	$ 241,724
1				$ -
2				$ -
3	AA		Crack Treatment	$ 5,000
4				$ -
5				$ -
6				$ -
7	BB		Chip Seal	$ 20,000
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15				$ -
16	BA		2" Mill and 3.5" Overlay	$ 161,691
17				$ -
18				$ -
19	AA		Crack Treatment	$ 5,000
20				$ -
21				$ -
22				$ -
23	BB		Chip Seal	$ 20,000
24				$ -
25				$ -
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31	BA		2" Mill and 3.5" Overlay	$ 161,691
32				$ -
33				$ -
34	AA		Crack Treatment	$ 5,000
35			Remaining Service Life Value**	$ (114,801)

Total Present Worth	$ 409,995
Eq. Annual Cost*	$18,254
% of Low Cost	104%

OPTION #2

DESCRIPTION: Bituminous Reclamation

DESIGN LIFE: 20 — TYPE: 1

Year	#	Life	Description	Cost/Mile
0			Initial Construction	$ 482,965
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8	BC		Light Crack Treatment	$ 2,500
9				$ -
10				$ -
11				$ -
12	BB		Chip Seal	$ 20,000
13				$ -
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20	BD		2.5" Mill and 4" Overlay	$ 188,967
21				$ -
22				$ -
23	AA		Crack Treatment	$ 5,000
24				$ -
25				$ -
26				$ -
27	BB		Chip Seal	$ 20,000
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ -

Total Present Worth	$ 622,875
Eq. Annual Cost*	$27,733
% of Low Cost	158%

OPTION #3

DESCRIPTION: 35 Year Concrete Whitetopping

DESIGN LIFE: 35 — TYPE: 2

Year	#	Life	Description	Cost/Mile
0			Initial Construction	$ 346,293
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15				$ -
16				$ -
17	BE		1st 35 Year CPR	$ 27,184
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27	BF		2nd 35 Year CPR	$ 93,312
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (35,889.11)

Total Present Worth	$ 394,901
Eq. Annual Cost*	$17,582
% of Low Cost	100%

OPTION #4

DESCRIPTION: 25 Year Whitetopping

DESIGN LIFE: 25 — TYPE: 2

Year	#	Life	Description	Cost/Mile
0			Initial Construction	$ 332,159
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14	BG		1st 25 Year CPR	$ 27,184
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20				$ -
21				$ -
22	BH		2nd 25 Year CPR	$ 93,312
23				$ -
24				$ -
25				$ -
26				$ -
27				$ -
28				$ -
29				$ -
30	BI		3rd 25 Year CPR	$ 166,271
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (96,991.25)

Total Present Worth	$ 439,398
Eq. Annual Cost*	$19,564
% of Low Cost	111%

OPTION #5

DESCRIPTION: Reclaim with Concrete Surfacing and DSB

DESIGN LIFE: 35 — TYPE: 2

Year	#	Life	Description	Cost/Mile
0			Initial Cost	$ 455,914
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15				$ -
16				$ -
17	BE		1st 35 Year CPR	$ 27,184
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27	BF		2nd 35 Year CPR	$ 93,312
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (35,889.11)

Total Present Worth	$ 504,521
Eq. Annual Cost*	$22,463
% of Low Cost	128%

OPTION #6

DESCRIPTION: Reclaim with Concrete Surfacing (no DSB)

DESIGN LIFE: 35 — TYPE: 2

Year	#	Life	Description	Cost/Mile
0			Initial Cost	$ 415,292
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15				$ -
16				$ -
17	BE		1st 35 Year CPR	$ 27,184
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27	BF		2nd 35 Year CPR	$ 93,312
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (35,889.11)

Total Present Worth	$ 463,900
Eq. Annual Cost*	$20,655
% of Low Cost	117%

* 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.

District	7
Performed By	C. Bower
Analysis Period	35
Discount Rate	2.7

Project Number	6703-23
Date	12/6/2012
Funding Category	RD
Low Cost Option #	1
Chosen Option #	

OPTION #1					OPTION #2				
DESCRIPTION					DESCRIPTION				
20 Year Concrete Whitetopping									
			DESIGN LIFE	TYPE				DESIGN LIFE	TYPE
			20	PCC					PCC
Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile
0			Initial Construction	$ 239,499	0				
1				$ -	1				$ -
2				$ -	2				$ -
3				$ -	3				$ -
4				$ -	4				$ -
5				$ -	5				$ -
6				$ -	6				$ -
7				$ -	7				$ -
8				$ -	8				$ -
9				$ -	9				$ -
10				$ -	10				$ -
11				$ -	11				$ -
12				$ -	12				$ -
13	BA		Yr. 13 CPR	$ 70,236	13				$ -
14				$ -	14				$ -
15				$ -	15				$ -
16				$ -	16				$ -
17				$ -	17				$ -
18				$ -	18				$ -
19				$ -	19				$ -
20				$ -	20				$ -
21				$ -	21				$ -
22				$ -	22				$ -
23				$ -	23				$ -
24				$ -	24				$ -
25	BB		Yr. 25 CPR	$ 146,502	25				$ -
26				$ -	26				$ -
27				$ -	27				$ -
28				$ -	28				$ -
29				$ -	29				$ -
30				$ -	30				$ -
31				$ -	31				$ -
32				$ -	32				$ -
33				$ -	33				$ -
34				$ -	34				$ -
35			No Remaining Service Life	$ -	35			Remaining Service Life Value**	$ -
			Total Present Worth	$ 364,438				Total Present Worth	
			Eq. Annual Cost*	$16,226				Eq. Annual Cost*	
			% of Low Cost	100%				% of Low Cost	

* Equivalent Annual Cost is included for information only.

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

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

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

Memo

TO: James Swanson
District Engineer

FROM: John Hager
District Materials Engineer

DATE: May 1, 2012

SUBJECT: LCCA Exception for SP 6703-23 (TH 23)

A life cycle cost analysis was performed in accordance with Tech Memo No. 10-04-MAT-01 for this project, which is proposed as an alternate bid with concrete and bituminous alternatives. A summary of the life cycle cost analysis is shown below:

Equivalent Annual Cost	Description (Selected Alternative)	Design Life (Years)	% Over Low Cost
$395,000	6" Concrete Whitetopping	35	
$410,000	4" Bituminous Mill and Overlay	16	104%
$464,000	**Reclaim with 6.5" Concrete Surfacing**	35	117%
$505,000	Reclaim with 6" Concrete Surfacing and DSB*	35	128%
$623,000	**Reclaim with 6" Bituminous Surfacing**	20	158%

*DSB – Drainable Stable Base – similar to the OGAB used in the past

The justification for not selecting the lowest cost alternatives is:

This section of TH 23 consists of a highly variable inplace pavement structure – with bituminous thickness between 8 and 12 inches, aggregate base between 0 and 8 inches, permeable asphalt stabilized base between 0 and 6 inches and granular between 0 and 36 inches. The bituminous pavement is also severely rutted to an unknown depth. In order to provide a more uniform base and repair the rutting, the district desires reclamation for both alternatives, which should reduce future maintenance costs. These benefits cannot be reflected in the current LCCA process. It should be noted that the "reclaim with concrete surfacing" options use 5-6" less select granular than current design standards call for.

I concur with the selected alternative,

James Swanson, District Engineer

May 1, 2012
Date

An Equal Opportunity Employer

Life Cycle Cost Analysis - Rehabilitation (Cost/Mile)

S.P. 7306-95
T.H. 23
Date 2/2/10

Interest Rate: 2.84
Inflation Rate: 0.00
Discount Rate 2.84

Soils Engineer: Chad DeMenge

Major Fixes are greater than $25,000.00

	Option 1				Option 2				Option 3			
	3.5" Mill and 3.5" Overlay				5.0" Mill and 5.0" Overlay				5.0" Mill and 5.0" Concrete			
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	3.5" Mill and 3.5" Overlay	153683	153683	8669	5.0" Mill and 5.0" Overlay	216304	216304	12201	5.0" Mill and 5.0" Concrete	335276	335276	18913
1		0	0	0		0	0	0		0	0	0
2		0	0	0		0	0	0		0	0	0
3		0	0	0		0	0	0		0	0	0
4		0	0	0		0	0	0		0	0	0
5		0	0	0		0	0	0		0	0	0
6		0	0	0		0	0	0		0	0	0
7		0	0	0		0	0	0		0	0	0
8		0	0	0		0	0	0		0	0	0
9		0	0	0		0	0	0		0	0	0
10		0	0	0		0	0	0		0	0	0
11		0	0	0		0	0	0		0	0	0
12		0	0	0		0	0	0		0	0	0
13		0	0	0		0	0	0		0	0	0
14		0	0	0		0	0	0		0	0	0
15	3.5" Mill and 3.5" Overlay	153683	100971	5696		0	0	0		0	0	0
16		0	0	0		0	0	0		0	0	0
17		0	0	0		0	0	0		0	0	0
18		0	0	0		0	0	0		0	0	0
19		0	0	0		0	0	0		0	0	0
20		0	0	0	5.0" Mill and 5.0" Overlay	216304	123544	6969	Remove and Pave 5.0" Concrete	335276	191497	10802
21		0	0	0		0	0	0		0	0	0
22		0	0	0		0	0	0		0	0	0
23		0	0	0		0	0	0		0	0	0
24		0	0	0		0	0	0		0	0	0
25		0	0	0		0	0	0		0	0	0
26		0	0	0		0	0	0		0	0	0
27		0	0	0		0	0	0		0	0	0
28		0	0	0		0	0	0		0	0	0
29		0	0	0		0	0	0		0	0	0
30	3.5" Mill and 3.5" Overlay	153683	66338	3742		0	0	0		0	0	0
31		0	0	0		0	0	0		0	0	0
32		0	0	0		0	0	0		0	0	0
33		0	0	0		0	0	0		0	0	0
34		0	0	0		0	0	0		0	0	0
35		0	0	0		0	0	0		0	0	0
36		0	0	0		0	0	0		0	0	0
37		0	0	0		0	0	0		0	0	0
38		0	0	0		0	0	0		0	0	0
39		0	0	0		0	0	0		0	0	0
40		0	0	0	5.0" Mill and 5.0" Overlay	216304	70564	3980	Remove and Pave 5.0" Concrete	335276	109375	6170
41		0	0	0		0	0	0		0	0	0
42		0	0	0		0	0	0		0	0	0
43		0	0	0		0	0	0		0	0	0
44		0	0	0		0	0	0		0	0	0
45	3.5" Mill and 3.5" Overlay	153683	43585	2459		0	0	0		0	0	0
46		0	0	0		0	0	0		0	0	0
47		0	0	0		0	0	0		0	0	0
48		0	0	0		0	0	0		0	0	0
49		0	0	0		0	0	0		0	0	0
50	Salvage Value	-102455	-25260	-1425	Salvage Value	-108152	-26664	-1504	Salvage Value	-167638	-41330	-2331
Totals		$512,277	$339,316			$540,760	$383,748			$838,190	$594,818	
			Annualized	$19,140.46			**Annualized**	$19,170.47			**Annualized**	$33,553.00
			Annual Cost	100%			**Annual Cost**	100%			**Annual Cost**	175%

3.5" Mill and 3.5" Overlay is the low cost option

	3.5" Mill and 3.5" Overlay	5.0" Mill and 5.0" Overlay	5.0" Mill and 5.0" Concrete
Major Fixes	4	3	3
Maintenance Activities	0	0	0

Life Cycle Cost Analysis - Rehabilitation (Cost/Mile)

S.P. 7307-12 Interest Rate: 2.50 Soils Engineer: Darren Nelson Major Fixes are greater than $25,000.00

T.H. 28 Inflation Rate: 0.00

Date ~~1/21/10~~ Discount Rate 2.50

Revised 11/6/2012

	Option 1				Option 2				Option 3				Option4			
	3" Mill & 3" OL-Shoulders and ML				1.5" Mill & 1.5" OL-Shlds and Mainline				5" Concrete Mainline							
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	Description of Work	Future Value	Present Value	Annualized
0	3" Mill & 3" OL-Shoulders and ML	$111,701	111701	6063	1.5" Mill & 1.5" OL-Shlds and	60204	60204	3268	5" Concrete Mainline	238168	238168	12927		0	0	0
1		0	0	0		0	0	0		0	0	0		0	0	0
2		0	0	0		0	0	0		0	0	0		0	0	0
3		0	0	0		0	0	0		0	0	0		0	0	0
4	Surface Treatment	25000	22649	1229	Surface Treatment	25000	22649	1229		0	0	0		0	0	0
5		0	0	0		0	0	0		0	0	0		0	0	0
6		0	0	0		0	0	0		0	0	0		0	0	0
7		0	0	0		0	0	0		0	0	0		0	0	0
8		0	0	0		0	0	0		0	0	0		0	0	0
9		0	0	0	2.0" Mill & 3.0" OL - Shldr and ML	112687	90232	4897		0	0	0		0	0	0
10		0	0	0		0	0	0		0	0	0		0	0	0
11		0	0	0		0	0	0		0	0	0		0	0	0
12		0	0	0		0	0	0		0	0	0		0	0	0
13		0	0	0	Surface Treatment	25000	18136	984		0	0	0		0	0	0
14		0	0	0		0	0	0		0	0	0		0	0	0
15	2.0" Mill & 3.0" OL - Shldr and ML	112687	77806	4223		0	0	0	Major CPR	150000	103570	5621		0	0	0
16		0	0	0		0	0	0		0	0	0		0	0	0
17		0	0	0		0	0	0		0	0	0		0	0	0
18		0	0	0		0	0	0		0	0	0		0	0	0
19	Surface Treatment	25000	15638	849		0	0	0		0	0	0		0	0	0
20		0	0	0		0	0	0		0	0	0		0	0	0
21		0	0	0		0	0	0		0	0	0		0	0	0
22		0	0	0	3.0" Mill & 3.0" OL-Shoulders and ML	111701	64883	3522		0	0	0		0	0	0
23		0	0	0		0	0	0		0	0	0		0	0	0
24		0	0	0		0	0	0		0	0	0		0	0	0
25		0	0	0		0	0	0	Concrete Milling and Paving	308477	166390	9031		0	0	0
26		0	0	0		0	0	0		0	0	0		0	0	0
27		0	0	0	Surface Treatment	25000	12835	697		0	0	0		0	0	0
28	1.5" Mill & 1.5" OL-Shlds and Mainline	60204	30155	1637		0	0	0		0	0	0		0	0	0
29		0	0	0		0	0	0		0	0	0		0	0	0
30	Salvage Value	-48163	-22961	-1246	Salvage Value	-47872	-22823	-1239	Salvage Value	-205651	-98043	-5321	Salvage Value	0	0	0
Totals		$286,429	$234,988			$311,720	$246,116			$490,994	$410,085			$0	$0	
			Annualized	$12,754.18			**Annualized**	$13,358.15			**Annualized**	$22,257.72			**Annualized**	$0.00
			Annual Cost	100%			**Annual Cost**	105%			**Annual Cost**	175%			**Annual Cost**	0%

3" Mill & 3" OL-Shoulders and ML is the low cost option

	ill & 3" OL-Shoulders and	ill & 1.5" OL-Shlds and M	5" Concrete Mainline	
Major Fixes	3	3	2	
Maintenance Activities	2	3	0	

District	3
Performed By	CD
Analysis Period	35
Discount Rate	2.84

Project Number	7326-14
Date	4/28/2011
Funding Category	RS
Low Cost Option #	1
Chosen Option #	1

District	3
Performed By	CD
Analysis Period	35
Discount Rate	2.84

OPTION #1

DESCRIPTION: 1.5" Mill and 3.0" Overlay

DESIGN LIFE: 15 **TYPE:** BIT

Year	#	Life	Description	Cost/Mile
0			1.5" Mill and 3.0" Overlay	$ 135,600
1				$ -
2				$ -
3				$ -
4				$ -
5			Seal Coat	$ 25,000
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15			2.0" Mill and 2.0" Overlay	$ 98,396
16				$ -
17				$ -
18				$ -
19				$ -
20			Seal Coat	$ 25,000
21				$ -
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27				$ -
28				$ -
29			2.0" Mill and 3.0" Overlay	$ 139,052
30				$ -
31				$ -
32				$ -
33				$ -
34			Seal Coat	$ 25,000
35			Remaining Service Life Value**	$ (69,526)

Total Present Worth	$ 281,544
Eq. Annual Cost*	$12,799
% of Low Cost	100%

OPTION #2

DESCRIPTION: 5.0" Whitetopping

DESIGN LIFE: 15 **TYPE:** PCC

Year	#	Life	Description	Cost/Mile
0			5.0" Whitetopping	$ 292,683
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12			Minor CPR	$ 40,000
13				$ -
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20			Major CPR	$ 150,000
21				$ -
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27				$ -
28				$ -
29				$ -
30			Remove and Replace Concrete	$ 456,000
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (305,520)

Total Present Worth	$ 489,128
Eq. Annual Cost*	$22,235
% of Low Cost	174%

OPTION #3

DESCRIPTION: Reclaim 12", Remove 4.5", 6.0" Bituminous

DESIGN LIFE: 20 **TYPE:** BIT

Year	#	Life	Description	Cost/Mile
0			Reclaim/Remove/6" Bituminous	$ 290,000
1				$ -
2				$ -
3				$ -
4				$ -
5			Seal Coat	$ 25,000
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20			2.0" Mill and 2.0" Overlay	$ 98,396
21				$ -
22				$ -
23				$ -
24				$ -
25			Seal Coat	$ 25,000
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ -

Total Present Worth	$ 380,347
Eq. Annual Cost*	$17,290
% of Low Cost	135%

OPTION #4

DESCRIPTION: Reclaim 12", Remove 5.5", 7.0" Concrete

DESIGN LIFE: 20 **TYPE:** PCC

Year	#	Life	Description	Cost/Mile
0			Reclaim/Remove/7" Concrete	$ 456,000
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13			Minor CPR	$ 40,000
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25			Major CPR	$ 150,000
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ -

Total Present Worth	$ 558,274
Eq. Annual Cost*	$25,378
% of Low Cost	198%

* Equivalent Annual Cost is included for information only.

* Equivalent Annual Cost is included for informatic

District	3
Performed By	CD
Analysis Period	35
Discount Rate	2.84

Project Number	7380-238
Date	2/6/2012
Funding Category	RS
Low Cost Option #	2
Chosen Option #	1

District	3
Performed By	CD
Analysis Period	35
Discount Rate	2.7

Project Number	7380-238
Date	2/6/2012
Funding Category	RS
Low Cost Option #	1/2/1900
Chosen Option #	1/1/1900

OPTION #1

DESCRIPTION: 6.0" SMA Overlay
DESIGN LIFE: 15
TYPE: BIT

Year	#	Life	Description	Cost/Mile
0			6.0" SMA Overlay	$ 463,319
1				$ -
2				$ -
3			Crack Treatment	$ 2,500
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15			2.0" Mill & 4.0" SMA Overlay	$ 292,231
16				$ -
17				$ -
18			Crack Treatment	$ 5,000
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25				$ -
26			2.5" Mill & 3.0" SMA Overlay	$ 257,273
27				$ -
28				$ -
29			Crack Treatment	$ 5,000
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (25,727.30)

Total Present Worth	$ 777,417
Eq. Annual Cost*	$35,340
% of Low Cost	125%

OPTION #2

DESCRIPTION: 7.0" Unbonded Overlay
DESIGN LIFE: 15
TYPE: PCC

Year	#	Life	Description	Cost/Mile
0			7.0" Unbonded Overlay	$ 439,108
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12			Reseal Joints & Partial Depth Re	$ 29,283
13				$ -
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20			Major CPR	$ 124,203
21				$ -
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27				$ -
28				$ -
29				$ -
30			Remove and Replace Concrete	$ 503,893
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (335,928.67)

Total Present Worth	$ 622,422
Eq. Annual Cost*	$28,294
% of Low Cost	100%

OPTION #3

DESCRIPTION: 9.0" Unbonded Overlay
DESIGN LIFE: 30
TYPE: PCC

Year	#	Life	Description	Cost/Mile
0			9.0" Unbonded Overlay	$ 551,318
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15			Reseal Joints & Partial Depth Re	$ 23,301
16				$ -
17				$ -
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25			Minor CPR	$ 116,897
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ -

Total Present Worth	$ 624,670
Eq. Annual Cost*	$28,397
% of Low Cost	100%

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

OPTION #4

DESCRIPTION: 6.0" Unbonded Overlay
DESIGN LIFE: 12
TYPE: PCC

Year	#	Life	Description	Cost/Mile
0			6.0" Unbonded Overlay	$ 381,302
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9			Reseal Joints & Partial Depth Re	$ 29,283
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15				$ -
16				$ -
17			Major CPR	$ 124,203
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27			Remove and Replace Concrete	$ 446,088
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ (148,696.00)

Total Present Worth	$ 634,852
Eq. Annual Cost*	$28,860
% of Low Cost	102%

OPTION #5

DESCRIPTION: 6.0" Bituminous Overlay
DESIGN LIFE: 12
TYPE: BIT

Year	#	Life	Description	Cost/Mile
0			6.0" Bituminous Overlay	$ 297,736
1				$ -
2				$ -
3			Crack Treatment	$ 2,500
4				$ -
5				$ -
6				$ -
7			Chip Seal	$ 20,000
8				$ -
9				$ -
10				$ -
11				$ -
12			Mill 2.0", Overlay 4.0", 2.0" Shld	$ 201,495
13				$ -
14				$ -
15			Crack Treatment	$ 2,500
16				$ -
17				$ -
18				$ -
19			Chip Seal	$ 20,000
20				$ -
21				$ -
22				$ -
23			Mill 3.0" Overlay 5.0"	$ 240,816
24				$ -
25				$ -
26			Crack Treatment	$ 2,500
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33			Remove and Replace Inplace Bi	$ 543,654
34				$ -
35			Remaining Service Life Value**	$ (453,045.00)

Total Present Worth	$ 647,272
Eq. Annual Cost*	$29,424
% of Low Cost	104%

OPTION #6

DESCRIPTION:
DESIGN LIFE:
TYPE: BIT

Year	#	Life	Description	Cost/Mile
0				
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ -

Total Present Worth	
Eq. Annual Cost*	
% of Low Cost	

* Equivalent Annual Cost is included for information only.

Minnesota Department of Transportation

Memo

TO: Dan Anderson
District Engineer

FROM: Darren Nelson
Materials Engineer

DATE: 11/29/12

SUBJECT: LCCA Exception for Pavement Preservation Project
In reconditioning (RD), resurfacing (RS), or road repair (RX) funding categories

S.P. 7380-238 (TH 94)

A Life Cycle Cost Analysis was performed in accordance with Tech Memo No. 10-04-MAT-01.

Both PCC and HMA alternatives were considered.

The alternative with the lowest Total Present Worth was: 7.0" Unbonded Overlay

The alternative selected by the District is: 9.0" Unbonded Overlay

The justification for not selecting the lowest cost alternative is:

The 9.0" was less than a 0.4% increase in annual cost over a 35 year analysis period.

Given the fact that the Life Cycle costs were nearly equal, the high amounts of interstate truck traffic,

and the fact that the 9" option required one less fix and traffic disruption over the next 35 years, the 9.0"

option was selected.

The 9.0" option also provided a 30 year design life opposed to 15 years with the 7.0" option.

I concur with the selected alternative,

for Calvin R. Pulkrabek ADE 11/29/12

District Engineer Date

District	7
Performed By	John Hager
Analysis Period	35
Discount Rate	2.5

Project Number	8304-113
Date	12/6/2012
Funding Category	RD
Low Cost Option #	1
Chosen Option #	1

OPTION #1					OPTION #2					OPTION #3				
DESCRIPTION					DESCRIPTION					DESCRIPTION				
3" Overlay with Novachip					7" Unbonded Overlay					Bituminous Reconstruct				
			DESIGN LIFE	TYPE				DESIGN LIFE	TYPE				DESIGN LIFE	TYPE
			14	BIT 1				20	PCC 2				20	BIT 1
Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile	Year	#	Life	Description	Cost/Mile
0	BB		3" Overlay with Novachip	$ 397,458	0	BC		7" Unbonded Overlay	$ 698,302	0	AZ		Bituminous Reconstruct	$ 1,742,847
1				$ -	1				$ -	1				$ -
2				$ -	2				$ -	2				$ -
3	AA		Crack Treatment	$ 3,000	3				$ -	3				$ -
4				$ -	4				$ -	4				$ -
5				$ -	5				$ -	5				$ -
6				$ -	6				$ -	6				$ -
7	AB		Surface Treatment	$ 20,000	7				$ -	7				$ -
8				$ -	8				$ -	8	AA		Crack Treatment	$ 3,000
9				$ -	9				$ -	9				$ -
10				$ -	10				$ -	10				$ -
11				$ -	11				$ -	11				$ -
12				$ -	12				$ -	12	AB		Surface Treatment	$ 20,000
13				$ -	13	AO		Reseal Joints (15')	$ 91,340	13				$ -
14	AJ	13	2" Mill & 3" Overlay	$ 150,981	14				$ -	14				$ -
15				$ -	15				$ -	15				$ -
16				$ -	16				$ -	16				$ -
17	AA		Crack Treatment	$ 3,000	17				$ -	17				$ -
18				$ -	18				$ -	18				$ -
19				$ -	19				$ -	19				$ -
20				$ -	20				$ -	20	AM		3" Mill & 4.5" Overlay	$ 244,929
21	AB		Surface Treatment	$ 20,000	21				$ -	21				$ -
22				$ -	22				$ -	22				$ -
23				$ -	23				$ -	23	AA		Crack Treatment	$ 3,000
24				$ -	24				$ -	24				$ -
25				$ -	25	AS		Major CPR (15')	$ 342,376	25				$ -
26				$ -	26				$ -	26				$ -
27	AJ	12	2" Mill & 3" Overlay	$ 150,981	27				$ -	27	AB		Surface Treatment	$ 20,000
28				$ -	28				$ -	28				$ -
29				$ -	29				$ -	29				$ -
30	AA		Crack Treatment	$ 3,000	30				$ -	30				$ -
31				$ -	31				$ -	31				$ -
32				$ -	32				$ -	32				$ -
33				$ -	33				$ -	33				$ -
34	AB		Surface Treatment	$ 20,000	34				$ -	34				$ -
35			4 years remaining service life	$ -	35			No Remaining Service Life	$ -	35			No Remaining Service Life	$ -
			Total Present Worth	$ 625,384				Total Present Worth	$ 949,236				Total Present Worth	$ 1,921,621
			Eq. Annual Cost*	$27,020				Eq. Annual Cost*	$41,012				Eq. Annual Cost*	$83,025
			% of Low Cost	100%				% of Low Cost	152%				% of Low Cost	307%

* Equivalent Annual Cost is included for information only.

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

Cost Analysis/ S.P. 8501-61/TH 14 From W. Jct. T.H. 74 to T.H. 61

Givens:

Length =	21.6 miles		
Width of Road =	24 feet(Conc.)	24 feet(Bit.)	11/14/11-TRM
1" Bituminous =	113 lbs/SY		
Interest Rate =	2.7 %		
Inflation Rate =	0 %		

MILL & 3" min. Bituminous Overlay(15 Year Fix)

Item	Course	Unit	Price/Unit	Total Cost
1.5" MILL BITUMINOUS		SY	0.50	$152,064.00
PATCH		Ton	100.00	$86,400.00
TACK COAT		GAL	$1.00	$60,825.60
3" SPWEB340B	Wear	TON	50.00	$2,577,484.80
		Total Cost:		**$2,876,774**
		Cost/Mile:		**$133,184**

Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
Initial Cost	0	$133,184	1.000	$133,184	$5,930
Rout & seal	2	$2,000	0.948	$1,896	$84
Chipseal	4	$20,000	0.899	$17,978	$800
Mill & 3" Overlay	17	$133,184	0.636	$84,675	$3,770
Rout & seal	19	$2,000	0.603	$1,206	$54
Chipseal	21	$20,000	0.572	$11,430	$509
Mill & 3" Overlay	33	$133,184	0.415	$55,288	$2,462
Rout & seal	35	$2,000	0.394	$787	$35
Remaining Life Value	35	($115,426)	0.394	-$45,430	-$2,023
	Total Present Worth:			**$261,014**	$11,621
	Equivalent Annual Cost:			**$11,621**	$11,621

7.5" Unbonded Overlay(20 Year Fix)

Item	Course	Unit	Price/Unit	Total Cost
6" MILL BITUMINOUS		SY	2.00	$608,256.00
PASSRC		Ton	58.54	$1,261,935.07
Conc Std Width 7.5		SY	5.00	$1,520,640.00
Structural Concrete		CY	65.77	$4,167,187.20
Reinforcement Bars	Epoxy	lb	0.80	$107,481.60
Dowel Bars	Epoxy	each	5.20	$948,879.36
		Total Cost:		**$8,614,379**
		Cost/Mile:		**$398,814**

Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
Initial Cost	0	$398,814	1.000	$398,814	$17,757
Minor CPR	15	$150,000	0.671	$100,585	$4,478
4.5" Bit. Overlay	22	$164,499	0.556	$91,541	$4,076
Remaining Life Value	35	($38,706)	0.394	-$15,234	-$678
	Total Present Worth:			**$575,706**	$25,633
	Equivalent Annual Cost:			**$25,633**	$25,633

MILL & 5" min. Bituminous Overlay(20 Year Fix)

Item	Course	Unit	Price/Unit	Total Cost
1.5" MILL BITUMINOUS		SY	0.50	$152,064.00
PATCH		Ton	100.00	$86,400.00
TACK COAT		GAL	$1.00	$60,825.60
5" SPWEB340B	Wear	TON	50.00	$4,295,808.00
		Total Cost:		**$4,595,098**
		Cost/Mile:		**$212,736**

Strategy	Year	Cost/Mile	P/F	Present Worth	Annual Cost
Initial Cost	0	$212,736	1.000	$212,736	$9,472
Rout & seal	2	$2,000	0.948	$1,896	$84
Chipseal	4	$20,000	0.899	$17,978	$800
Mill & 3" Overlay	22	$133,184	0.556	$74,114	$3,300
Rout & seal	24	$2,000	0.528	$1,055	$47
Chipseal	26	$20,000	0.500	$10,005	$445
Remaining Life Value	35	($31,337)	0.394	-$12,334	-$549
	Total Present Worth:			**$305,451**	$13,600
	Equivalent Annual Cost:			**$13,600**	$13,600

1. Preventive Maintenance adds 1 year of life to thin overlays and 2 years to medium 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 Bituminous over Bituminous-20 years, reclamation overlay-20 years, whitetopping-20 years, unbonded-20 years,heavy bituminous over concrete
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.

District	8
Performed By	NAP
Analysis Period	35
Discount Rate	2.7

Project Number	8711-89
Date	12/5/2011
Funding Category	RS
Low Cost Option #	1
Chosen Option #	

District	8
Performed By	NAP
Analysis Period	35
Discount Rate	2.7

OPTION #1

DESCRIPTION: 3" MILL & 3" BITUMINOUS OVERLAY

DESIGN LIFE: 15 **TYPE:** BIT

Year	#	Life	Description	Cost/Mile
0	AK	15	3" Mill & 3" Overlay	$ 181,220
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7	AB		Surface Treatment	$ 21,000
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15	AH		2" Mill & 2" Overlay	$ 110,791
16				$ -
17				$ -
18	AB		Surface Treatment	$ 21,000
19				$ -
20				$ -
21				$ -
22				$ -
23				$ -
24				$ -
25	AK		3" Mill & 3" Overlay	$ 181,220
26				$ -
27				$ -
28				$ -
29				$ -
30				$ -
31				$ -
32	AB		Surface Treatment	$ 21,000
33				$ -
34				$ -
35	BD		Remaining Service Life Value**	$ (72,407)
			Total Present Worth	$ 359,495
			Eq. Annual Cost*	$16,006
			% of Low Cost	100%

OPTION #2

DESCRIPTION: MILL & UNBONDED OVERLAY

DESIGN LIFE: 15 **TYPE:** PCC

Year	#	Life	Description	Cost/Mile
0	AY	15	Unbonded Concrete Overlay 15	$ 838,929
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7				$ -
8				$ -
9				$ -
10	AP		Minor CPR (6'X6')	$ 100,000
11				$ -
12				$ -
13				$ -
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20	AR		Major CPR (6'X6')	$ 150,000
21				$ -
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27				$ -
28				$ -
29				$ -
30	AE		3" Overlay	$ 140,859
31				$ -
32				$ -
33				$ -
34				$ -
35	BE		Remaining Service Life Value**	$ (120,814)
			Total Present Worth	$ 1,019,371
			Eq. Annual Cost*	$45,386
			% of Low Cost	284%

OPTION #3

DESCRIPTION: 4.5" MILL & 4.5" BITUMINOUS OVERLAY

DESIGN LIFE: 20 **TYPE:** BIT

Year	#	Life	Description	Cost/Mile
0	AM	20	4.5" Mill & 4.5" Overlay	$ 247,625
1				$ -
2				$ -
3				$ -
4				$ -
5				$ -
6				$ -
7	AB		Surface Treatment	$ 21,000
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13	AA		Crack Treatment	$ 7,000
14	AB		Surface Treatment	$ 21,000
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20	AC		1.5" Overlay	$ 70,429
21				$ -
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27	AC		1.5" Overlay	$ 70,429
28				$ -
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34	BC		7.5" Mill & 4.5" Overlay	$ 259,945
35	BF		Remaining Service Life Value**	$ (246,948)
			Total Present Worth	$ 367,985
			Eq. Annual Cost*	$16,384
			% of Low Cost	102%

OPTION #4

DESCRIPTION: Historical Approach

DESIGN LIFE: 35 **TYPE:** PCC

Year	#	Life	Description	Cost/Mile
0	AM	21	4.5" Mill & 4.5" Overlay	$ 247,625
1				$ -
2				$ -
3				$ -
4				$ -
5	AA		Crack Treatment	$ 7,000
6	AB		Surface Treatment	$ 21,000
7				$ -
8				$ -
9				$ -
10				$ -
11				$ -
12				$ -
13				$ -
14				$ -
15				$ -
16				$ -
17				$ -
18				$ -
19				$ -
20				$ -
21	AK		3" Mill & 3" Overlay	$ 181,220
22				$ -
23				$ -
24				$ -
25				$ -
26				$ -
27	AA		Crack Treatment	$ 7,000
28	AB		Surface Treatment	$ 21,000
29				$ -
30				$ -
31				$ -
32				$ -
33				$ -
34				$ -
35			Remaining Service Life Value**	$ -
			Total Present Worth	$ 388,587
			Eq. Annual Cost*	$17,301
			% of Low Cost	108%

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

c:\projectwise\pw_working\pede1nat\d1438190\
8711-89 LCCA
LCCA

DISTRICT 1 LIFE CYCLE COST ANALYSIS

(General Pre-Scoping / Planning Estimate)

Worksheet

SP 8821-153 Date 11/1/2012

				Alternate #1			Alternate #2			Alternate #3			Alternate #4	
	Initial Project Descriptions ---->		Preservation Codes	**Mill 2" Pave 3.5" HMA 15 Year design**		Preservation Codes	**Mill 4" Pave 5" HMA 20 Year design**		Preservation Codes	**Mill 4" Pave 5" PCC 20 Year design**		Preservation Codes		
	First Cost in $ / Mile				$131,120			$189,728			$245,859			
	Rehab Life in Yrs				35			35			35			35
	Discount Rate %				2.70%			2.70%			2.70%			3.20%
Preservation Codes		**YR**												
		1			$0			$0			$0			$0
		2			$0			$0			$0			$0
		3	B	Crack Seal	$2,200	B	Crack Seal	$2,200			$0			$0
		4			$0			$0			$0			$0
		5			$0			$0			$0			$0
	Preservation Options	6			$0			$0			$0			$0
A	Micro-surface	7	C	Chip Seal	$13,400	C	Chip Seal	$13,400			$0			$0
B	Crack Seal	8			$0			$0			$0			$0
C	Chip Seal	9			$0			$0			$0			$0
D	Crack Fill	10			$0			$0			$0			$0
E	Thin Overlay	11			$0			$0			$0			$0
F	Medium Overlay	12			$0			$0			$0			$0
G	Thick Overlay	13			$0			$0	U	Joint Seal & Minor CPR	$102,564			$0
H	Thin Mill and Overlay	14			$0			$0			$0			$0
I	Medium Mill and Overlay	15	I	Medium Mill and Overlay	$117,920			$0			$0			$0
J	Thick Mill and Overlay	16			$0			$0			$0			$0
K	Reclaim and Overlay	17			$0			$0			$0			$0
L	Joint Seal	18	B	Crack Seal	$2,200			$0			$0			$0
M	Diamond Grind	19			$0			$0			$0			$0
N	Minor CPR	20			$0	I	Medium Mill and Overlay	$117,920			$0			$0
O	Major CPR	21			$0			$0			$0			$0
P	Rubblize and Thick Overlay	22	C	Chip Seal	$13,400			$0			$0			$0
Q	Crack / Seat and Thick Overlay	23			$0	B	Crack Seal	$2,200			$0			$0
R	Minor CPR abd Diamond Grind	24			$0			$0			$0			$0
S	Major CPR and Diamond Grind	25			$0			$0	O	Major CPR	$166,320			$0
T	Unbonded Overlay	26			$0			$0			$0			$0
U	Joint Seal and Minor CPR	27			$0	C	Chip Seal	$13,400			$0			$0
V		28	I	Medium Mill and Overlay	$117,920			$0			$0			$0
W		29			$0			$0			$0			$0
X		30			$0			$0			$0			$0
Y		31	B	Crack Seal	$2,200			$0			$0			$0
Z	Residual Value	32			$0			$0			$0			$0
		33			$0			$0			$0			$0
		34			$0			$0			$0			$0
		35	Z	Residual Value	($42,880)	Z	Residual Value	($1)	Z	Residual Value	($1)	Z	Residual Value	$0
		36			$0			$0			$0			$0
		37			$0			$0			$0			$0
		38			$0			$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
		44			$0			$0			$0			$0
		45			$0			$0			$0			$0
		46			$0			$0			$0			$0
		47			$0			$0			$0			$0
		48			$0			$0			$0			$0
		49			$0			$0			$0			$0
	Total Cost (Present Worth)				$272,176			$279,809			$403,843			$0
	Annual Cost (Present Worth)				$12,118			$12,458			$17,981			
	% Above Low Option				100%			103%			148%			0%

Data Furnished By:

Completed By: Derek Fredrickson