**Forecast Model**

$E_{t+n} = E_t \times (1+g)^n$

$g = (Et/Et\text{-}k)^{1/4}-1$

| | | |
|---|---|---|
| $E_{t+k}$ | = | Variable value in Year t, forecasted at n Years calaculated as: |
| | | $E_{t+n} = E_t \times (1+g)^n$ |
| k | = | Number of years between first and last variable value (10 yrs -- (calculated as diff between years 2004 & 1994)) |
| n | = | Number of forecast years (calacted as Diff between last year (2004) in base data and last year (21 yrs) in forecast period). |
| g | = | Modified formula for computing annual average variable growth rate. Calculated as: |
| | | $= (Et/Et\text{-}k)^{1/4}-1$ |

Note: the above model was used to forecast future value of each variable over the study herizon.

| Item # | Code Description | Analytical Assumptions and Parameters: Riverside Road Project | Unit | Value | Sources |
|---|---|---|---|---|---|
| 1 | P | Base Year | Years | 2019-2020 | Model parameter and consistent with U.S. DOT Benefit-Cost Analysis (BCA) Guidance for Discretionary Grant Programs, June 2020. |
| | | Project/investment level | Dollars | $ 11,610,760 | Total cost (including development cost and operation & maintenance costs) of Riverside Road project in Quitman County, MS |
| 2 | P | Real Discount | % | 0.07 | Model parameter and consistent with U.S. DOT Benefit-Cost Analysis (BCA) Guidance for Discretionary Grant Programs, June 2020. |
| 3 | R | 40-year Weighted Average of CPI-(from 1979 to 2019) | % | 0.0318 | Determine by grant and project analyts |
| 4 | A | Depreciation of Riverside road after paving will occur annually over evaluation period | % | TBD | Assumes a straight depreciation schedule for the Riverside road project during the evaluation period. |
| 5 | P | GHG Emissions Discount at | % | 0.03 | Model parameter and consistent with U.S. DOT Benefit-Cost Analysis (BCA) Guidance for Discretionary Grant Programs, June 2020. |
| 6 | A | Useful life of Riverside Road pavement is 50 years | Years | 50 | Based on readings from various national and state transportation studies concerning rhe life of paved highways and roads in the United State |
| 7 | A | Evaluation Period | Years | 36 | Assumption by grant and project analyts from local experiences in Mississippi |
| 8 | A | The construction planning horizon | Years | 3 | Assumption by grant and project analyts from local experiences in Mississippi |
| 9 | C | Study Period | Years | 39 | Assumption and consistent with U.S. DOT Benefit-Cost Analysis (BCA) Guidance for Discretionary Grant Programs, June 2020. |
| 10 | R | Length of Riverside Road project (in miles) | Miles | 5.25 | Determination by grant and project analyts |
| 11 | P | Predominant GHG in a Gasoline | | | |
| 12 | P | $CO_2$ | % | 95% | The U.S. Environmental Protection Agency (EPA) developed this fact sheet to answer common questions about greenhouse gas emissions from passenger vehicles. This fact sheet provides emission rates and calculations consistent with EPA's regulatory work. |
| 13 | | Predominant gases emissions from Gasoline | | | |
| 14 | P | NOx | % | 0.036 | Internet search:Yahoo.com |
| 15 | P | $SO_2$ (weight in lbs) | % | 0.014 | Enviroment Canada, Sulphur in Liquid Fuel, 2003 |
| 16 | P | $CO_2$ Emissions from a gallon of Gasoline (grams) | Grams | 8887 | The U.S. Environmental Protection Agency (EPA) developed this fact sheet to answer common questions about greenhouse gas emissions from passenger vehicles. This fact sheet provides emission rates and calculations consistent with EPA's regulatory work. |
| 17 | P | One gallon of gasoline produces (lbs) of $CO_2$ | lbs | 19.6 | U.S. Energy Information Administration |
| 18 | A | Average size (gallons) of automible gas tanks in U.S. | gal | 17 | Assumption by grant and project analyts from local experiences in Mississippi |
| 19 | P | One gallon of gasoline weighs (lbs) | lbs | 6 | the Science and Technology Desk Reference. |
| 20 | P | Average automobile miles driven per year in Mississippi | miles | 20,000 | https://www.bts.gov/content/average-annual-pmt-vmt-person-trips-and-trip-length-trip-purpose |
| 21 | A | Average automobile gas mileage per gallon in U.S. | MPG | 18 | Assumption by grant and project analyts from local experiences and information from energy publications |
| 22 | P | Average annual vehicle operating and maintenance cost per mile in U.S. | $ per mile | $ 0.58 | https://www.aaa.com/autorepair/articles/what-does-it-cost-to-own-and-operate-a-car |
| 23 | R | Average change in vehicle operating cost on gravel road | % | 1.40 | Kentucky Transportation Center, University of Kentucky research report titled "When to Pave a Gravel Road" & MISSISSIPPI TRANSPORTATION BY THE NUMBERS: |
| 24 | R | Average change in vehicle operating cost on a on paved road | % | 1 | Kentucky Transportation Center, University of Kentucky research report titled "When to Pave a Gravel Road" & MISSISSIPPI TRANSPORTATION BY THE NUMBERS: |
| 25 | P | Average speed on rural gravel and poorly paved roads is (mph) | MPH | 50 | Kentucky Transportation Center, University of Kentucky research report titled "When to Pave a Gravel Road" |
| 26 | A | Average speed on all and good rural paved roads is (mph) | MPH | 67 | https://www.autoblog.com/2010/01/26/tomtom-data-reveals-u-s-drivers-average-speed-fastest-highway/ |
| 27 | P | Average Reduction in fuel effiency when speed increases from 50 MPG to 65 MPG | % | 0.08 | https://mpgforspeed.com |
| 28 | P | The average America spends--hours in traffic delays | Hrs | 42 | 2017 INFRASTRUCTURE Report Card ASCE |
| 29 | P | Value of travel time savings | Dollars | $ 17.5 | U.S. Department of Energy, "Benefit-Cost Analysis Guidance for Discretionary Grant Programs", Table A-3 |
| 30 | P | Property Damage Only (PDO) Crashes | Dollars per vehicle | $ 4,500 | U.S. Department of Energy, "Benefit-Cost Analysis Guidance for Discretionary Grant Programs", Table A - 2 |
| 31 | P | Value of fatal crash (inflation adjusted) | Dollars per life | $ 12,071,000 | U.S. Department of Energy, "Benefit-Cost Analysis Guidance for Discretionary Grant Programs", Table A - 1 |
| 32 | P | Value of injury crash (inflation adjusted) | Dollars per crash | $ 284,100 | U.S. Department of Energy, "Benefit-Cost Analysis Guidance for Discretionary Grant Programs", Table A - 1 |
| 33 | P | Property damage only (PDO) (inflation adjusted) | Dollars-per vehicle | $ 4,500 | U.S. Department of Energy, "Benefit-Cost Analysis Guidance for Discretionary Grant Programs", Table A - 1 |
| 34 | P | Adjustment factor localizing estimates of deaths, injuries, and Property damage in Quitman County defind as county population divided by Mississippi population | % | 0.0023 | |
| 35 | P | Adjustment factor for # of hours Quitman Countians spend in traffic delays annually /a | Value | 0.2805 | Grant and project analysts assumption based on the average statewide rurality |
| 36 | P | Damage Costs for Emissions per metric ton (2020 to 2050) | Dollars | | U.S. Department of Energy, "Benefit-Cost Analysis Guidance for Discretionary Grant Programs", Table A-6 |
| 37 | P | Damage Costs for Emissions per metric ton (2020 to 2050) | Dollars | | U.S. Department of Energy, "Benefit-Cost Analysis Guidance for Discretionary Grant Programs", Table A-6 |
| 38 | P | Damage Costs for Emissions per metric ton (2020 to 2050) | Dollars | | U.S. Department of Energy, "Benefit-Cost Analysis Guidance for Discretionary Grant Programs", Table A-6 |
| 39 | P | The average cost per American of time in traffic delays per hour is | $ per hr | $ 2.32 | 2017 INFRASTRUCTURE Report Card ASCE |
| 40 | P | The average automobile in U.S. consumes about-- more gallons of gas per hour while idling | % | 0.20 | https://carfromjapan.com/article/car-maintenance/how-much-gas-does-idling-use/ |
| 41 | P | Estimated number of Mississippi licensed drivers | Drivers | 2,000,000 | MISSISSIPPI TRANSPORTATION BY THE NUMBERS: Meeting the State's Need for Safe and Efficient Mobility |
| 42 | P | Vehicle miles in Mississippi total (billions) in 2016 | Billions $ | 42.3 | MISSISSIPPI TRANSPORTATION BY THE NUMBERS: Meeting the State's Need for Safe and Efficient Mobility |
| 43 | A | Mississippi vehicle miles average annual growth grate is | % | 0.03 | MISSISSIPPI TRANSPORTATION BY THE NUMBERS: Meeting the State's Need for Safe and Efficient Mobility |
| 44 | A | Average wage rate per hour in Mississippi | $ | 18.00 | Grant and project analysts assumption based on the average statewide salary in the state |
| 45 | P | The average Mississippian drives about (minutes) per day | Minutes per day | 55 | National Household Travel Survey, 2001 to 2202 |
| 46 | P | The average American Driver drives | Miles per day | 29 | National Household Travel Survey, 2001-2002. |
| 47 | P | Average price of gasoline between 1998 and 2018 was (gal) | $ per gal | $ 2.38 | National Household Travel Survey, 2001-2002. |
| 48 | R | Quitman County, Marks, Lambert, & surrounding areas ADDT counts | Value | Projections | https://mdot.ms.gov/applications/trafficcounters/ & Idaho ADDT Traffic count methodology |
| 49 | P | Metric tons of $CO_2$ emitted per year (metric tons) | Metric tons | 4.6 | The U.S. Environmental Protection Agency (EPA) developed this fact sheet to answer common questions about greenhouse gas emissions from passenger vehicles. This fact sheet provides emission rates and calculations consistent with EPA's regulatory work. |
| 50 | P | One metric ton in pounds is | lbs | 2204.62 | Internet search:Yahoo.com |
| 51 | R | Average annual reductions in serious traffic crashes (percent) | % | -0.574% | Derived using data from a Texas Department of Transportation repor in 2012 |
| 52 | FM | Idaho Forecast model for key variables in the analysis | NA | | Literature Research and review by analyst and grant director (see model formulation below) |

/ a-- Adjustment factor is calculated as the 1 -(# of rural counties in Mississippi /total # of counties in Mississippi). Formula wise, it is (1 - (59/82) = .28048, where 59 is the number of rural counties in the state and 82 is the total number of in the state.

Where:

**P**: Parameter
**A**:Assumption
**R**: Researchers
**C**: Consistency
**FM**: Forecasting model

## Table 1. Base Data for Evaluating the Benefits and Cost of Changing Riverside Road from Gravel to Asphalt/Paved , 2019

**Baseline Scenario**

Scenario description: Restore and Maintain Current Gravel Road

| Study period | | | 39 |
|---|---|---|---|

| Year | | | Operations & Maintenance | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Restoration Cost of Gravel Road | Blading | Re-shape Cross section-Ditch | Spot gravel | Dust Abatement | Re-gravel | FEAM Flood & Other Public Assistance/ a | Total Cost |
| 1 | 2019 | | | | | | | $ 1,375,568 | $ 1,375,568 |
| 2 | 2020 | | | | | | | | $ - |
| 3 | 2021 | $ 3,630,860 | | | | | | | $ 3,630,860 |
| 4 | 2022 | | $ 3,054 | $ 7,532 | $ 662 | $ 6,260 | | | $ 17,508 |
| 5 | 2023 | | $ 3,150.69 | $ 7,771.70 | $ 682.65 | $ 6,458.91 | | | $ 18,064 |
| 6 | 2024 | | $ 3,250.76 | $ 8,018.53 | $ 704.33 | $ 6,664.05 | | | $ 18,638 |
| 7 | 2025 | | $ 3,354.00 | $ 8,273.21 | $ 726.70 | $ 6,875.71 | | | $ 19,230 |
| 8 | 2026 | | $ 3,460.53 | $ 8,535.98 | $ 749.78 | $ 7,094.09 | | | $ 19,840 |
| 9 | 2027 | | $ 3,570.44 | $ 8,807.09 | $ 773.60 | $ 7,319.40 | $ 13,233 | | $ 33,703 |
| 10 | 2028 | | $ 3,683.84 | $ 9,086.81 | $ 798.17 | $ 7,551.88 | | | $ 21,121 |
| 11 | 2029 | | $ 3,800.84 | $ 9,375.42 | $ 823.52 | $ 7,791.73 | | | $ 21,792 |
| 12 | 2030 | | $ 3,921.56 | $ 9,673.19 | $ 849.67 | $ 8,039.20 | | | $ 22,484 |
| 13 | 2031 | | $ 4,046.12 | $ 9,980.42 | $ 876.66 | $ 8,294.54 | | | $ 23,198 |
| 14 | 2032 | | $ 4,174.62 | $ 10,297.41 | $ 904.50 | $ 8,557.98 | $ 15,963 | $ 2,065,429 | $ 2,105,327 |
| 15 | 2033 | | $ 4,307.21 | $ 10,624.46 | $ 933.23 | $ 8,829.79 | | | $ 24,695 |
| 16 | 2034 | | $ 4,444.02 | $ 10,961.90 | $ 962.87 | $ 9,110.23 | | | $ 25,479 |
| 17 | 2035 | | $ 4,585.16 | $ 11,310.06 | $ 993.45 | $ 9,399.58 | | | $ 26,288 |
| 18 | 2036 | | $ 4,730.79 | $ 11,669.28 | $ 1,025.00 | $ 9,698.12 | | | $ 27,123 |
| 19 | 2037 | | $ 4,881.05 | $ 12,039.91 | $ 1,057.56 | $ 10,006.14 | $ 19,257 | | $ 47,242 |
| 20 | 2038 | | $ 5,036.07 | $ 12,422.31 | $ 1,091.15 | $ 10,323.95 | | | $ 28,873 |
| 21 | 2039 | | $ 5,196.02 | $ 12,816.85 | $ 1,125.80 | $ 10,651.85 | | | $ 29,791 |
| 22 | 2040 | | $ 5,361.05 | $ 13,223.93 | $ 1,161.56 | $ 10,990.16 | | | $ 30,737 |
| 23 | 2041 | | $ 5,531.33 | $ 13,643.94 | $ 1,198.45 | $ 11,339.22 | | | $ 31,713 |
| 24 | 2042 | | $ 5,707.01 | $ 14,077.28 | $ 1,236.52 | $ 11,699.36 | $ 23,231 | | $ 55,951 |
| 25 | 2043 | | $ 5,888.27 | $ 14,524.39 | $ 1,275.79 | $ 12,070.94 | | | $ 33,759 |
| 26 | 2044 | | $ 6,075.28 | $ 14,985.70 | $ 1,316.31 | $ 12,454.33 | | | $ 34,832 |
| 27 | 2045 | | $ 6,268.24 | $ 15,461.66 | $ 1,358.12 | $ 12,849.89 | | $ 3,101,263 | $ 3,137,201 |
| 28 | 2046 | | $ 6,467.32 | $ 15,952.73 | $ 1,401.25 | $ 13,258.02 | | | $ 37,079 |
| 29 | 2047 | | $ 6,672.73 | $ 16,459.41 | $ 1,445.76 | $ 13,679.10 | $ 28,025 | | $ 66,282 |
| 30 | 2048 | | $ 6,884.67 | $ 16,982.18 | $ 1,491.68 | $ 14,113.57 | | | $ 39,472 |
| 31 | 2049 | | $ 7,103.33 | $ 17,521.55 | $ 1,539.05 | $ 14,561.83 | | | $ 40,726 |
| 32 | 2050 | | $ 7,328.94 | $ 18,078.05 | $ 1,587.94 | $ 15,024.32 | | | $ 42,019 |
| 33 | 2051 | | $ 7,561.71 | $ 18,652.22 | $ 1,638.37 | $ 15,501.51 | | | $ 43,354 |
| 34 | 2052 | | $ 7,801.88 | $ 19,244.64 | $ 1,690.41 | $ 15,993.85 | $ 33,808 | | $ 78,539 |
| 35 | 2053 | | $ 8,049.68 | $ 19,855.87 | $ 1,744.10 | $ 16,501.83 | | | $ 46,151 |
| 36 | 2054 | | $ 8,305.34 | $ 20,486.51 | $ 1,799.49 | $ 17,025.95 | | | $ 47,617 |
| 37 | 2055 | | $ 8,569.13 | $ 21,137.18 | $ 1,856.64 | $ 17,566.71 | | | $ 49,130 |
| 38 | 2056 | | $ 8,841.29 | $ 21,808.52 | $ 1,915.61 | $ 18,124.64 | $ 40,785 | | $ 91,475 |
| 39 | 2057 | | $ 9,122.10 | $ 22,501.18 | $ 1,976.45 | $ 18,700.30 | | $ 4,656,577 | $ 4,708,877 |
| | Total Cost | | | | | | | | $ 16,151,737 |

a/ During the period, June 2005 to July 2018, Quitman County and Riverside Road area received $1,375,568 in flood, personal property loss, and other assistancee from the Federal Emergency Management Agency (FEMA). The analysis assumed that similar levels(adjusted for inflation using a 40-year weighted average of the CPI) of FEMA assistance would could over future periods unless the "Riverside Road" area of the county is not improved to prevent future losses associated heavy rains and flooding.

**Alternative Scenario**

Scenario: New Construction: Replacement of Gravel Road with Asphalt Pavement

| Study period | | 39 |
|---|---|---|

| Year | | Operations & Maintenance | | | | | Total Cost | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | New Construction /Asphalt Pavement | Crack Seal | Striping | Patching | Mill & Overlay (1.5") | | Years | Net Diff:Paved minus Gravel Road | Discounted Net Cost Savings |
| 1 | 2019 | | | | | | $ - | 1 | $ 1,375,568.00 | $ 1,375,568.00 |
| 2 | 2020 | | | | | | $ - | 2 | $ - | $ |
| 3 | 2021 | $ 11,074,625 | | | | | $ 11,074,625.00 | 3 | $ (7,443,764.67) | $ (6,501,672.34) |
| 4 | 2022 | | | | | | $ - | 4 | $ 17,507.88 | $ 14,291.65 |
| 5 | 2023 | | | | | | $ - | 5 | $ 18,063.95 | $ 13,780.90 |
| 6 | 2024 | | | | | | $ - | 6 | $ 18,637.68 | $ 13,288.41 |
| 7 | 2025 | | | | | | $ - | 7 | $ 19,229.63 | $ 12,813.51 |
| 8 | 2026 | | | | | | $ - | 8 | $ 19,840.38 | $ 12,355.59 |
| 9 | 2027 | | | | | | $ - | 9 | $ 33,703.23 | $ 19,615.59 |
| 10 | 2028 | | | | | | $ - | 10 | $ 21,120.69 | $ 11,488.26 |
| 11 | 2029 | | $ 4,175 | | $ 2,523 | | $ 6,697.71 | 11 | $ 15,093.79 | $ 7,672.92 |
| 12 | 2030 | | | | $ 2,603 | | $ 2,603.22 | 12 | $ 19,880.40 | $ 9,445.04 |
| 13 | 2031 | | | | $ 2,686 | | $ 2,685.90 | 13 | $ 20,511.82 | $ 9,107.49 |
| 14 | 2032 | | | | $ 2,771 | | $ 2,771.21 | 14 | $ 2,102,555.83 | $ 872,485.92 |
| 15 | 2033 | | | | $ 2,859 | | $ 2,859.23 | 15 | $ 21,835.46 | $ 8,468.17 |
| 16 | 2034 | | $ 5,036 | $ 1,577 | $ 2,950 | | $ 9,563.04 | 16 | $ 15,915.98 | $ 5,768.68 |
| 17 | 2035 | | | | $ 3,044 | | $ 3,043.74 | 17 | $ 23,244.52 | $ 7,873.72 |
| 18 | 2036 | | | | $ 3,140 | | $ 3,140.41 | 18 | $ 23,982.79 | $ 7,592.34 |
| 19 | 2037 | | | | $ 3,240 | | $ 3,240.15 | 19 | $ 44,001.91 | $ 13,018.58 |
| 20 | 2038 | | | | $ 3,343 | | $ 3,343.06 | 20 | $ 25,530.42 | $ 7,059.37 |
| 21 | 2039 | | $ 6,075 | | $ 3,449 | | $ 9,524.52 | 21 | $ 20,266.01 | $ 5,237.12 |
| 22 | 2040 | | | | $ 3,559 | | $ 3,558.79 | 22 | $ 27,177.91 | $ 6,563.82 |
| 23 | 2041 | | | | $ 3,672 | | $ 3,671.82 | 23 | $ 28,041.11 | $ 6,329.25 |
| 24 | 2042 | | | | $ 3,788 | | $ 3,788.44 | 24 | $ 52,162.95 | $ 11,003.61 |
| 25 | 2043 | | | | $ 3,909 | | $ 3,908.77 | 25 | $ 29,850.62 | $ 5,884.95 |
| 26 | 2044 | | $ 7,329 | $ 2,224 | $ 4,033 | $ 380,467 | $ 394,053.13 | 26 | $ (359,221.51) | $ (66,186.27) |
| 27 | 2045 | | | | $ 4,161 | | $ 4,161.00 | 27 | $ 3,133,039.69 | $ 539,495.31 |
| 28 | 2046 | | | | $ 4,293 | | $ 4,293.16 | 28 | $ 32,786.17 | $ 5,276.29 |
| 29 | 2047 | | | | $ 4,430 | | $ 4,429.52 | 29 | $ 61,852.56 | $ 9,302.76 |
| 30 | 2048 | | | | $ 4,570 | | $ 4,570.20 | 30 | $ 34,901.88 | $ 4,905.91 |
| 31 | 2049 | | | | $ 4,715 | | $ 4,715.35 | 31 | $ 36,010.40 | $ 4,730.58 |
| 32 | 2050 | | | | $ 4,865 | | $ 4,865.12 | 32 | $ 37,154.13 | $ 4,561.52 |
| 33 | 2051 | | | | $ 5,020 | | $ 5,019.64 | 33 | $ 38,334.18 | $ 4,398.51 |
| 34 | 2052 | | | | $ 5,179 | | $ 5,179.07 | 34 | $ 73,359.86 | $ 7,866.72 |
| 35 | 2053 | | | | $ 5,344 | | $ 5,343.56 | 35 | $ 40,807.91 | $ 4,089.74 |
| 36 | 2054 | | $ 8,841 | $ 3,137 | $ 5,513 | | $ 17,491.84 | 36 | $ 30,125.44 | $ 2,821.64 |
| 37 | 2055 | | | | $ 5,688 | | $ 5,688.38 | 37 | $ 43,441.27 | $ 3,802.65 |
| 38 | 2056 | | | | $ 5,869 | | $ 5,869.05 | 38 | $ 85,605.58 | $ 7,003.29 |
| 39 | 2057 | | | | $ 6,055 | | $ 6,055.46 | 39 | $ 4,702,821.89 | $ 359,562.99 |
| | Total Cost | $ 11,074,625 | $ 31,456 | $ 6,938 | $ 117,273 | $ 380,467 | $ 11,610,759.52 | | $ 4,540,977.75 | $ (3,153,327.82) |

**Note**: Positive numbers in the **Net Diff column** represent cost savings/benefits, whereas negative numbers denote cost increases/disbenefits to the "Riverside Road" project "

**Table 2. Summary of Riverside Road Cost Analysis**

| Summary of: Cost Analysis | |
|---|---|
| a) Cost increases | $ (7,802,986) |
| b) Costs savings | $ 12,343,964 |
| c) Net Benefits | $ 4,540,978 |
| d) Discounted net Benefits | $ 3,153,327.82 |

## Scenario: Gravel Riverside Road

| Year | ADDT: Gravel Road | in- Vehicle Waiting: Vehicle of hours travel (VHT) | in- Vehicle Waiting: Value of Travel Time (VTT) | Delays & Waiting: Vehicle of hours travel (VHT) | Delays & Waiting: Value of Travel Time (VTT) | Gallons of Gasoline | Gasoline Expenditure | Emissions Cost: CO2 | Emissions Cost: NOx | Emissions Cost: SO2 | Vehicle Operating Costs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2019 | 8,928 | 2,033 | $ 50,956 | 5,216 | $ 96,340 | 14,384 | $ 35,323 | $ 6,074 | $ 72,278 | $ 72,330 | 216,176 |
| 2020 | 8,226 | 1,874 | $ 46,952 | 4,806 | $ 88,769 | 13,254 | $ 32,547 | $ 5,597 | $ 66,598 | $ 66,645 | 199,187 |
| 2021 | 8,320 | 1,895 | $ 47,484 | 4,861 | $ 89,774 | 13,404 | $ 32,916 | $ 5,660 | $ 67,353 | $ 67,400 | 201,444 |
| 2022 | 9,585 | 2,183 | $ 54,707 | 5,600 | $ 103,430 | 15,443 | $ 37,923 | $ 6,521 | $ 77,598 | $ 77,653 | 232,087 |
| 2023 | 9,577 | 2,181 | $ 54,661 | 5,596 | $ 103,345 | 15,430 | $ 37,891 | $ 6,516 | $ 77,534 | $ 77,589 | 231,895 |
| 2024 | 7,994 | 1,821 | $ 45,627 | 4,671 | $ 86,265 | 12,880 | $ 31,629 | $ 5,439 | $ 64,719 | $ 64,765 | 193,568 |
| 2025 | 7,863 | 1,791 | $ 44,876 | 4,594 | $ 84,843 | 12,668 | $ 31,108 | $ 5,349 | $ 63,653 | $ 63,698 | 190,379 |
| 2026 | 8,016 | 1,826 | $ 45,751 | 4,683 | $ 86,498 | 12,915 | $ 31,714 | $ 5,454 | $ 64,895 | $ 64,941 | 194,093 |
| 2027 | 6,763 | 1,540 | $ 38,602 | 3,952 | $ 72,982 | 10,897 | $ 26,759 | $ 4,602 | $ 54,754 | $ 54,793 | 163,763 |
| 2028 | 6,533 | 1,488 | $ 37,285 | 3,817 | $ 70,492 | 10,525 | $ 25,846 | $ 4,445 | $ 52,886 | $ 52,924 | 158,176 |
| 2029 | 6,310 | 1,437 | $ 36,013 | 3,687 | $ 68,087 | 10,166 | $ 24,964 | $ 4,293 | $ 51,082 | $ 51,118 | 152,780 |
| 2030 | 6,095 | 1,388 | $ 34,784 | 3,561 | $ 65,765 | 9,819 | $ 24,113 | $ 4,147 | $ 49,339 | $ 49,374 | 147,569 |
| 2031 | 5,887 | 1,341 | $ 33,598 | 3,439 | $ 63,521 | 9,484 | $ 23,290 | $ 4,005 | $ 47,656 | $ 47,690 | 142,534 |
| 2032 | 5,686 | 1,295 | $ 32,452 | 3,322 | $ 61,354 | 9,161 | $ 22,495 | $ 3,868 | $ 46,031 | $ 46,063 | 137,672 |
| 2033 | 5,305 | 1,208 | $ 30,275 | 3,099 | $ 57,240 | 8,546 | $ 20,987 | $ 3,609 | $ 42,944 | $ 42,974 | 128,439 |
| 2034 | 5,305 | 1,208 | $ 30,275 | 3,099 | $ 57,240 | 8,546 | $ 20,987 | $ 3,609 | $ 42,944 | $ 42,974 | 128,439 |
| 2035 | 5,124 | 1,167 | $ 29,242 | 2,993 | $ 55,287 | 8,255 | $ 20,271 | $ 3,486 | $ 41,479 | $ 41,508 | 124,058 |
| 2036 | 4,949 | 1,127 | $ 28,245 | 2,891 | $ 53,401 | 7,973 | $ 19,579 | $ 3,367 | $ 40,064 | $ 40,092 | 119,826 |
| 2037 | 4,780 | 1,089 | $ 27,281 | 2,793 | $ 51,579 | 7,701 | $ 18,911 | $ 3,252 | $ 38,697 | $ 38,724 | 115,738 |
| 2038 | 4,617 | 1,052 | $ 26,351 | 2,697 | $ 49,820 | 7,438 | $ 18,266 | $ 3,141 | $ 37,377 | $ 37,403 | 111,790 |
| 2039 | 4,459 | 1,016 | $ 25,452 | 2,605 | $ 48,120 | 7,185 | $ 17,643 | $ 3,034 | $ 36,102 | $ 36,127 | 107,976 |
| 2040 | 4,307 | 981 | $ 24,583 | 2,517 | $ 46,478 | 6,940 | $ 17,041 | $ 2,931 | $ 34,870 | $ 34,895 | 104,293 |
| 2041 | 4,160 | 948 | $ 23,745 | 2,431 | $ 44,893 | 6,703 | $ 16,460 | $ 2,831 | $ 33,681 | $ 33,704 | 100,735 |
| 2042 | 4,018 | 915 | $ 22,935 | 2,348 | $ 43,361 | 6,474 | $ 15,898 | $ 2,734 | $ 32,532 | $ 32,555 | 97,298 |
| 2043 | 3,881 | 884 | $ 22,152 | 2,268 | $ 41,882 | 6,253 | $ 15,356 | $ 2,641 | $ 31,422 | $ 31,444 | 93,979 |
| 2044 | 3,749 | 854 | $ 21,397 | 2,190 | $ 40,453 | 6,040 | $ 14,832 | $ 2,551 | $ 30,350 | $ 30,371 | 90,773 |
| 2045 | 3,621 | 825 | $ 20,667 | 2,116 | $ 39,073 | 5,834 | $ 14,326 | $ 2,464 | $ 29,315 | $ 29,335 | 87,677 |
| 2046 | 3,498 | 797 | $ 19,962 | 2,043 | $ 37,741 | 5,635 | $ 13,838 | $ 2,380 | $ 28,315 | $ 28,335 | 84,686 |
| 2047 | 3,378 | 769 | $ 19,281 | 1,974 | $ 36,453 | 5,443 | $ 13,365 | $ 2,298 | $ 27,349 | $ 27,368 | 81,797 |
| 2048 | 3,263 | 743 | $ 18,623 | 1,906 | $ 35,210 | 5,257 | $ 12,910 | $ 2,220 | $ 26,416 | $ 26,434 | 79,006 |
| 2049 | 3,152 | 718 | $ 17,988 | 1,841 | $ 34,008 | 5,078 | $ 12,469 | $ 2,144 | $ 25,515 | $ 25,533 | 76,311 |
| 2050 | 3,044 | 693 | $ 17,374 | 1,779 | $ 32,848 | 4,904 | $ 12,044 | $ 2,071 | $ 24,644 | $ 24,662 | 73,708 |
| 2051 | 2,940 | 670 | $ 16,781 | 1,718 | $ 31,728 | 4,737 | $ 11,633 | $ 2,000 | $ 23,803 | $ 23,820 | 71,193 |
| 2052 | 2,840 | 647 | $ 16,209 | 1,659 | $ 30,645 | 4,576 | $ 11,236 | $ 1,932 | $ 22,991 | $ 23,008 | 68,765 |
| 2053 | 2,743 | 625 | $ 15,656 | 1,603 | $ 29,600 | 4,419 | $ 10,853 | $ 1,866 | $ 22,207 | $ 22,223 | 66,419 |
| 2054 | 2,650 | 603 | $ 15,122 | 1,548 | $ 28,590 | 4,269 | $ 10,483 | $ 1,803 | $ 21,450 | $ 21,465 | 64,153 |
| 2055 | 2,559 | 583 | $ 14,606 | 1,495 | $ 27,615 | 4,123 | $ 10,125 | $ 1,741 | $ 20,718 | $ 20,733 | 61,965 |
| 2056 | 2,472 | 563 | $ 14,108 | 1,444 | $ 26,673 | 3,982 | $ 9,780 | $ 1,682 | $ 20,011 | $ 20,025 | 59,851 |
| 2057 | 2,388 | 544 | $ 13,627 | 1,395 | $ 25,763 | 3,847 | $ 9,446 | $ 1,624 | $ 19,328 | $ 19,342 | 57,809 |

## Scenario: Asphalt/paved Riverside Road

| Year | in- Vehicle Waiting: Vehicle of hours travel (VHT) | in- Vehicle Waiting: Value of Travel Time (VTT) | Delays & Waiting: Vehicle of hours travel (VHT) | Delays & Waiting: Value of Travel Time (VTT) | Gallons of Gasoline | Gasoline Expenditure | Emissions Cost: CO2 | Emissions Cost: NOx | Emissions Cost: SO2 | Vehicle Operating Costs |
|---|---|---|---|---|---|---|---|---|---|---|
| 2019 | 1,084 | 36,397 | 2,781 | 14,404 | 15,535 | 38,149 | $ 6,560 | $ 78,061 | $ 78,116 | $ 154,412 |
| 2020 | 999 | 33,537 | 2,562 | 13,272 | 14,314 | 35,151 | $ 6,045 | $ 71,926 | $ 71,977 | $ 142,277 |
| 2021 | 1,010 | 33,917 | 2,591 | 13,422 | 14,476 | 35,549 | $ 6,113 | $ 72,741 | $ 72,792 | $ 143,889 |
| 2022 | 1,164 | 39,076 | 2,985 | 15,464 | 16,678 | 40,956 | $ 7,043 | $ 83,806 | $ 83,865 | $ 165,776 |
| 2023 | 1,163 | 39,044 | 2,983 | 15,451 | 16,664 | 40,923 | $ 7,037 | $ 83,737 | $ 83,796 | $ 165,639 |
| 2024 | 971 | 32,591 | 2,490 | 12,897 | 13,910 | 34,159 | $ 5,874 | $ 69,897 | $ 69,946 | $ 138,263 |
| 2025 | 955 | 32,054 | 2,449 | 12,685 | 13,681 | 33,596 | $ 5,777 | $ 68,746 | $ 68,794 | $ 135,985 |
| 2026 | 973 | 32,679 | 2,496 | 12,932 | 13,948 | 34,252 | $ 5,890 | $ 70,086 | $ 70,136 | $ 138,638 |
| 2027 | 821 | 27,573 | 2,106 | 10,911 | 11,768 | 28,899 | $ 4,970 | $ 59,134 | $ 59,176 | $ 116,974 |
| 2028 | 793 | 26,632 | 2,035 | 10,539 | 11,367 | 27,913 | $ 4,800 | $ 57,117 | $ 57,158 | $ 112,983 |
| 2029 | 766 | 25,723 | 1,965 | 10,180 | 10,979 | 26,961 | $ 4,636 | $ 55,169 | $ 55,208 | $ 109,129 |
| 2030 | 740 | 24,846 | 1,898 | 9,832 | 10,605 | 26,042 | $ 4,478 | $ 53,287 | $ 53,324 | $ 105,406 |
| 2031 | 715 | 23,998 | 1,833 | 9,497 | 10,243 | 25,153 | $ 4,325 | $ 51,469 | $ 51,505 | $ 101,810 |
| 2032 | 690 | 23,180 | 1,771 | 9,173 | 9,893 | 24,295 | $ 4,178 | $ 49,713 | $ 49,748 | $ 98,337 |
| 2033 | 644 | 21,625 | 1,652 | 8,558 | 9,230 | 22,666 | $ 3,898 | $ 46,379 | $ 46,412 | $ 91,742 |
| 2034 | 644 | 21,625 | 1,652 | 8,558 | 9,230 | 22,666 | $ 3,898 | $ 46,379 | $ 46,412 | $ 91,742 |
| 2035 | 622 | 20,887 | 1,596 | 8,266 | 8,915 | 21,893 | $ 3,765 | $ 44,797 | $ 44,829 | $ 88,613 |
| 2036 | 601 | 20,175 | 1,541 | 7,984 | 8,611 | 21,146 | $ 3,636 | $ 43,269 | $ 43,299 | $ 85,590 |
| 2037 | 580 | 19,487 | 1,489 | 7,712 | 8,317 | 20,424 | $ 3,512 | $ 41,793 | $ 41,822 | $ 82,670 |
| 2038 | 561 | 18,822 | 1,438 | 7,449 | 8,033 | 19,728 | $ 3,392 | $ 40,367 | $ 40,396 | $ 79,850 |
| 2039 | 541 | 18,180 | 1,389 | 7,194 | 7,759 | 19,055 | $ 3,277 | $ 38,990 | $ 39,018 | $ 77,126 |
| 2040 | 523 | 17,560 | 1,341 | 6,949 | 7,495 | 18,405 | $ 3,165 | $ 37,660 | $ 37,686 | $ 74,495 |
| 2041 | 505 | 16,961 | 1,296 | 6,712 | 7,239 | 17,777 | $ 3,057 | $ 36,375 | $ 36,401 | $ 71,954 |
| 2042 | 488 | 16,382 | 1,251 | 6,483 | 6,992 | 17,170 | $ 2,953 | $ 35,134 | $ 35,159 | $ 69,499 |
| 2043 | 471 | 15,823 | 1,209 | 6,262 | 6,754 | 16,585 | $ 2,852 | $ 33,936 | $ 33,960 | $ 67,128 |
| 2044 | 455 | 15,283 | 1,168 | 6,048 | 6,523 | 16,019 | $ 2,755 | $ 32,778 | $ 32,801 | $ 64,838 |
| 2045 | 440 | 14,762 | 1,128 | 5,842 | 6,301 | 15,472 | $ 2,661 | $ 31,660 | $ 31,682 | $ 62,626 |
| 2046 | 425 | 14,258 | 1,089 | 5,643 | 6,086 | 14,945 | $ 2,570 | $ 30,580 | $ 30,601 | $ 60,490 |
| 2047 | 410 | 13,772 | 1,052 | 5,450 | 5,878 | 14,435 | $ 2,482 | $ 29,537 | $ 29,557 | $ 58,426 |
| 2048 | 396 | 13,302 | 1,016 | 5,264 | 5,678 | 13,942 | $ 2,398 | $ 28,529 | $ 28,549 | $ 56,433 |
| 2049 | 383 | 12,848 | 982 | 5,085 | 5,484 | 13,467 | $ 2,316 | $ 27,556 | $ 27,575 | $ 54,508 |
| 2050 | 370 | 12,410 | 948 | 4,911 | 5,297 | 13,007 | $ 2,237 | $ 26,616 | $ 26,635 | $ 52,649 |
| 2051 | 357 | 11,987 | 916 | 4,744 | 5,116 | 12,564 | $ 2,161 | $ 25,708 | $ 25,726 | $ 50,852 |
| 2052 | 345 | 11,578 | 884 | 4,582 | 4,942 | 12,135 | $ 2,087 | $ 24,831 | $ 24,848 | $ 49,118 |
| 2053 | 333 | 11,183 | 854 | 4,425 | 4,773 | 11,721 | $ 2,016 | $ 23,984 | $ 24,001 | $ 47,442 |
| 2054 | 322 | 10,801 | 825 | 4,274 | 4,610 | 11,321 | $ 1,947 | $ 23,166 | $ 23,182 | $ 45,824 |
| 2055 | 311 | 10,433 | 797 | 4,129 | 4,453 | 10,935 | $ 1,880 | $ 22,375 | $ 22,391 | $ 44,260 |
| 2056 | 300 | 10,077 | 770 | 3,988 | 4,301 | 10,562 | $ 1,816 | $ 21,612 | $ 21,627 | $ 42,751 |
| 2057 | 290 | 9,733 | 744 | 3,852 | 4,154 | 10,202 | $ 1,754 | $ 20,875 | $ 20,889 | $ 41,292 |

**/a** Projected costs of fatalities shown above are derived using fatalities estimates derived in the "Deaths_Injury_&_ Property Losses" section of the spreads
A - 1 of the Benefit Cost Analysis Guidance.
**/b** Total benefits captures the direct benefits derived from going from a gravel road to a paved road, as well as the indirect benefits in cost savings derived f
discounted benefits derived from the "State of Good Repair" analysis are include after all other benefits have been discounted also.

| Safety Benefits (Gravel & Paved Road | | | Net Diff: Paved minus Gravel Road | Discounted Net Benefits | Years | Total Benefits/ b |
|---|---|---|---|---|---|---|
| Cost of Fatality /a | Cost of Injury | Cost of Personal property | | | | |
| $ 19 | $ 2,960,158 | $ 3,011,546 | 6,069,005 | $ 6,069,005 | 1 | 7,444,573 |
| $ 19 | $ 2,995,606 | $ 3,062,862 | 6,148,124 | $ 5,745,911 | 2 | 6,148,124 |
| $ 19 | $ 3,031,479 | $ 2,602,357 | 5,724,508 | $ 5,000,007 | 3 | (1,719,257) |
| $ 19 | $ 3,067,781 | $ 2,605,249 | 5,777,491 | $ 4,716,154 | 4 | 5,794,999 |
| $ 19 | $ 3,104,518 | $ 2,703,552 | 5,912,445 | $ 4,510,576 | 5 | 5,930,509 |
| $ 20 | $ 3,141,695 | $ 2,321,872 | 5,550,695 | $ 3,957,569 | 6 | 5,569,333 |
| $ 20 | $ 3,179,317 | $ 2,282,764 | 5,547,774 | $ 3,696,716 | 7 | 5,567,003 |
| $ 20 | $ 3,217,390 | $ 2,244,314 | 5,549,068 | $ 3,455,680 | 8 | 5,568,908 |
| $ 20 | $ 3,255,918 | $ 2,206,512 | 5,536,145 | $ 3,222,087 | 9 | 5,569,849 |
| $ 20 | $ 3,294,908 | $ 2,169,346 | 5,535,456 | $ 3,010,921 | 10 | 5,556,577 |
| $ 21 | $ 3,334,365 | $ 2,132,807 | 5,535,945 | $ 2,814,194 | 11 | 5,551,039 |
| $ 21 | $ 3,374,294 | $ 2,025,350 | 5,466,073 | $ 2,596,892 | 12 | 5,485,953 |
| $ 21 | $ 3,414,701 | $ 2,061,564 | 5,540,429 | $ 2,460,017 | 13 | 5,560,940 |
| $ 21 | $ 3,455,593 | $ 2,026,840 | 5,544,408 | $ 2,300,732 | 14 | 7,646,964 |
| $ 22 | $ 3,496,974 | $ 1,992,700 | 5,547,495 | $ 2,151,414 | 15 | 5,569,331 |
| $ 22 | $ 3,538,850 | $ 1,959,136 | 5,555,808 | $ 2,013,680 | 16 | 5,571,724 |
| $ 22 | $ 3,581,228 | $ 1,926,138 | 5,563,216 | $ 1,884,454 | 17 | 5,586,460 |
| $ 22 | $ 3,624,114 | $ 1,893,695 | 5,571,754 | $ 1,763,875 | 18 | 5,595,737 |
| $ 23 | $ 3,667,513 | $ 1,861,798 | 5,581,417 | $ 1,651,340 | 19 | 5,625,419 |
| $ 23 | $ 3,711,432 | $ 1,830,439 | 5,592,200 | $ 1,546,290 | 20 | 5,617,731 |
| $ 23 | $ 3,755,876 | $ 1,799,608 | 5,604,098 | $ 1,448,205 | 21 | 5,624,364 |
| $ 23 | $ 3,800,853 | $ 1,769,296 | 5,617,106 | $ 1,356,605 | 22 | 5,644,284 |
| $ 23 | $ 3,846,369 | $ 1,739,495 | 5,631,219 | $ 1,271,040 | 23 | 5,659,260 |
| $ 24 | $ 3,892,429 | $ 1,710,196 | 5,646,434 | $ 1,191,098 | 24 | 5,698,597 |
| $ 24 | $ 3,939,042 | $ 1,681,390 | 5,662,747 | $ 1,116,391 | 25 | 5,692,598 |
| $ 24 | $ 3,986,212 | $ 1,653,069 | 5,680,155 | $ 1,046,564 | 26 | 5,320,933 |
| $ 24 | $ 4,033,947 | $ 1,625,226 | 5,698,653 | $ 981,282 | 27 | 8,831,693 |
| $ 25 | $ 4,082,254 | $ 1,597,851 | 5,718,239 | $ 920,238 | 28 | 5,751,026 |
| $ 25 | $ 4,131,139 | $ 1,570,938 | 5,738,912 | $ 863,145 | 29 | 5,800,764 |
| $ 25 | $ 4,180,610 | $ 1,544,478 | 5,760,667 | $ 809,736 | 30 | 5,795,569 |
| $ 26 | $ 4,230,673 | $ 1,518,463 | 5,783,503 | $ 759,762 | 31 | 5,819,513 |
| $ 26 | $ 4,281,336 | $ 1,492,887 | 5,807,418 | $ 712,994 | 32 | 5,844,572 |
| $ 26 | $ 4,332,605 | $ 1,467,741 | 5,832,410 | $ 669,217 | 33 | 5,870,745 |
| $ 26 | $ 4,384,488 | $ 1,443,019 | 5,858,479 | $ 628,232 | 34 | 5,931,839 |
| $ 27 | $ 4,436,993 | $ 1,418,714 | 5,885,623 | $ 589,853 | 35 | 5,926,431 |
| $ 27 | $ 4,490,126 | $ 1,394,818 | 5,913,841 | $ 553,908 | 36 | 5,943,966 |
| $ 27 | $ 4,543,896 | $ - | 4,571,808 | $ 400,195 | 37 | 4,615,249 |
| $ 28 | $ 4,598,309 | $ - | 4,625,271 | $ 378,388 | 38 | 4,710,876 |
| $ 28 | $ 4,653,375 | $ - | 4,679,417 | $ 357,774 | 39 | 9,382,239 |
| | | | **Total** | $ 80,622,142 | | $ 223,106,433 |

heet times the loss of life etimates provided in Appendix Table

from this road improvement project. Inaddition, the

**State of Good Repair Benefits**

| Total project Investment | Time Herizon for Evaluation Period | Life Expectancy | Residual Value | Discounted Residual Value |
|---|---|---|---|---|
| $ 11,610,760 | 36 | 50 | $ 3,251,013 | $ 2,149,302 |

**Table 2. Summary of Costs Analysis from Riverside Road Project Cost Analysis**

| Summary of: Cost Analysis | |
|---|---|
| a) Cost increases | $ (7,802,986) |
| b) Costs savings | $ 12,343,964 |
| c) Net costs savings form gravel to paved road | $ 4,540,978 |

**Table 3. Summary of Benefits Analysis from Riverside Road Project Cost Analysis**

| Summary of: Cost Analysis | |
|---|---|
| a) Cost increases | $ - |
| b) Costs savings | $ - |
| c) Net costs savings form gravel to paved road | $ - |

Years

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 36 37 38 39

| | Variables | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In-vehicle driving (minutes) | Delays/waiting time | ADDT | Delay/waiting Factor for gravel road | Average miles driven per day | Average speed on gravel road (MPH) | Hourly value of travel time | Gravel Road Inflation Factor | Avg Size of Automobile Tank | Avg. MPG | Avg. Price of Gasoline | | Vehicle of hours travel (VHT) | Value of Travel Time (VTT) | Net Benefit/Cost |
| Travel Savings | | | | | | | | | | | | | | | |
| In-vehicle | | | | | | | | | | | | | | | |
| Gravel road | 55 | 42 | 8,928 | 0.28048 | 29 | 50 | $ 17.90 | 1.40 | 17 | 18 | $ 2.38 | | 2,033 | $ 50,956 | |
| Paved road | | | 8,928 | | | 67 | | | | | | | 1,084 | $ 19,402 | **$ (31,555)** |
| Delays/waiting | | 0.917 | 8,928 | | 29 | 50 | $ 17.90 | | | | | | | | |
| Gravel road | | | | | | | | | | | | | $ 5,216.24 | $ 93,371 | |
| Paved road | | | | | | | | | | | | | $ 3,725.88 | $ 66,693 | **$ (26,677)** |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| Gasoline Expenditure | | | | | | | | | | | | | Fuel Cost | Costs/Savings | |
| Gravel road | | | | | | | | | | | | | $ 34,234 | | |
| Paved road | | | | | | | | | | | | | $ 36,973 | **$ 2,738.74** | |

| Operating | ADDT | miles driven | Road Type | Costs | Net VOC |
|---|---|---|---|---|---|
| $ 0.58 | 8,928 | 29 | Gravel road | $ 209,514 | |
| | | | Paved road | $ 149,653 | **$ (59,861)** |

12071000
284100
4500

**Mississippi Motor Vehicle Deaths**

| Year | State | Motor Vehicle Deaths - state of residence | Traffic deaths - state of incident | Motor Vehicle Deaths per 100,000 population | Traffic deaths per 10,000 motor vehicles | Traffic deaths - per 100,000,000 vehicle miles |
|---|---|---|---|---|---|---|
| 2010 | Mississippi | 1.57 | 641 | 23.0 | 3.1 | 1.6 |
| 2011 | Mississippi | 1.67 | 630 | 24.4 | 3.1 | 1.6 |
| 2012 | Mississippi | 1.59 | 582 | 19.5 | 2.9 | 1.5 |
| 2013 | Mississippi | 1.57 | 624 | 22.8 | 3.0 | 1.6 |
| 2014 | Mississippi | 1.55 | 607 | 22.5 | 2.9 | 1.5 |
| 2015 | Mississippi | 1.77 | 677 | 25.7 | 3.2 | 1.7 |
| 2016 | Mississippi | 1.81 | 737 | 26.3 | 3.6 | 1.8 |
| 2018 | Mississippi | 1.62 | 663 | 23.6 | 3.2 | 1.6 |
| 2019 | Mississippi | 1.73 | 643 | 25.2 | 3.1 | 1.6 |
| | | | | | | |
| | | Projected deaths: Current Roads | Projected deaths:Improved/paved Roads | Diff in Deaths | | |
| 2020 | Mississippi | 1.74 | 1.74 | 0.00 | | 1 |
| 2021 | Mississippi | 1.76 | 1.76 | 0.00 | | 2 |
| 2022 | Mississippi | 1.78 | 1.78 | 0.00 | | 3 |
| 2023 | Mississippi | 1.80 | 1.80 | 0.00 | | 4 |
| 2024 | Mississippi | 1.82 | 1.81 | 0.01 | | 5 |
| 2025 | Mississippi | 1.84 | 1.83 | 0.01 | | 6 |
| 2026 | Mississippi | 1.86 | 1.85 | 0.01 | | 7 |
| 2027 | Mississippi | 1.88 | 1.87 | 0.01 | | 8 |
| 2028 | Mississippi | 1.90 | 1.89 | 0.01 | | 9 |
| 2029 | Mississippi | 1.92 | 1.91 | 0.01 | | 10 |
| 2030 | Mississippi | 1.94 | 1.93 | 0.01 | | 11 |
| 2031 | Mississippi | 1.96 | 1.94 | 0.01 | | 12 |
| 2032 | Mississippi | 1.98 | 1.96 | 0.01 | | 13 |
| 2033 | Mississippi | 2.00 | 1.98 | 0.02 | | 14 |
| 2034 | Mississippi | 2.02 | 2.00 | 0.02 | | 15 |
| 2035 | Mississippi | 2.04 | 2.02 | 0.02 | | 16 |
| 2036 | Mississippi | 2.06 | 2.04 | 0.02 | | 17 |
| 2037 | Mississippi | 2.09 | 2.06 | 0.02 | | 18 |
| 2038 | Mississippi | 2.11 | 2.09 | 0.02 | | 19 |
| 2039 | Mississippi | 2.13 | 2.11 | 0.02 | | 20 |
| 2040 | Mississippi | 2.15 | 2.13 | 0.03 | | 21 |
| 2041 | Mississippi | 2.18 | 2.15 | 0.03 | | 22 |
| 2042 | Mississippi | 2.20 | 2.17 | 0.03 | | 23 |
| 2043 | Mississippi | 2.22 | 2.19 | 0.03 | | 24 |
| 2044 | Mississippi | 2.25 | 2.21 | 0.03 | | 25 |
| 2045 | Mississippi | 2.27 | 2.24 | 0.03 | | 26 |
| 2046 | Mississippi | 2.29 | 2.26 | 0.04 | | 27 |
| 2047 | Mississippi | 2.32 | 2.28 | 0.04 | | 28 |
| 2048 | Mississippi | 2.34 | 2.30 | 0.04 | | 29 |
| 2049 | Mississippi | 2.37 | 2.33 | 0.04 | | 30 |
| 2050 | Mississippi | 2.39 | 2.35 | 0.04 | | 31 |
| 2051 | Mississippi | 2.42 | 2.37 | 0.04 | | 32 |
| 2052 | Mississippi | 2.44 | 2.40 | 0.05 | | 33 |
| 2053 | Mississippi | 2.47 | 2.42 | 0.05 | | 34 |
| 2054 | Mississippi | 2.50 | 2.45 | 0.05 | | 35 |
| 2055 | Mississippi | 2.52 | 2.47 | 0.05 | | 36 |
| 2056 | Mississippi | 2.55 | 2.50 | 0.05 | | 37 |
| 2057 | Mississippi | 2.58 | 2.52 | 0.06 | | 38 |
| 2058 | Mississippi | 2.60 | 2.55 | 0.06 | | 39 |
| 2059 | Mississippi | 2.63 | 2.57 | 0.06 | | 40 |

**Forecast Values**

| Year | Projected Injury Costs | projected Property & Damage Costs | Forecast Period |
|---|---|---|---|
| 2010 | 3,547 | 8,848 | 0 |
| 2011 | 3,519 | 8,689 | 1 |
| 2012 | 3,758 | 9,085 | 2 |
| 2013 | 3,659 | 9,352 | 3 |
| 2014 | 3,790 | 10,090 | 4 |
| 2015 | 3,945 | 10,460 | 5 |
| 2016 | 4237 | 11634 | 6 |
| 2017 | 4287 | 11842 | 7 |
| 2018 | 4339 | 12054 | 8 |
| 2019 | 4391 | 12269 | 9 |
| 2020 | 4443 | 12489 | 10 |
| 2021 | 4496 | 12712 | 11 |
| 2022 | 4550 | 12939 | 12 |
| 2023 | 4605 | 13171 | 13 |
| 2024 | 4660 | 13406 | 14 |
| 2025 | 4716 | 13646 | 15 |
| 2026 | 4772 | 13890 | 16 |
| 2027 | 4829 | 14138 | 17 |
| 2028 | 4887 | 14391 | 18 |
| 2029 | 4946 | 14648 | 19 |
| 2030 | 5005 | 14910 | 20 |
| 2031 | 5065 | 15177 | 21 |
| 2032 | 5125 | 15448 | 22 |
| 2033 | 5187 | 15724 | 23 |
| 2034 | 5249 | 16005 | 24 |
| 2035 | 5312 | 16292 | 25 |
| 2036 | 5375 | 16583 | 26 |
| 2037 | 5440 | 16879 | 27 |
| 2038 | 5505 | 17181 | 28 |
| 2039 | 5571 | 17488 | 29 |
| 2040 | 5637 | 17801 | 30 |
| 2041 | 5705 | 18119 | 31 |
| 2042 | 5773 | 18443 | 32 |
| 2043 | 5842 | 18773 | 33 |
| 2044 | 5912 | 19109 | 34 |
| 2045 | 5983 | 19450 | 35 |
| 2046 | 6055 | 19798 | 36 |
| 2047 | 6127 | 20152 | 37 |
| 2048 | 6201 | 20513 | 38 |
| 2049 | 6275 | 20879 | 39 |
| 2050 | 6350 | 21253 | 40 |
| 2051 | 6426 | 21633 | 41 |
| 2052 | 6503 | 22019 | 42 |
| 2053 | 6581 | 22413 | 43 |
| 2054 | 6660 | 22814 | 44 |
| 2055 | 6740 | 23222 | 45 |
| 2056 | 6820 | 23637 | 46 |
| 2057 | 6902 | 24060 | 47 |
| 2058 | 6985 | 24490 | 48 |
| 2059 | 7068 | 24928 | 49 |
| 2060 | 7153 | 25373 | 50 |

Source: Motor-vehicle traffic deaths are from the National Highway Traffic Safety Administration. All motor-vehicle deaths are from the National Center for Health Statistics; motor-vehicle mileage and registration are from the Federal Highway Administration; population data are from the U.S. Census Bureau.

| Year | | Total Restore and O & M Costs: Gravel Road | Discounted Total Restore and O & M Costs: Gravel Road | Total of Development and O & M Costs: Paved Road | Discounted Total Dvelopment and O & M Costs Paved Road | Discounted Net Costs/Savings from Gravel to Paved Road | | Economic, Environmental, and Safety Benefits/a | Discounted Economic and Environmental Benefits/a | Discounted Benefits from Good State of Repair: Riverside Road/b | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0** | | | | | | | | | | $ 2,149,302 | | |
| 1 | 2019 | $ 1,375,568 | $ 1,375,568 | $ - | $ - | $ (1,375,568) | | $ 6,069,005 | $ 6,069,005 | | | |
| 2 | 2020 | $ - | $ - | $ - | $ - | $ - | | $ 6,148,124 | $ 5,745,911 | | | |
| 3 | 2021 | $ 3,630,860 | $ 3,171,334 | $ 11,074,625 | $ 9,673,006 | $ 6,501,672 | | $ 5,724,508 | $ 5,000,007 | | | |
| 4 | 2022 | $ 17,508 | $ 14,292 | $ - | $ - | $ (14,292) | | $ 5,777,491 | $ 4,716,154 | | | |
| 5 | 2023 | $ 18,064 | $ 13,781 | $ - | $ - | $ (13,781) | | $ 5,912,445 | $ 4,510,576 | | | |
| 6 | 2024 | $ 18,638 | $ 13,288 | $ - | $ - | $ (13,288) | | $ 5,550,695 | $ 3,957,569 | | | |
| 7 | 2025 | $ 19,230 | $ 12,814 | $ - | $ - | $ (12,814) | | $ 5,547,774 | $ 3,696,716 | | | |
| 8 | 2026 | $ 19,840 | $ 12,356 | $ - | $ - | $ (12,356) | | $ 5,549,068 | $ 3,455,680 | | | |
| 9 | 2027 | $ 33,703 | $ 19,616 | $ - | $ - | $ (19,616) | | $ 5,536,145 | $ 3,222,087 | | | |
| 10 | 2028 | $ 21,121 | $ 11,488 | $ - | $ - | $ (11,488) | | $ 5,535,456 | $ 3,010,921 | | | |
| 11 | 2029 | $ 21,792 | $ 11,078 | $ 6,698 | $ 3,405 | $ (7,673) | | $ 5,535,945 | $ 2,814,194 | | | |
| 12 | 2030 | $ 22,484 | $ 10,682 | $ 2,603 | $ 1,237 | $ (9,445) | | $ 5,466,073 | $ 2,596,892 | | | |
| 13 | 2031 | $ 23,198 | $ 10,300 | $ 2,686 | $ 1,193 | $ (9,107) | | $ 5,540,429 | $ 2,460,017 | | | |
| 14 | 2032 | $ 2,105,327 | $ 873,636 | $ 2,771 | $ 1,150 | $ (872,486) | | $ 5,544,408 | $ 2,300,732 | | | |
| 15 | 2033 | $ 24,695 | $ 9,577 | $ 2,859 | $ 1,109 | $ (8,468) | | $ 5,547,495 | $ 2,151,414 | | | |
| 16 | 2034 | $ 25,479 | $ 9,235 | $ 9,563 | $ 3,466 | $ (5,769) | | $ 5,555,808 | $ 2,013,680 | | | |
| 17 | 2035 | $ 26,288 | $ 8,905 | $ 3,044 | $ 1,031 | $ (7,874) | | $ 5,563,216 | $ 1,884,454 | | | |
| 18 | 2036 | $ 27,123 | $ 8,587 | $ 3,140 | $ 994 | $ (7,592) | | $ 5,571,754 | $ 1,763,875 | | | |
| 19 | 2037 | $ 47,242 | $ 13,977 | $ 3,240 | $ 959 | $ (13,019) | | $ 5,581,417 | $ 1,651,340 | | | |
| 20 | 2038 | $ 28,873 | $ 7,984 | $ 3,343 | $ 924 | $ (7,059) | | $ 5,592,200 | $ 1,546,290 | | | |
| 21 | 2039 | $ 29,791 | $ 7,698 | $ 9,525 | $ 2,461 | $ (5,237) | | $ 5,604,098 | $ 1,448,205 | | | |
| 22 | 2040 | $ 30,737 | $ 7,423 | $ 3,559 | $ 859 | $ (6,564) | | $ 5,617,106 | $ 1,356,605 | | | |
| 23 | 2041 | $ 31,713 | $ 7,158 | $ 3,672 | $ 829 | $ (6,329) | | $ 5,631,219 | $ 1,271,040 | | | |
| 24 | 2042 | $ 55,951 | $ 11,803 | $ 3,788 | $ 799 | $ (11,004) | | $ 5,646,434 | $ 1,191,098 | | | |
| 25 | 2043 | $ 33,759 | $ 6,656 | $ 3,909 | $ 771 | $ (5,885) | | $ 5,662,747 | $ 1,116,391 | | | |
| 26 | 2044 | $ 34,832 | $ 6,418 | $ 394,053 | $ 72,604 | $ 66,186 | | $ 5,680,155 | $ 1,046,564 | | | |
| 27 | 2045 | $ 3,137,201 | $ 540,212 | $ 4,161 | $ 717 | $ (539,495) | | $ 5,698,653 | $ 981,282 | | | |
| 28 | 2046 | $ 37,079 | $ 5,967 | $ 4,293 | $ 691 | $ (5,276) | | $ 5,718,239 | $ 920,238 | | | |
| 29 | 2047 | $ 66,282 | $ 9,969 | $ 4,430 | $ 666 | $ (9,303) | | $ 5,738,912 | $ 863,145 | | | |
| 30 | 2048 | $ 39,472 | $ 5,548 | $ 4,570 | $ 642 | $ (4,906) | | $ 5,760,667 | $ 809,736 | | | |
| 31 | 2049 | $ 40,726 | $ 5,350 | $ 4,715 | $ 619 | $ (4,731) | | $ 5,783,503 | $ 759,762 | | | |
| 32 | 2050 | $ 42,019 | $ 5,159 | $ 4,865 | $ 597 | $ (4,562) | | $ 5,807,418 | $ 712,994 | | | |
| 33 | 2051 | $ 43,354 | $ 4,974 | $ 5,020 | $ 576 | $ (4,399) | | $ 5,832,410 | $ 669,217 | | | |
| 34 | 2052 | $ 78,539 | $ 8,422 | $ 5,179 | $ 555 | $ (7,867) | | $ 5,858,479 | $ 628,232 | | | |
| 35 | 2053 | $ 46,151 | $ 4,625 | $ 5,344 | $ 536 | $ (4,090) | | $ 5,885,623 | $ 589,853 | | | |
| 36 | 2054 | $ 47,617 | $ 4,460 | $ 17,492 | $ 1,638 | $ (2,822) | | $ 5,913,841 | $ 553,908 | | | |
| 37 | 2055 | $ 49,130 | $ 4,301 | $ 5,688 | $ 498 | $ (3,803) | | $ 4,571,808 | $ 400,195 | | | |
| 38 | 2056 | $ 91,475 | $ 7,483 | $ 5,869 | $ 480 | $ (7,003) | | $ 4,625,271 | $ 378,388 | | | |
| 39 | 2057 | $ 4,708,877 | $ 360,026 | $ 6,055 | $ 463 | $ (359,563) | | $ 4,679,417 | $ 357,774 | | | |
| | | | | | | | | | | | | |
| | Total Cost | $ 16,151,737 | $ 6,622,148 | $ 11,610,760 | $ 9,775,476 | $ 3,153,328 | | $ 218,565,455 | $ 80,622,142 | $ - | | |

**/a** These represent the sum of benefits from net savings in reduced in-vehicle time, net savings in reduced delays and waiting in vehicle, net gains in less emissions level due to a better road , net savings from reduced loss of life, injury, and personal property, and net savings from lower vehicle operating costs on Riverside road.

/b Note these benefits were discounted at the level of 3 percent as required in the "Benefit Cost Guidance " document.

**Table 1.Discounted Costs Analysis from Riverside Road Project:Gravel to Paved**

| Summary of: Cost Analysis | |
|---|---|
| Item | Cost |
| New Construction /Asphalt Pavement | $ 8,827,020 |
| Crack Seal | $ 25,072 |
| | $ 5,530 |
| Patching | $ 93,472 |
| Mill & Overlay (1.5") | $ 303,251 |
| Total Direct Costs | $ 9,254,345 |
| Indirect/inkind Costs | $ 2,570,000 |

**Note**: An additional $2.57 million in indirect inkind O & M and labor contributions during the 39-year life of the road were substracted against the net benefits in the study. While some my argue to add thm to the benefits tally, these are real costs to county officials and were treated as such.

**Table 1.Discounted Net Savings from Costs Analysis from Riverside Road Project:Gravel to Paved**

| Summary of: Net Cost Analysis | |
|---|---|
| a) Cost increases | $ (7,802,986) |
| b) Costs savings | $ 12,343,964 |
| c) Net costs savings form gravel to paved road | $ 4,540,978 |

| Benefit Cost Criterion | Value |
|---|---|
| BCR | 7.38 |
| NPV (@.09% interest) over the 39-year herizon | $ 58,975,801 |

**Table 3. State of Good Repair Benefits from Riverside Road Project Cost**

| State of Good Repair Benefits | | | | |
|---|---|---|---|---|
| Total project Investment | Time Herizon for Evaluation Period | Life Expectancy | Residual Value | Discounted Residual Value |
| $ 11,610,760 | 36 | 50 | $ 3,251,013 | $ 2,149,302 |

**Table 2. Summary of Discounted Economic, Environmental, and Safety Benefits from Riverside Road Project Cost Analysis**

| Benefit Type | Value |
|---|---|
| Economic benefits | $ 3,153,328 |
| Economic, Environmental, and Safety Benefits | $ 80,622,142 |