

2024 Report on the

Life-Cycle Cost Analyses

January 2025

Prepared by:

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January 3, 2025

The Honorable Frank Hornstein, Chair
House Transportation Finance & Policy Committee
5th Floor, Centennial Office Building
658 Cedar Street
Saint Paul, Minnesota 55155

The Honorable John Petersburg, Republican Lead
House Transportation Finance & Policy Committee
2nd Floor, Centennial Office Building
658 Cedar Street
Saint Paul, Minnesota 55155

The Honorable Scott Dibble, Chair
Senate Transportation Committee
3107 Minnesota Senate 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 Erin Koegel, Chair
House Sustainable Infrastructure Policy Committee
5th Floor, Centennial Office Building
658 Cedar Street
Saint Paul, Minnesota 55155

The Honorable Mary Franson, Republican Lead
House Sustainable Infrastructure Policy Committee
2nd Floor, Centennial Office Building
658 Cedar Street
Saint Paul, Minnesota 55155

Re: 2024 Life-Cycle Cost Analyses 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 2024, 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

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Legislative Request

This report is issued to comply with [2022 Minnesota Statutes 174.185.¹](#) Changes to this section were made in the 2024 Legislative Session but do not become effective until July 1, 2025 (see Appendix D).

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 must perform a life-cycle cost analysis and document the lowest life-cycle costs and all alternatives considered. The commissioner must document the chosen pavement strategy and, if the lowest life cycle is not selected, document the justification for the chosen strategy.

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.

¹ Minn. Stat. 174.185 was changed in [2024 Laws of Minnesota, Ch. 127, Art. 3, Sec. 75-78](#). The new requirements will be reported on in the 2025 report. The language of the 2024 changes is shown in Appendix D.

Life-Cycle Cost Analysis Report

In the 2024 Session changes were passed to Minn. Stat. 174.185. Many of the changes passed in the new language go into effect on July 1, 2025. Those changes are being implemented by MnDOT and will be reported on in the 2025 Life-Cycle Cost Analyses Report. This report, the 2024 Life-Cycle Cost Analyses Report, is written to satisfy the requirements under [2022 Minn. Stat. 174.185](#).

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 2024, 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 22 LCCAs and 21 were selected for construction; one project changed its selection from HMA to PCC and an exception letter is provided in Appendix C.
- Portland cement concrete was the low-cost option for one LCCA and was selected for construction.

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

Discussion

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

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 2024, 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 is implementing the new requirements in [2024 Minn. Stat. 174.185, subd. 2a and 2b](#) for 2025. The 2025 Life-Cycle Cost Analyses Report will have the results using the new requirements.

MnDOT implemented the requirements of [2022 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) |
|----------------------------|------------------------|--------------------------------|------------------------|--------------------|-----------------|-----------------------|---------------------|--------------------|
| 0102-28 | HMA | No | 20 | PCC Overlay | \$12,730,098.78 | PCC | | No |
| | | | 20 | CIR | \$7,106,316.80 | HMA | X | |
| | | | 35 | PCC Overlay | \$9,240,362.85 | PCC | | |
| 0208-165 | HMA | No | 15 | M&OL | \$15,852,262.26 | HMA | X | No |
| | | | 20 | New HMA | \$41,635,627.68 | HMA | | |
| | | | 20 | New PCC | \$38,884,188.10 | PCC | | |
| 0801-35 | HMA | No | 15 | M&OL | \$5,362,230.22 | HMA | X | No |
| | | | 20 | New HMA | \$12,092,881.73 | HMA | | |
| | | | 20 | New PCC | \$11,901,454.86 | PCC | | |
| 1505-25 | HMA | No | 15 | M&OL | \$2,654,203.39 | HMA | X | No |
| | | | 20 | New HMA | \$5,195,830.90 | HMA | | |
| | | | 20 | New PCC | \$8,034,186.85 | PCC | | |
| 1926-23 | HMA | No | 17 | M & OL | \$4,478,712.25 | HMA | X | No |
| | | | 20 | New HMA | \$12,202,245.64 | HMA | | |
| | | | 20 | New PCC | \$12,660,409.93 | PCC | | |
| 2002-37 | HMA | No | 15 | M&OL | \$7,207,903.30 | HMA | X | No |
| | | | 20 | New HMA | \$17,544,728.49 | HMA | | |
| | | | 20 | PCC Overlay | \$12,648,837.46 | PCC | | |
| 2180-125 | HMA | No | 20 | PCC Overlay | \$17,536,463.15 | PCC | | No |
| | | | 20 | New HMA | \$19,019,361.06 | HMA | | |
| | | | 35 | PCC Overlay | \$14,555,484.43 | PCC | X | |
| 2723-144 | HMA | No | 17 | M&OL | \$7,331,506.56 | HMA | X | No |
| | | | 20 | PCC Overlay | \$9,915,212.12 | PCC | | |
| | | | 20 | New HMA | \$13,173,852.10 | HMA | | |
| 2909-18 | HMA | No | 15 | M&OL | \$3,593,925.08 | HMA | X | No |
| | | | 20 | New HMA | \$6,107,034.09 | HMA | | |
| | | | 20 | New PCC | \$9,430,853.01 | PCC | | |
| 4204-40 | HMA | Yes | 20 | New HMA | \$3,752,962.36 | HMA | | No |
| | | | 20 | New PCC | \$4,720,659.52 | PCC | | |
| | | | 35 | New PCC | \$4,799,903.98 | PCC | X | |
| 4508-35 | HMA | No | 17 | M&OL | \$6,210,916.49 | HMA | X | No |
| | | | 17 | M&OL | \$7,482,758.71 | HMA | | |
| | | | 20 | New PCC | \$15,789,022.31 | PCC | | |
| 4811-76 | HMA | No | 13 | M&OL | \$9,397,791.76 | HMA | X | No |
| | | | 20 | New HMA | \$17,203,210.46 | HMA | | |
| | | | 20 | New PCC | \$16,366,914.26 | PCC | | |
| 4814-56 | HMA | No | 15 | M&OL | \$3,390,561.81 | HMA | X | No |
| | | | 20 | FDR | \$4,537,862.54 | HMA | | |
| | | | 20 | PCC Overlay | \$6,314,659.54 | 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) |
|----------------------------|------------------------|--------------------------------|------------------------|--------------------|-----------------|-----------------------|---------------------|--------------------|
| 4902-63 | HMA | No | 15 | M&OL | \$7,088,713.20 | HMA | X | No |
| | | | 20 | PCC Overlay | \$10,487,975.66 | PCC | | |
| | | | 20 | New HMA | \$11,693,685.68 | HMA | | |
| 4908-24 | HMA | No | 15 | M&OL | \$3,509,784.71 | HMA | X | No |
| | | | 20 | PCC Overlay | \$5,801,127.80 | PCC | | |
| | | | 20 | New HMA | \$7,695,473.95 | HMA | | |
| 4911-15 | HMA | Yes | 15 | M&OL | \$6,418,749.45 | HMA | X | No |
| | | | 20 | PCC Overlay | \$9,234,958.72 | PCC | | |
| | | | 20 | CIR | \$5,945,276.33 | HMA | | |
| 4913-26 | HMA | No | 15 | M&OL | \$6,793,692.07 | HMA | X | No |
| | | | 20 | PCC Overlay | \$12,182,237.36 | PCC | | |
| | | | 20 | FDR | \$7,499,579.35 | HMA | | |
| 5505-30 | HMA | No | 15 | M&OL | \$6,245,587.00 | HMA | X | No |
| | | | 20 | Heavy M&OL | \$6,424,441.00 | HMA | | |
| | | | 20 | PCC Overlay | \$11,144,319.00 | PCC | | |
| 5902-25 | HMA | No | 17 | M&OL | \$12,125,456.48 | HMA | X | No |
| | | | 20 | SFDR | \$20,001,878.28 | HMA | | |
| | | | 20 | PCC Overlay | \$25,946,134.83 | PCC | | |
| 6111-26 | HMA | No | 16 | M&OL | \$3,289,489.26 | HMA | X | No |
| | | | 20 | PCC Overlay | \$6,563,841.53 | PCC | | |
| | | | 20 | FDR | \$3,634,104.02 | HMA | | |
| 6212-192 | HMA | No | 15 | M&OL | \$7,199,726.24 | HMA | X | No |
| | | | 20 | New HMA | \$13,687,470.95 | HMA | | |
| | | | 20 | New PCC | \$16,028,777.40 | PCC | | |
| 6906-19 | HMA | No | 13 | M&OL | \$13,804,381.01 | HMA | X | No |
| | | | 20 | FDR | \$17,362,633.49 | HMA | | |
| | | | 20 | PCC Overlay | \$21,312,001.14 | PCC | | |
| 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 | \$12,998,417.85 | 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 & 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 |
| 0102-28 | 50 |
| Highway | Discount Rate |
| 18 | 0.66% |
| Date | District 3 2021/2022 Prices |
| 11/16/2022 | |
| Performed By | |
| Scott Zeidler | |

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/4" CIR/3" Overlay | 4.5" Whitetopping | 6" White-topping | 12.6 |
| Net Present Cost | \$7,106,316.80 | \$12,730,098.78 | \$9,240,362.85 | 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 | \$7,106,316.80 | \$12,730,098.78 | \$9,240,362.85 | Total |
| % of Low Cost | 100.0% | 179.1% | 130.0% | 12.6 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| | | | |
|-----------------------|------------------|------------------------|-------|
| Project Number | 0208-165 | Analysis Period | 35 |
| Highway | MN 65 | Discount Rate | 0.66% |
| Date | 7/11/2023 | District 5 | |
| Performed By | Ethan Rossow | | |
| | 2021/2022 Prices | | |

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 | 20 YR Bit Reconstruct | 20 YR Concrete Reconstruct | 16.8 |
| Net Present Cost | \$15,852,262.26 | \$41,635,627.68 | \$38,884,188.10 | 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 | \$15,852,262.26 | \$41,635,627.68 | \$38,884,188.10 | Total |
| % of Low Cost | 100.0% | 262.6% | 245.3% | 16.8 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| | |
|-----------------------|--------------------------------|
| Project Number | Analysis Period |
| 0801-35 | 35 |
| Highway | Discount Rate |
| 4 | 0.66% |
| Date | District 1 2021/2022 Prices |
| 9/15/2021 | |
| 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 | 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 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| Project Number | Analysis Period |
|----------------|--------------------------------|
| 1505-25 | 35 |
| Highway | Discount Rate |
| 200 | 0.66% |
| Date | District 2 2021/2022 Prices |
| 9/20/2022 | |
| 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 & Overlay | New HMA | 20 yr Concrete | 6.4 |
| Net Present Cost | \$2,654,203.39 | \$5,195,830.90 | \$8,034,186.85 | 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 | \$2,654,203.39 | \$5,195,830.90 | \$8,034,186.85 | Total |
| % of Low Cost | 100.0% | 195.8% | 302.7% | 6.4 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| | |
|----------------|--------------------------------|
| Project Number | Analysis Period |
| 1926-23 | 35 |
| Highway | Discount Rate |
| 316 | 0.66% |
| Date | District 5 2021/2022 Prices |
| 2/8/2024 | |
| Performed By | |
| Ben Nixa | |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes:

| LCCA SUMMARY | | | | |
|---------------------------------|---|----------------------------|---------------------------------|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | 2" mill, 4" overlay, 2" overlay on shoulder | 20 year HMA reconstruction | 20 year concrete reconstruction | 8.6 |
| Net Present Cost | \$4,478,712.25 | \$12,202,245.64 | \$12,660,409.93 | 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 | \$4,478,712.25 | \$12,202,245.64 | \$12,660,409.93 | Total |
| % of Low Cost | 100.0% | 272.4% | 282.7% | 8.6 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| | |
|-------------------|--------------------------------|
| Project Number | Analysis Period |
| 2002-37 & 5501-45 | 35 |
| Highway | Discount Rate |
| 14 EB & WB | 0.66% |
| Date | District 6 2021/2022 Prices |
| 12/28/2022 | |
| Performed By | |
| trm | |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes: From 1.09 Mi. W. of Jct. TH 57 to 0.195 Mi. W. CSAH 5
 Alternate #1 & #2 did not take into account the cost of moving all the traffic to the other two lanes (4 lane divided roadway) when constructing the other two lanes.

| LCCA SUMMARY | | | | |
|---------------------------------|------------------------|------------------------|-------------------------------|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | PCC-7" UBOL | 6" HMA Reconstruct | 15 YR HMA-1.5" Mill and 3" OL | 1.8 |
| Net Present Cost | \$1,980,414.34 | \$2,675,562.46 | \$934,900.60 | Miles |
| Segment #2 | PCC-7" UBOL | 6" HMA Reconstruct | 15 YR HMA- 4.5" OL | 10.0 |
| Net Present Cost | \$10,668,423.12 | \$14,869,166.02 | \$6,273,002.70 | Miles |
| Segment #3 | | | | 0.0 |
| Net Present Cost | | | | Miles |
| Segment #4 | | | | 0.0 |
| Net Present Cost | | | | Miles |
| Project Net Present Cost | \$12,648,837.46 | \$17,544,728.49 | \$7,207,903.30 | Total |
| % of Low Cost | 175.5% | 243.4% | 100.0% | 11.8 |

50-Year Analysis Period

DELETE LCCA
INPUTS

| | |
|----------------|--------------------------------|
| Project Number | Analysis Period |
| 2180-125 | 50 |
| Highway | Discount Rate |
| I-94 WB | 1.02% |
| Date | District 4 2020/2021 Prices |
| 4/2/2021 | |
| Performed By | |
| Nathan Bausman | |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes:

| LCCA SUMMARY | | | | |
|---------------------------------|--------------------------------|--------------------------------|-------------------------------|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | 8.5" Unbonded Concrete Overlay | 7.5" Unbonded Concrete Overlay | 12" Bituminous Reconstruction | 6.0 |
| Net Present Cost | \$6,750,769.38 | \$8,132,874.68 | \$8,981,653.67 | Miles |
| Segment #2 | 8.5" Concrete Reconstruction | 7.5" Concrete Reconstruction | 12" Bituminous Reconstruction | 0.2 |
| Net Present Cost | \$327,615.12 | \$387,773.69 | \$283,974.90 | Miles |
| Segment #3 | 8.5" Unbonded Concrete Overlay | 7.5" Unbonded Concrete Overlay | 12" Bituminous Reconstruction | 6.3 |
| Net Present Cost | \$7,049,456.12 | \$8,492,712.44 | \$9,381,987.36 | Miles |
| Segment #4 | 8.5" Concrete Reconstruction | 7.5" Concrete Reconstruction | 12" Bituminous Reconstruction | 0.3 |
| Net Present Cost | \$427,643.81 | \$523,102.54 | \$371,745.14 | Miles |
| Project Net Present Cost | \$14,555,484.43 | \$17,536,463.35 | \$19,019,361.06 | Total |
| % of Low Cost | 100.0% | 120.5% | 130.7% | 12.7 |

50-Year Analysis Period

DELETE LCCA
INPUTS

| Project Number | Analysis Period |
|----------------|--------------------------------|
| 2723-144 | 50 |
| Highway | Discount Rate |
| TH 55 | 1.02% |
| Date | |
| 4/21/2021 | |
| Performed By | |
| | District 5 2020/2021 Prices |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes:

| LCCA SUMMARY | | | | |
|---------------------------------|--|-----------------------|---------------------------------|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | 4: mill & overlay and UTBWC underlayer | BCOA | 20 YR BITUMINOUS RECONSTRUCTION | 8.8 |
| Net Present Cost | \$7,331,506.56 | \$9,915,212.12 | \$13,173,852.10 | 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 | \$7,331,506.56 | \$9,915,212.12 | \$13,173,852.10 | Total |
| % of Low Cost | 100.0% | 135.2% | 179.7% | 8.8 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| Project Number | Analysis Period |
|----------------|--------------------------------|
| 2909-18 | 35 |
| Highway | Discount Rate |
| 87 | 0.66% |
| Date | District 2 2021/2022 Prices |
| 9/29/2022 | |
| Performed By | |
| Adam Wick | |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes:

| LCCA SUMMARY | | | | |
|---------------------------------|-----------------------|-----------------------|-----------------------|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | 3.0" Mill and Overlay | Remove & Replace | 20 Year Concrete | 8.1 |
| Net Present Cost | \$3,593,925.08 | \$6,107,034.09 | \$9,430,853.01 | 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 | \$3,593,925.08 | \$6,107,034.09 | \$9,430,853.01 | Total |
| % of Low Cost | 100.0% | 169.9% | 262.4% | 8.1 |

50-Year Analysis Period

DELETE LCCA INPUTS

| | |
|----------------|--------------------------------|
| Project Number | Analysis Period |
| 4204-40 | 50 |
| Highway | Discount Rate |
| 19 | 0.82% |
| Date | District 8 2022/2023 Prices |
| 11/7/2024 | |
| Performed By | |
| Jacob Miller | |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes: Roundabout and mill/overlay segments not considered in LCCA due to high complexity and short length.
Project extended west 0.37 miles. Included in segment 1 length.

| LCCA SUMMARY | | | | |
|---------------------------------|---|--|--|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | 0 Year Design (24' wide & two 8' shoulders) | 20 Year Design (24' wide & two 8' shoulders) | 35 Year Design (24' wide & two 8' shoulders) | 0.5 |
| Net Present Cost | \$1,226,799.89 | \$1,519,973.59 | \$1,545,387.84 | Miles |
| Segment #2 | A 20 Year Design (36' wide & 7' shoulders) | 20 Year Design (36' wide & 7' shoulders) | 35 Year Design (36' wide & 7' shoulders) | 0.4 |
| Net Present Cost | \$982,153.13 | \$1,241,731.87 | \$1,262,401.81 | Miles |
| Segment #3 | A 20 Year Design (37' wide, no shoulders) | 20 Year Design (37' wide, no shoulders) | 35 Year Design (37' wide, no shoulders) | 0.6 |
| Net Present Cost | \$1,387,077.29 | \$1,748,005.15 | \$1,779,622.06 | Miles |
| Segment #4 | A 20 Year Design (60' wide, no shoulders) | 20 Year Design (60' wide, no shoulders) | 35 Year Design (60' wide, no shoulders) | 0.1 |
| Net Present Cost | \$156,932.05 | \$210,948.91 | \$212,492.27 | Miles |
| Project Net Present Cost | \$3,752,962.36 | \$4,720,659.52 | \$4,799,903.98 | Total |
| % of Low Cost | 100.0% | 125.8% | 127.9% | 1.6 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| | |
|----------------|--------------------------------|
| Project Number | Analysis Period |
| 4508-35 | 35 |
| Highway | Discount Rate |
| 89 | 0.66% |
| Date | District 2 2021/2022 Prices |
| 10/20/2021 | |
| Performed By | |
| Adam Wick | |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes:

| LCCA SUMMARY | | | | |
|---------------------------------|-----------------------|-----------------------|------------------------|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | 3.0" Mill and Overlay | 4.5" Mill and Overlay | 20 Year Concrete | 16.5 |
| Net Present Cost | \$6,210,916.49 | \$7,482,758.71 | \$15,789,022.31 | 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 | \$6,210,916.49 | \$7,482,758.71 | \$15,789,022.31 | Total |
| % of Low Cost | 100.0% | 120.5% | 254.2% | 16.5 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| | |
|----------------|--------------------------------|
| Project Number | Analysis Period |
| 4811-76 | 35 |
| Highway | Discount Rate |
| 169 | 0.66% |
| Date | District 3 2021/2022 Prices |
| 9/7/2021 | |
| Performed By | |
| Scott Zeidler | |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes:

| LCCA SUMMARY | | | | |
|---------------------------------|---------------------------|------------------------|--------------------------|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | 2" Mill & 3" Overlay (NB) | 6" HMA Option (NB) | 7" PCC Construction (NB) | 8.6 |
| Net Present Cost | \$4,640,155.59 | \$8,804,520.59 | \$9,004,304.95 | Miles |
| Segment #2 | 3" Mill & 3" Overlay (SB) | 6" HMA Option (SB) | 7" PCC Overlay (SB) | 8.6 |
| Net Present Cost | \$4,757,636.17 | \$8,398,689.87 | \$7,362,609.30 | Miles |
| Segment #3 | | | | 0.0 |
| Net Present Cost | | | | Miles |
| Segment #4 | | | | 0.0 |
| Net Present Cost | | | | Miles |
| Project Net Present Cost | \$9,397,791.76 | \$17,203,210.46 | \$16,366,914.26 | Total |
| % of Low Cost | 100.0% | 183.1% | 174.2% | 17.3 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| Project Number | Analysis Period |
|----------------|--------------------------------|
| 4814-56 | 35 |
| Highway | Discount Rate |
| 169 | 0.66% |
| Date | District 3 2021/2022 Prices |
| 6/16/2022 | |
| Performed By | |
| Scott Zeidler | |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes:

| LCCA SUMMARY | | | | |
|---------------------------------|------------------------------------|-----------------------|-----------------------|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | O on Mainline w/ 1.5" M & O on Sho | 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 |
|----------------|--------------------------------|
| 4902-63 | 35 |
| Highway | Discount Rate |
| 10/371 | 0.66% |
| Date | District 3 2021/2022 Prices |
| 1/5/2022 | |
| Performed By | |
| SJN | |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes:

| LCCA SUMMARY | | | | |
|---------------------------------|-----------------------|-----------------------------|---------------------------|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | 2" Mill & 3.5" HMA | 6.5" Remove & 8" HMA 20 yrs | 4.5" Mill & 6" PCC 20 yrs | 10.7 |
| Net Present Cost | \$5,220,820.14 | \$8,606,935.83 | \$7,740,489.35 | Miles |
| Segment #2 | 2" Mill & 3.5" HMA | 7" remove & 8" HMA 20 yrs | 4.5" Mill & 6" PCC 20 yrs | 0.6 |
| Net Present Cost | \$495,062.09 | \$826,747.72 | \$728,472.08 | Miles |
| Segment #3 | 2" Mill & 3.5" HMA | 7" remove & 8" HMA 20 yrs | 4.5" Mill & 6" PCC 20 yrs | 0.1 |
| Net Present Cost | \$97,577.77 | \$161,900.00 | \$143,418.25 | Miles |
| Segment #4 | 2" Mill & 3.5" HMA | 7" remove & 8" HMA 20 yrs | 4.5" Mill & 6" PCC 20 yrs | 2.3 |
| Net Present Cost | \$1,275,253.20 | \$2,098,102.13 | \$1,875,595.99 | Miles |
| Project Net Present Cost | \$7,088,713.20 | \$11,693,685.68 | \$10,487,975.66 | Total |
| % of Low Cost | 100.0% | 165.0% | 148.0% | 13.7 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| Project Number | Analysis Period |
|----------------|--------------------------------|
| 4908-24 | 35 |
| Highway | Discount Rate |
| 115 | 0.66% |
| Date | District 3 2021/2022 Prices |
| 11/28/2022 | |
| Performed By | |
| SJN | |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes:

| LCCA SUMMARY | | | | |
|---------------------------------|--------------------------|--------------------------|---------------------------|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | 1.5" Mill and 3" Overlay | 6" HMA 20 yr Reconstruct | 5" PCC 20 yr Whitetopping | 0.9 |
| Net Present Cost | \$437,399.03 | \$1,004,897.74 | \$760,888.54 | Miles |
| Segment #2 | 1.5" Mill & 3" Overlay | 6" HMA 20 yr Reconstruct | 5" PCC 20 yr Whitetopping | 7.4 |
| Net Present Cost | \$2,969,301.06 | \$6,467,347.25 | \$4,863,013.24 | Miles |
| Segment #3 | Urban 3" M&O | 6" HMA 20 yr Reconstruct | 5" PCC 20 yr Whitetopping | 0.1 |
| Net Present Cost | \$103,084.62 | \$223,228.96 | \$177,226.02 | Miles |
| Segment #4 | | | | 0.0 |
| Net Present Cost | | | | Miles |
| Project Net Present Cost | \$3,509,784.71 | \$7,695,473.95 | \$5,801,127.80 | Total |
| % of Low Cost | 100.0% | 219.3% | 165.3% | 8.4 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| | |
|----------------|------------------|
| Project Number | Analysis Period |
| 4911-15 | 35 |
| Highway | Discount Rate |
| TH 25 | 1.02% |
| Date | District 3 |
| Performed By | 2020/2021 Prices |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes:

| LCCA SUMMARY | | | | |
|---------------------------------|-----------------------|-----------------------|-------------------------|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | 4" MILL & OVERLAY | 6" WHITE TOPPING | 3" MILL, 3" CIR, 3" HMA | 14.0 |
| Net Present Cost | \$6,418,749.45 | \$9,234,958.72 | \$5,945,276.33 | 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 | \$6,418,749.45 | \$9,234,958.72 | \$5,945,276.33 | Total |
| % of Low Cost | 108.0% | 155.3% | 100.0% | 14.0 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| | |
|----------------|--------------------------------|
| Project Number | Analysis Period |
| 4913-26 | 35 |
| Highway | Discount Rate |
| 238 | 0.66% |
| Date | District 3 2021/2022 Prices |
| 8/9/2023 | |
| Performed By | |
| Scott Zeidler | |

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" M & O (Full Width) | FDR | 6 White Topping | 19.0 |
| Net Present Cost | \$6,793,692.07 | \$7,499,579.35 | \$12,182,237.36 | 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 | \$6,793,692.07 | \$7,499,579.35 | \$12,182,237.36 | Total |
| % of Low Cost | 100.0% | 110.4% | 179.3% | 19.0 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| Project Number | Analysis Period |
|----------------|--------------------------------|
| 5505-30 | 35 |
| Highway | Discount Rate |
| 30 | 0.66% |
| Date | District 6 2021/2022 Prices |
| 2/1/2023 | |
| Performed By | |
| trm | |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

0.42 Mi. E. TH 63 to 0.198 Mi. W. T.H. 52

| LCCA SUMMARY | | | | |
|---------------------------------|-------------------------------------|--------------------------------------|----------------------------|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | Med. Bit. Mill & Overlay(15 YR HMA) | Heavy Bit. Mill & Overlay(20 YR HMA) | 7" Whitetopping(20 YR PCC) | 11.3 |
| Net Present Cost | \$4,537,271.48 | \$4,792,800.22 | \$8,213,357.45 | Miles |
| Segment #2 | Med. Bit. Mill & Overlay(15 YR HMA) | Heavy Bit. Mill & Overlay(20 YR HMA) | 7" Whitetopping(20 YR PCC) | 3.4 |
| Net Present Cost | \$1,708,316.02 | \$1,631,640.94 | \$2,930,961.75 | Miles |
| Segment #3 | | | | 0.0 |
| Net Present Cost | | | | Miles |
| Segment #4 | | | | 0.0 |
| Net Present Cost | | | | Miles |
| Project Net Present Cost | \$6,245,587.50 | \$6,424,441.16 | \$11,144,319.20 | Total |
| % of Low Cost | 100.0% | 102.9% | 178.4% | 14.7 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| | |
|-----------------------|--------------------------------|
| Project Number | Analysis Period |
| 5902-25 | 35 |
| Highway | Discount Rate |
| 23 | 1.02% |
| Date | District 8 2020/2021 Prices |
| 10/30/2020 | |
| Performed By | |
| MnDOT | |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Notes:

| LCCA SUMMARY | | | | |
|---------------------------------|------------------------|------------------------|------------------------|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | 2.5" Mill and Overlay | 5" Mill, SFDR, 5" HMA | 7" Mill, 7" PCC | 15.1 |
| Net Present Cost | \$5,973,024.20 | \$10,683,468.72 | \$12,974,114.03 | Miles |
| Segment #2 | 2.5" Mill and Overlay | 3" Mill, SFDR, 3" HMA | 4" Mill, 4" PCC | 15.6 |
| Net Present Cost | \$6,152,432.27 | \$9,318,409.56 | \$12,972,020.80 | Miles |
| Segment #3 | | | | 0.0 |
| Net Present Cost | | | | Miles |
| Segment #4 | | | | 0.0 |
| Net Present Cost | | | | Miles |
| Project Net Present Cost | \$12,125,456.48 | \$20,001,878.28 | \$25,946,134.83 | Total |
| % of Low Cost | 100.0% | 165.0% | 214.0% | 30.7 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| | |
|----------------|--------------------------------|
| Project Number | Analysis Period |
| 6111-26 | 35 |
| Highway | Discount Rate |
| TH 114 | 1.02% |
| Date | District 4 2020/2021 Prices |
| 2/19/2021 | |
| Performed By | |
| Nathan Bausman | |

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" Bituminous Overlay | II, 7" Reclaim & 4.5" Bituminous Ov | 3.5" Mill & 5" Whitetopping | 6.1 |
| Net Present Cost | \$2,800,064.83 | \$3,178,288.64 | \$5,844,419.83 | Miles |
| Segment #2 | 5" Bituminous Reconstruction | 5" Bituminous Reconstruction | 6" Concrete Reconstruction | 0.4 |
| Net Present Cost | \$489,424.43 | \$455,815.39 | \$719,421.70 | Miles |
| Segment #3 | | | | 0.0 |
| Net Present Cost | | | | Miles |
| Segment #4 | | | | 0.0 |
| Net Present Cost | | | | Miles |
| Project Net Present Cost | \$3,289,489.26 | \$3,634,104.02 | \$6,563,841.53 | Total |
| % of Low Cost | 100.0% | 110.5% | 199.5% | 6.4 |

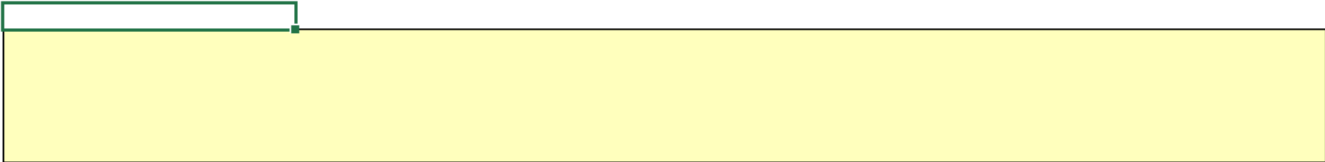
35-Year Analysis Period

DELETE LCCA
INPUTS

| Project Number | Analysis Period |
|----------------|--------------------------------|
| 6212-192 | 35 |
| Highway | Discount Rate |
| 36 | 0.66% |
| Date | District 5 2021/2022 Prices |
| 6/14/2022 | |
| Performed By | |
| BN | |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period



| LCCA SUMMARY | | | | |
|---------------------------------|--|-------------------------------------|--------------------------------------|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | 20 Year Concrete Option BOC Segment | Year Bituminous Option BOC Segment | Mill and Overlay BOC Segment | 8.4 |
| Net Present Cost | \$11,800,338.40 | \$9,952,054.50 | \$5,328,335.20 | Miles |
| Segment #2 | Year Concrete Option BOB & BAB Segment | Bituminous Option BOB & BAB Segment | Mill and Overlay BOB and BAB Segment | 3.1 |
| Net Present Cost | \$4,228,439.01 | \$3,735,416.45 | \$1,871,391.04 | Miles |
| Segment #3 | | | | 0.0 |
| Net Present Cost | | | | Miles |
| Segment #4 | | | | 0.0 |
| Net Present Cost | | | | Miles |
| Project Net Present Cost | \$16,028,777.40 | \$13,687,470.95 | \$7,199,726.24 | Total |
| % of Low Cost | 222.6% | 190.1% | 100.0% | 11.5 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| | |
|----------------|--------------------------------|
| Project Number | Analysis Period |
| 6906-19 | 35 |
| Highway | Discount Rate |
| US 2 | 0.82% |
| Date | District 1 2023/2024 Prices |
| | |
| Performed By | |

Change to:
50-Year
Analysis
Period

Change to:
35-Year
Analysis
Period

Version 3 11/13/2023

Notes:

| LCCA SUMMARY | | | | |
|---------------------------------|------------------------|--------------------------|------------------------|--------------|
| | Alternate #1 | Alternate #2 | Alternate #3 | Length |
| Segment #1 | FDR | PCC 20 year Whitetopping | Mill and Overlay | 19.9 |
| Net Present Cost | \$17,362,633.49 | \$21,312,001.14 | \$13,804,381.01 | 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 | \$17,362,633.49 | \$21,312,001.14 | \$13,804,381.01 | Total |
| % of Low Cost | 125.8% | 154.4% | 100.0% | 19.9 |

35-Year Analysis Period

DELETE LCCA
INPUTS

| | |
|----------------|--------------------------------|
| Project Number | Analysis Period |
| 8302-48 | 35 |
| Highway | Discount Rate |
| 4 | 0.66% |
| Date | District 1 2021/2022 Prices |
| 9/14/2021 | |
| 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 recostruct | 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 |

Appendix C: Copies of LCCA Exceptions

Office Memorandum

TO: Jon Huseby, P.E.
Transportation District Engineer

FROM: Jacob Miller, E.I.T.
Soils Engineer

CONCUR: Lowell Flaten, P.E.
District Materials Engineer

DATE: September 1, 2023

SUBJECT: REQUEST FOR AN EXCEPTION

| | |
|---------------------|---|
| SP # | 4204-40 |
| Highway # | MN 19 |
| Project Limits | RP 33+00.271 to RP 35+00.514 |
| Project Description | Downtown Marshall full reconstruct, pedestrian improvements and bike lane striping. Short mill and overlay section and roundabout construction. |

LCCA Results

| Alternative | Design Life (years) | Total Present Cost | Requested Selection | % Of Low Cost |
|-----------------|---------------------|--------------------|---------------------|---------------|
| HMA Reconstruct | 20 | \$3,752,962.36 | No | 100.0% |
| PCC Reconstruct | 20 | \$4,720,659.52 | No | 125.8% |
| PCC Reconstruct | 35 | \$4,799,903.98 | Yes | 127.9% |

Reason for Request

Suggesting use of an 8" concrete with 1.25" dowels for this project.

The thicker pavement and dowel bars are expected to last longer under the aggressive snow and ice efforts in an urban environment.

Utilities are being replaced under the new pavement, so there is less risk of settlement over utility trenches.

There will be fewer maintenance actives needed on a concrete pavement, which would result in fewer traffic interruptions over the pavement service life.

Jon Huseby Digitally signed by Jon Huseby
Date: 2023.10.11 09:22:04
-05'00'

District Engineer

Date

Office Memorandum

TO: Amy Thorson
Acting Pavement Engineer

FROM: Sara Johnson
District 3 Materials Engineer

DATE: October 16, 2024

SUBJECT: REQUEST FOR AN EXCEPTION TO
SELECTING THE LOW-COST ALTERNATE

| | |
|---------------------|--|
| SP # | 4911-15 |
| Highway # | TH25 |
| Project Limits | R.P. 126+00.072 to R.P. 128+00.439 and R.P. 129+00.425 to R.P. 141+00.245 |
| Project Description | 4" Mill and Fill from 0.25 miles north of the Skunk River to the Morrison/Crow Wing County Line, with an exception in the town of Pierz. |

LCCA Results

| Alternative | Design Life | Total Present Cost | Requested Selection | % of Low Cost |
|-----------------------|-------------|--------------------|---------------------|---------------|
| Thick Mill and Fill | 18 | \$6,418,750 | Yes | 108.0 |
| Whitetopping | 20 | \$9,234,959 | No | 155.3 |
| Cold In-Place Recycle | 20 | \$5,945,277 | No | 100.0 |

Reason for Request

This project was originally slated as a cold in-place recycle (CIR). After a road review with MnDOT Pavement Design Office personnel on 3/3/2020, it was determined that a mill and fill was a more appropriate fix due to subgrade issues throughout the entire project. Coring also verified that the bituminous thickness varied from 5.0" to 14.25" on mainline, and the existing 2' paved shoulders also had varying bituminous thicknesses from 3.5" to 11.75". This variability in the mainline and shoulder thicknesses would not be ideal for a CIR design.

The majority of this pavement had a medium mill and overlay in 2007, and it lasted 16 years without any preventive maintenance, other than a crack fill in 2020, before reaching a Ride Quality less than 2.5. Therefore, it is predicted that a thick mill and fill, with the addition of routine preventive maintenance, will have an equivalent design life, if not longer, before requiring a major rehab.

Mike Ginnaty

Digitally signed by Mike
Ginnaty
Date: 2024.10.16 12:23:04
-05'00'

District Engineer

Date

Appendix D: 2024 Legislative Changes to Minn. Stat. 174.185 Effective July 1, 2025

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 must perform a life-cycle cost analysis and document the lowest life-cycle costs and all alternatives considered. The commissioner must document the chosen pavement strategy and, if the lowest life cycle is not selected, document the justification for the chosen strategy.

Subd. 2a. Review and collaboration.²

(a) Before finalizing a pavement selection, the commissioner must post a draft of the life-cycle cost analysis and the draft pavement selection on the department's Office of Materials and Road Research website for 21 days. During this period, the commissioner must allow industry association representatives to submit questions and comments. The commissioner must collaborate with the person who submitted the question or comment, where necessary, to ensure the commissioner fully understands the question or comment. The commissioner must respond to each question or comment in writing, which must include a description of any associated changes that will be made to the life-cycle cost analysis.

(b) After the review period under paragraph (a) closes, the commissioner may make revisions, when deemed appropriate, to the life-cycle cost analysis in response to questions or comments received. If the commissioner revises the type of pavement from concrete to asphalt or from asphalt to concrete,

² **NOTE:** Subdivisions 2a and 2b, as added by Laws 2024, chapter 127, article 3, sections 76 and 77, are effective July 1, 2025. Laws 2024, chapter 127, article 3, sections 76 and 77, the effective dates.

the commissioner must post the revised life-cycle cost analysis for review in accordance with the requirements under paragraph (a).

Subd. 2b. Selection.³

(a) After the review period required in subdivision 2a and any subsequent changes to the analysis, the commissioner must select the pavement strategy and prepare a document of justification. At a minimum, the document of justification must:

(1) explain why the pavement strategy was selected;

(2) if the lowest life-cycle cost is not selected, justify why a strategy with a higher life-cycle cost was selected; and

(3) include all questions and comments received during the review period and the commissioner's responses to each.

(b) The commissioner must submit the analysis and document of justification to a licensed professional engineer for review. A life-cycle cost analysis is not considered final until it is certified and signed by a licensed professional engineer as provided by Minnesota Rules, part [1800.4200](#).

(c) For all projects that began construction on or after January 1, 2024, the commissioner must store all life-cycle cost analyses and documents of justification on the department's website in a manner that allows the public to easily access the documents.

(d) After completing the certification and signature requirements in paragraph (b) and the posting requirements in paragraph (c), the commissioner may advance the project to substantial plan development.

(e) For purposes of this subdivision, "substantial plan development" means the point in time during the plan development process after which any further activities would preclude any of the feasible pavement alternatives from being selected or constructed.

Subd. 3. Report.⁴

By January 31 of each year, the commissioner must report to the chairs and ranking minority members of the legislative committees with jurisdiction over transportation policy and finance on life-cycle cost analyses conducted under this section. At a minimum, the report must include information on the results of the analyses under subdivision 2, the public review under subdivision 2a, and the final selection and document of justification under subdivision 2b.

³ **NOTE:** Subdivisions 2a and 2b, as added by Laws 2024, chapter 127, article 3, sections 76 and 77, are effective July 1, 2025. Laws 2024, chapter 127, article 3, sections 76 and 77, the effective dates.

⁴ **NOTE:** The amendment to subdivision 3 by Laws 2024, chapter 127, article 3, section 78, is effective July 1, 2025. Laws 2024, chapter 127, article 3, section 78, the effective date.