

2023 Report on the

Life-Cycle Cost Analysis

January 2024

Prepared by:

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You may also send an email to ADArequest.dot@state.mn.us

January 3, 2024

The Honorable Frank Hornstein
Chair
House Transportation Finance & Policy Committee
563 State Office Building
Saint Paul, Minnesota 55155

The Honorable Scott Dibble
Chair
Senate Transportation Committee
3107 Minnesota Senate Building
Saint Paul, Minnesota 55155

The Honorable Erin Koegel
Chair
House Sustainable Infrastructure Policy Committee
445 State Office Building
Saint Paul, Minnesota 55155

The Honorable John Petersburg
Republican Lead
House Transportation Finance & Policy Committee
217 State Office Building
Saint Paul, Minnesota 55155

The Honorable John Jasinski
Ranking Minority Member
Senate Transportation Finance & Policy Committee
2227 Minnesota Senate Building
Saint Paul, Minnesota 55155

The Honorable Mary Franson
Republican Lead
House Sustainable Infrastructure Policy Committee
303 State Office Building
Saint Paul, Minnesota 55155

Re: 2023 Life-Cycle Cost Analysis Report

Dear Legislators,

The Minnesota Department of Transportation is pleased to provide the annual report on pavement life-cycle cost analysis, as required under [Minn. Stat. 174.185, subd. 3](#).

In 2023, 23 construction projects were in the reconditioning, resurfacing and road repair funding categories and required a LCCA according to the MnDOT Pavement Design Manual.

MnDOT has conducted LCCAs on road rehabilitation projects since 1999. In addition, MnDOT is innovating new methods to design and select the most cost-effective pavement structure. Innovations include new pavement design procedures and refining the alternate bidding process to allow bidders of both pavement materials to bid on a project.

Please contact me if you have questions or comments about this report at nancy.daubenberger@state.mn.us, or you may contact Curt Turgeon at curt.turgeon@state.mn.us, or 651-366-5535.

Sincerely,



Nancy Daubenberger, P.E.
Commissioner

Contents

Cover Letter3

Legislative Request5

Life-Cycle Cost Analysis Report6

 Implementation6

 Results.....6

 Discussion7

 Conclusion.....8

Appendix A: Summary of LCCA Results9

Appendix B: Copies of LCCAs12

Legislative Request

This report is issued to comply with [Minnesota Statutes 174.185](#).

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

- Lowest life-cycle cost
- Alternatives considered
- Chosen strategy
- Documented justification, if the chosen strategy is not the low-cost option

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.

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.

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

Life-Cycle Cost Analysis Report

Implementation

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

The Minnesota Department of Transportation first implemented a LCCA process for roadway rehabilitation projects in 1999. The LCCA process was modified in 2010 to meet the specific requirements of legislation and was presented in Technical Memorandum 10-04-MAT-01. After the technical memorandum expired, the LCCA process, with some modifications, was incorporated into the MnDOT Pavement Design Manual which went into effect October 31st, 2014.

The LCCA process, which is consistent with Federal Highway Administration guidelines, is performed on all pavement projects regardless of funding category, but only the results of projects in the reconditioning, resurfacing and road repair funding categories are included in this report. The LCCA process limits the requirement to perform a LCCA to projects with more than 60,000 square yards of pavement and to projects that include placing more than two-inch thickness of pavement material. Thin overlays (two inches or less) are considered short-term preventive maintenance and do not have a viable concrete alternative with an equal design life.

The LCCA process requires the inclusion of 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 LCCA may include additional alternatives with other design lives.

Results

In 2023, 23 construction projects were in the reconditioning, resurfacing and road repair funding categories and required a LCCA according to the MnDOT Pavement Design Manual.

The results of the 23 LCCAs are as follows:

- Hot-mix asphalt was the low-cost option for 21 LCCAs and 21 were selected for construction.
- Portland cement concrete was the low-cost option for 1 LCCA and was selected for construction.
- A LCCA for SP 7380-274 was not performed because the resurfacing was completed by the District Maintenance Office completing a 3" mill and overlay.

A table of LCCA results and copies of the LCCAs submitted by MnDOT districts are attached. There are no exceptions this year.

Discussion

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

MnDOT continues to improve and refine its portland cement pavement design procedures. The design program for portland cement pavement thickness design has been updated and a research project is developing a new procedure to design portland cement concrete pavements that are built on top of existing portland cement concrete pavements.

No projects used the alternate bidding process in 2023, but MnDOT continued to provide for its use on projects that were likely to have competitive hot-mix asphalt and portland cement concrete options.

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

1. MnDOT lets a project with two options, one hot-mix asphalt and one portland cement concrete.
2. MnDOT calculates a maintenance factor. This is the difference between the maintenance costs of the two options.
3. Each contractor bids on either of the two options.
4. MnDOT adjusts the bids by adding the maintenance factor to the bids of the option with the greater maintenance costs.
5. MnDOT selects the bid with the lowest adjusted bid.

Conclusion

MnDOT implemented the requirements of [Minn. Stat. 174.185](#) and provided the required results in this report. MnDOT continues to work to ensure that all future projects meet the requirements of the legislation. In addition, MnDOT is innovating new pavement design methods to design the most cost-effective pavement structure.

Appendix A: Summary of LCCA Results

State Project Number (SP#)	Existing Pavement Type	Exception for low-cost option?	Design Life (in years)	Option Description	Present Worth	Optional Material (1)	Selected Option (2)	Alternate Bid? (3)
0303-67	HMA	No	20	PCC Overlay	\$9,807,064.90	PCC	X	No
			20	FDR	\$6,671,900.38	HMA		
			35	New PCC	\$11,224,223.18	PCC		
0801-35	HMA	No	15	M&OL	\$5,362,230.22	HMA	X	No
			20	New HMA	\$12,092,881.73	HMA		
			35	New PCC	\$11,901,454.86	PCC		
1926-23	HMA	No	17	M & OL	\$4,760,498.24	HMA	X	No
			20	CIR	\$5,278,326.57	HMA		
			20	PCC Overlay	\$9,110,785.38	PCC		
2180-118	PCC	No	20	New HMA	\$5,578,755.47	HMA	X	No
			20	New PCC	\$6,165,199.87	PCC		
			35	New PCC	\$5,019,051.16	PCC		
2782-352	HMA	No	17	M&OL	\$5,773,836.20	HMA	X	No
			20	New PCC	\$11,608,236.18	PCC		
			20	New HMA	\$12,024,829.82	HMA		
3104-62	HMA	No	16	M&OL	\$2,770,243.09	HMA	X	No
			20	New PCC	\$6,023,924.58	PCC		
			20	New HMA	\$4,836,144.41	HMA		
4407-13	HMA	No	15	M&OL	\$3,294,301.42	HMA	X	No
			20	New HMA	\$3,768,467.96	HMA		
			20	PCC Overlay	\$4,556,041.43	PCC		
4501-53	HMA	No	15	M&OL	\$1,188,205.68	HMA	X	No
			20	New PCC	\$3,024,194.79	PCC		
			20	New HMA	\$1,460,130.36	HMA		
4504-19	HMA	No	20	New PCC	\$35,505,861.31	PCC	X	No
			20	FDR	\$10,451,127.90	HMA		
			35	New PCC	\$26,737,463.71	PCC		
4602-27	HMA	No	20	CIR	\$13,081,970.98	HMA	X	No
			20	PCC Overlay	\$19,961,493.80	PCC		
			35	PCC Overlay	\$18,700,831.50	PCC		

State Project Number (SP#)	Existing Pavement Type	Exception for low-cost option?	Design Life (in years)	Option Description	Present Worth	Optional Material (1)	Selected Option (2)	Alternate Bid? (3)
4802-25	HMA	No	15	M&OL	\$5,533,116.35	HMA	X	No
			20	CIR	\$6,652,327.72	HMA		
			20	PCC Overlay	\$11,138,278.81	PCC		
4814-56	HMA	No	17	M&OL	\$3,390,561.81	HMA	X	No
			20	FDR	\$4,537,862.54	HMA		
			20	PPC Overlay	\$6,314,659.54	PCC		
5705-61	HMA	No	17	M&OL	\$4,919,829.13	HMA	X	No
			20	PCC Overlay	\$10,908,032.76	PCC		
			20	FDR	\$5,536,141.59	HMA		
5809-16	HMA	No	20	CIR	\$2,460,256.66	HMA	X	No
			20	New PCC	\$4,229,195.14	PCC		
			35	New PCC	\$3,778,177.97	PCC		
6229-37	HMA	No	16	M&OL	\$2,770,243.09	HMA	X	No
			20	New HMA	\$4,836,144.41	HMA		
			20	New PCC	\$6,023,924.58	PCC		
6903-17	HMA	No	16	M&OL	\$3,154,310.61	HMA	X	No
			20	FDR	\$3,705,303.10	HMA		
			20	PCC Overlay	\$5,666,527.22	PCC		
6910-105	HMA	No	20	New PCC	\$2,368,684.87	PCC	X	No
			20	New HMA	\$1,839,794.32	HMA		
			35	New PCC	\$2,448,436.80	PCC		
6935-94	HMA	No	20	CIR	\$13,324,825.53	HMA	X	No
			20	New PCC	\$22,380,252.78	PCC		
			35	New PCC	\$19,948,843.13	PCC		
7009-85	HMA	No	15	M&OL	\$8,465,282.58	HMA	X	No
			20	PCC Overlay	\$13,031,986.72	PCC		
			20	New HMA	\$18,229,639.52	HMA		
7480-133	BOC	No	15	M&OL	\$4,772,812.77	HMA	X	No
			20	PCC Overlay	\$11,003,244.30	PCC		
			20	M&OL	\$5,293,484.52	HMA		
8302-48	HMA	No	17	M&OL	\$5,884,496.65	HMA	X	No
			20	New HMA	\$13,002,869.24	HMA		
			35	New PCC	\$12,998,417.82	PCC		

State Project Number (SP#)	Existing Pavement Type	Exception for low-cost option?	Design Life (in years)	Option Description	Present Worth	Optional Material (1)	Selected Option (2)	Alternate Bid? (3)
8303-48	HMA	No	15	M&OL	\$6,058,444.61	HMA	X	No
			20	CIR	\$6,173,174.27	HMA		
			20	PCC Overlay	\$8,872,837.63	PCC		

(1) Option material - The pavement material that each option utilizes.

(2) Selected Option- This is marked (X) if the pavement option was selected to be constructed.

* If the project uses alternate bidding, more than one option will be marked and the constructed option will be the low-cost option as determined by alternate bidding.

(3) Alternate Bidding? - 'Yes' if the project used alternate bidding to select which option to construct.

Definitions:

HMA = Hot-Mix Asphalt

M&OL = Mill and overlay HMA

PCC = Portland Cement Concrete

BOC = Bituminous over Concrete

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

SFDR = Stabilized Full-Depth Reclamation (recycle existing HMA and Base stabilized with emulsion or foamed asphalt to use as a new base)

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

CPR = Concrete Pavement Repair

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

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

Appendix B: Copies of LCCAs

50-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	50-Year Analysis Period	35-Year Analysis Period
	0303-67	50		
	Highway	Discount Rate		
	TH 34	1.22%		
	Date	District 4 2019/2020 Prices		
	10/5/2020			
	Performed By			
	Nathan Bausman			

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	11" Reclaim & 5.5" Bituminous Overlay	4" Mill & 5" Whitetopping	7" Concrete Reconstruction	1.2
Net Present Cost	\$766,286.74	\$1,239,924.80	\$1,368,986.83	Miles
Segment #2	11" Reclaim & 5" Bituminous Overlay	4" Mill & 5" Whitetopping	7" Concrete Reconstruction	1.2
Net Present Cost	\$1,358,580.10	\$1,571,489.78	\$2,304,236.49	Miles
Segment #3	11" Reclaim & 5" Bituminous Overlay	4" Mill & 5" Whitetopping	7" Concrete Reconstruction	5.6
Net Present Cost	\$4,022,609.09	\$6,165,069.07	\$6,656,877.49	Miles
Segment #4	11" Reclaim & 5.5" Bituminous Overlay	3" Mill & 5" Whitetopping	7" Concrete Reconstruction	0.8
Net Present Cost	\$524,424.45	\$830,581.25	\$894,122.37	Miles
Project Net Present Cost	<u>\$6,671,900.38</u>	<u>\$9,807,064.90</u>	<u>\$11,224,223.18</u>	Total
% of Low Cost	<u>100.0%</u>	<u>147.0%</u>	<u>168.2%</u>	8.7

35-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	Change to: 50-Year Analysis Period	Change to: 35-Year Analysis Period
	0801-35	35		
	Highway	Discount Rate		
	4	0.66%		
	Date	District 1 2021/2022 Prices		
	9/15/2021			
	Performed By			
	Mike Schoeb			

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	Mill and overlay	Biutuminous Reconstruct	Concrete Reconstruct	11.7
Net Present Cost	\$5,362,230.22	\$12,092,881.73	\$11,901,454.86	Miles
Segment #2				0.0
Net Present Cost				Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	\$5,362,230.22	\$12,092,881.73	\$11,901,454.86	Total
% of Low Cost	100.0%	225.5%	221.9%	11.7

State Project: 1926-23

35-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	Change to: 50-Year Analysis Period	Change to: 35-Year Analysis Period
	1926-23	35		
	Highway	Discount Rate		
	TH 316	0.66%		
	Date	District 5		
	3/10/2021	2021/2022 Prices		
	Performed By			

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	2" mill, 4" overlay, 2" overlay on shoulders	20 year HMA CIR	20 year PCC whitetopping	8.6
Net Present Cost	\$4,760,498.24	\$5,278,326.57	\$9,110,785.38	Miles
Segment #2				0.0
Net Present Cost				Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	\$4,760,498.24	\$5,278,326.57	\$9,110,785.38	Total
% of Low Cost	100.0%	110.9%	191.4%	8.6

50-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	50-Year Analysis Period	35-Year Analysis Period
	2180-118	50		
	Highway	Discount Rate		
	I-94 WB	1.22%		
	Date	District 4 2019/2020 Prices		
	1/7/2022			
Performed By				
Chris Thorson				

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	12" Bituminous Reconstruction	7.5" Concrete Reconstruction	8.5" Concrete Reconstruction	0.1
Net Present Cost	\$236,669.54	\$277,826.41	\$234,708.01	Miles
Segment #2	12" Bituminous Reconstruction	7.5" Unbonded Concrete Overlay	8.5" Unbonded Concrete Overlay	3.2
Net Present Cost	\$5,342,085.93	\$5,887,373.46	\$4,784,343.16	Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	<u>\$5,578,755.47</u>	<u>\$6,165,199.87</u>	<u>\$5,019,051.16</u>	Total
% of Low Cost	<u>111.2%</u>	<u>122.8%</u>	<u>100.0%</u>	3.4

35-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	50-Year Analysis Period	35-Year Analysis Period
	2782-352	35		
	Highway	Discount Rate		
	35W	1.22%		
	Date	District 5 2019/2020 Prices		
	6/10/2020			
	Performed By			
EL				

Notes: updated April 2022 based on MDR final review comments from OMRR Pavement Design Office. Alternate #1 remains the low cost option

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	4" M&O	bituminous reconstruct	Concrete Reconstruct	2.9
Net Present Cost	\$5,773,836.20	\$12,024,829.82	\$11,608,236.18	Miles
Segment #2				0.0
Net Present Cost				Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	<u>\$5,773,836.20</u>	<u>\$12,024,829.82</u>	<u>\$11,608,236.18</u>	Total
% of Low Cost	<u>100.0%</u>	<u>208.3%</u>	<u>201.0%</u>	2.9

35-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	Change to: 50-Year Analysis Period	Change to: 35-Year Analysis Period
	3104-62	35		
	Highway	Discount Rate		
	2	0.66%		
	Date	District 1 2021/2022 Prices		
	12/23/2021			
	Performed By			
Sarah BaeHurst/Ellie Keen				

Notes: Due to soft subgrade, only a HMA reconstruct alternate will have a 20 year HMA design life

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	5" M&O	5" HMA Reconstruct	20 year concrete	3.6
Net Present Cost	\$2,541,437.75	\$4,235,360.81	\$3,945,060.27	Miles
Segment #2	5" M&O	5" HMA Reconstruct	20 year concrete	2.6
Net Present Cost	\$1,835,482.83	\$3,058,871.68	\$2,824,812.16	Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	\$4,376,920.57	\$7,294,232.49	\$6,769,872.43	Total
% of Low Cost	100.0%	166.7%	154.7%	6.2

35-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	50-Year Analysis Period	35-Year Analysis Period
	4407-13	35		
	Highway	Discount Rate		
	TH 113	1.22%		
	Date	District 4 2019/2020 Prices		
	11/13/2020			
	Performed By			
	Nathan Bausman			

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	3.5" Mill & 3.5" Bituminous Overlay	3.5" Mill & 3.5" Bituminous Overlay	2" Mill & 5" Whitetopping	5.7
Net Present Cost	\$3,243,710.82	\$3,712,351.05	\$4,490,124.78	Miles
Segment #2	3.5" Mill & 3.5" Bituminous Overlay	3.5" Mill & 3.5" Bituminous Overlay	2" Mill & 5" Whitetopping	0.1
Net Present Cost	\$50,590.60	\$56,116.91	\$65,916.65	Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	<u>\$3,294,301.42</u>	<u>\$3,768,467.96</u>	<u>\$4,556,041.43</u>	Total
% of Low Cost	<u>100.0%</u>	<u>114.4%</u>	<u>138.3%</u>	5.8

35-Year Analysis Period

DELETE LCCA
INPUTS

Project Number	Analysis Period
4501-53	35
Highway	Discount Rate
1	0.66%
Date	District 2 2021/2022 Prices
3/16/2022	
Performed By	
KO	

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	3" Mill & 3" HMA	Concrete	Remove HMA and replace	2.4
Net Present Cost	\$1,188,205.68	\$3,024,194.79	\$1,460,130.36	Miles
Segment #2				0.0
Net Present Cost				Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	\$1,188,205.68	\$3,024,194.79	\$1,460,130.36	Total
% of Low Cost	100.0%	254.5%	122.9%	2.4

50-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	50-Year Analysis Period	35-Year Analysis Period
	4504-19	50		
	Highway	Discount Rate		
	32	1.22%		
	Date	District 2 2019/2020 Prices		
	5/28/2020			
	Performed By			
KO				

Middle river to Greenbush, there is a 1/2 mile reconstruct in Stathcona I did not separate out.

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	FDR, HMA	35 Yr Conc	20 Yr Concrete	17.7
Net Present Cost	\$10,451,127.90	\$26,737,463.71	\$35,505,861.31	Miles
Segment #2				0.0
Net Present Cost				Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	<u>\$10,451,127.90</u>	<u>\$26,737,463.71</u>	<u>\$35,505,861.31</u>	Total
% of Low Cost	<u>100.0%</u>	<u>255.8%</u>	<u>339.7%</u>	17.7

50-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	50-Year Analysis Period	35-Year Analysis Period
	4602-27	50		
	Highway	Discount Rate		
	4	1.22%		
	Date	District 7 2019/2020 Prices		
	12/5/2019			
	Performed By			
	LKR/MCS			

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	CIR	35 UBCOA	20 BCOA	2.4
Net Present Cost	\$1,437,761.48	\$2,103,540.88	\$2,137,728.06	Miles
Segment #2	CIR	35 UBCOA	BCOA	13.3
Net Present Cost	\$7,753,654.28	\$10,968,255.36	\$11,794,799.56	Miles
Segment #3	CIR	35 UBCOA	20 BCOA	7.6
Net Present Cost	\$3,890,555.22	\$5,629,035.25	\$6,028,966.19	Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	<u>\$13,081,970.98</u>	<u>\$18,700,831.50</u>	<u>\$19,961,493.80</u>	Total
% of Low Cost	<u>100.0%</u>	<u>143.0%</u>	<u>152.6%</u>	23.2

35-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	Change to: 50-Year Analysis Period	Change to: 35-Year Analysis Period
	4802-25	35		
	Highway	Discount Rate		
	TH 23	0.66%		
	Date	District 3		
	11/17/2022	2021/2022 Prices		
	Performed By			

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	Mill 1.5" Center 24' and Pave 3"	Mill 2"/CIR 3"/Pave 3"	UBOL-20 Year Design	11.8
Net Present Cost	\$5,533,116.35	\$6,652,327.72	\$11,138,278.81	Miles
Segment #2				0.0
Net Present Cost				Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	\$5,533,116.35	\$6,652,327.72	\$11,138,278.81	Total
% of Low Cost	100.0%	120.2%	201.3%	11.8

35-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	Change to: 50-Year Analysis Period	Change to: 35-Year Analysis Period
	4814-56	35		
	Highway	Discount Rate		
	169	0.66%		
	Date	District 3 2021/2022 Prices		
	6/16/2022			
	Performed By			
	Scott Zeidler			

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	M & O on Mainline w/ 1.5" M & O on Shoulders	FDR Option	6" White Topping	6.4
Net Present Cost	\$3,390,561.81	\$4,537,862.54	\$6,314,659.54	Miles
Segment #2				0.0
Net Present Cost				Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	\$3,390,561.81	\$4,537,862.54	\$6,314,659.54	Total
% of Low Cost	100.0%	133.8%	186.2%	6.4

35-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	Change to: 50-Year Analysis Period	Change to: 35-Year Analysis Period
	5705-61	35		
	Highway	Discount Rate		
	59	1.02%		
	Date	District 2 2020/2021 Prices		
	2/18/2021			
	Performed By			
KO				

Did not include the RAB or CSAH 3

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	3" Mill & 3" HMA - Widening	Reclaim	5" BCOA	6.9
Net Present Cost	\$3,826,555.63	\$4,215,065.80	\$8,096,221.45	Miles
Segment #2	3" Mill & 3" overlay -no widening	Reclaim	5" BCOA	2.8
Net Present Cost	\$1,093,273.49	\$1,321,075.79	\$2,811,811.31	Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	\$4,919,829.13	\$5,536,141.59	\$10,908,032.76	Total
% of Low Cost	100.0%	112.5%	221.7%	9.7

State Project: 5809-16

50-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	50-Year Analysis Period	35-Year Analysis Period
	5809-16	50		
	Highway	Discount Rate		
	23	1.22%		
	Date	District 1 2019/2020 Prices		
	2/2/2023			
	Performed By			
	Sarah BaeHurst			

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	CIR	35 year PCC	20 year concrete	3.6
Net Present Cost	\$2,460,256.66	\$3,778,177.97	\$4,229,195.14	Miles
Segment #2				0.0
Net Present Cost				Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	<u>\$2,460,256.66</u>	<u>\$3,778,177.97</u>	<u>\$4,229,195.14</u>	Total
% of Low Cost	<u>100.0%</u>	<u>153.6%</u>	<u>171.9%</u>	3.6

35-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	50-Year Analysis Period	35-Year Analysis Period
	6229-37	35		
	Highway	Discount Rate		
	TH 5	1.22%		
	Date	District 5 2018/2019 Prices		
	8/30/2021			
	Performed By			

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	mill and overlay	Concrete reconstruction	bituminous	3.9
Net Present Cost	\$2,328,471.01	\$5,120,666.27	\$4,097,009.75	Miles
Segment #2	mill and overlay	Concrete reconstruction	bituminous	0.5
Net Present Cost	\$441,772.08	\$903,258.31	\$739,134.66	Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	<u>\$2,770,243.09</u>	<u>\$6,023,924.58</u>	<u>\$4,836,144.41</u>	Total
% of Low Cost	<u>100.0%</u>	<u>217.5%</u>	<u>174.6%</u>	4.4

35-Year Analysis Period

DELETE LCCA
INPUTS

Project Number	Analysis Period
6903-17	35
Highway	Discount Rate
1 & 169	0.66%
Date	District 1 2021/2022 Prices
11/1/2021	
Performed By	
Sarah BaeHurst	

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	3.5 inch M&O	FDR	PCC overlay	6.3
Net Present Cost	\$3,154,310.61	\$3,705,303.10	\$5,666,527.22	Miles
Segment #2				0.0
Net Present Cost				Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	\$3,154,310.61	\$3,705,303.10	\$5,666,527.22	Total
% of Low Cost	100.0%	117.5%	179.6%	6.3

35-Year Analysis Period

DELETE LCCA
INPUTS

Project Number	Analysis Period
6910-105	35
Highway	Discount Rate
23	0.66%
Date	District 1 2021/2022 Prices
9-Jun-22	
Performed By	
Thorson/Baehurst	

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	Replacement	20 year Concrete	35 year concrete	1.9
Net Present Cost	\$1,839,794.32	\$2,368,684.87	\$2,448,436.80	Miles
Segment #2				0.0
Net Present Cost				Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	\$1,839,794.32	\$2,368,684.87	\$2,448,436.80	Total
% of Low Cost	100.0%	128.7%	133.1%	1.9

50-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	50-Year Analysis Period	35-Year Analysis Period
	6935-94	50		
	Highway	Discount Rate		
	169	1.22%		
	Date	District 1 2019/2020 Prices		
	12/7/2022			
	Performed By			
	Amy Thorson			

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	CIR	35 year PCC	20 year concrete	25.1
Net Present Cost	\$13,324,825.53	\$19,948,843.13	\$22,380,252.78	Miles
Segment #2				0.0
Net Present Cost				Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	<u>\$13,324,825.53</u>	<u>\$19,948,843.13</u>	<u>\$22,380,252.78</u>	Total
% of Low Cost	<u>100.0%</u>	<u>149.7%</u>	<u>168.0%</u>	25.1

35-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	Change to: 50-Year Analysis Period	Change to: 35-Year Analysis Period
	SP7009-85	35		
	Highway	Discount Rate		
	TH169	0.66%		
	Date	District 5 2021/2022 Prices		
	9/1/2022			
	Performed By			
	Elizabeth Gierke/Dave Wald			

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	3" HMA M&OL	7.5" Conc Overlay	HMA Reconstruction	6.4
Net Present Cost	\$8,465,282.58	\$13,031,986.72	\$18,229,639.52	Miles
Segment #2				0.0
Net Present Cost				Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	\$8,465,282.58	\$13,031,986.72	\$18,229,639.52	Total
% of Low Cost	100.0%	153.9%	215.3%	6.4

35-Year Analysis Period

DELETE LCCA
INPUTS

Project Number	Analysis Period
7480-133	35
Highway	Discount Rate
I-35 SB	0.66%
Date	District 6
1/20/2022	2021/2022 Prices
Performed By	
trm	

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes: I-35 SB From RP 27.133-35.906

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	20 YR PC-8" UBOL	15 YR HMA-2" Mill and 3.5" Overlay	20 YR HMA-3.5" mill and 5.5" Overlay	8.8
Net Present Cost	\$11,003,244.60	\$4,772,812.77	\$5,293,484.52	Miles
Segment #2				0.0
Net Present Cost				Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	\$11,003,244.60	\$4,772,812.77	\$5,293,484.52	Total
% of Low Cost	230.5%	100.0%	110.9%	8.8

35-Year Analysis Period

DELETE LCCA
INPUTS

Project Number	Analysis Period
8302-48	35
Highway	Discount Rate
4	0.66%
Date	District 1
9/14/2021	2021/2022 Prices
Performed By	
Mike Schoeb	

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	Mill and Overlay	Bituminous reconstruct	Concrete Reconstruct	12.9
Net Present Cost	\$5,884,496.65	\$13,002,869.24	\$12,998,417.82	Miles
Segment #2				0.0
Net Present Cost				Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	\$5,884,496.65	\$13,002,869.24	\$12,998,417.82	Total
% of Low Cost	100.0%	221.0%	220.9%	12.9

35-Year Analysis Period

DELETE LCCA INPUTS	Project Number	Analysis Period	Change to: 50-Year Analysis Period	Change to: 35-Year Analysis Period
	8303-48	35		
	Highway	Discount Rate		
	15	0.66%		
	Date	District 1 2021/2022 Prices		
	1/14/2022			
	Performed By			
CJF				

Notes:

LCCA SUMMARY				
	Alternate #1	Alternate #2	Alternate #3	Length
Segment #1	M & OL	20yr White Topping	CIR and OL 20yr	9.0
Net Present Cost	\$6,058,444.61	\$8,872,837.63	\$6,173,174.27	Miles
Segment #2				0.0
Net Present Cost				Miles
Segment #3				0.0
Net Present Cost				Miles
Segment #4				0.0
Net Present Cost				Miles
Project Net Present Cost	\$6,058,444.61	\$8,872,837.63	\$6,173,174.27	Total
% of Low Cost	100.0%	146.5%	101.9%	9.0