Economic Evaluation Complete Report  
Riverbend v2

# Analysis Base Information

* Number of Alternatives: 2
* Planning Horizon: 50 years
* Discount Rate: 3.0%
* Disaster Rate: Every 25 years
* Disaster Magnitude: 6.25% of build cost
* Risk Preference: neutral
* Statistical Value of a Life: $7500000

# Summary (with Externalities)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Plan Title | Total Benefits ($) | Total Costs ($) | Net ($) | SIR (%) | IRR (%) | ROI (%) | Non-Disaster ROI (%) |
| Base | 0 | 0 | 0 | No Valid SIR | --- | No Valid ROI | No Valid ROI |
| Retrofit | 3,795,704 | 3,500,000 | 295,704 | 0.08 | 3.45 | 2.17 | 0.00 |
| New Bridge | 12,844,328 | 7,777,368 | 5,066,960 | 0.72 | 6.37 | 3.30 | 1.68 |

# Summary

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Plan Title | Total Benefits ($) | Total Costs ($) | Net ($) | SIR (%) | IRR (%) | ROI (%) | Non-Disaster ROI (%) |
| Base | 0 | 0 | 0 | No Valid SIR | --- | No Valid ROI | No Valid ROI |
| Retrofit | 3,795,704 | 3,500,000 | 295,704 | 0.08 | 3.45 | 2.17 | 0.00 |
| New Bridge | 8,859,566 | 7,777,368 | 1,082,198 | 0.15 | 3.79 | 2.28 | 0.66 |

# Base

### Alternative 0

## Fatalities Averted

Number of Statistical Lives Saved: 0.00

Value of Statistical Lives Saved: $0

## Disaster-Related Benefits

|  |  |  |
| --- | --- | --- |
| Title | Amount ($) | Effective Present Value ($) |
| Response and Recovery Cost Reductions |  | 0 |
| Direct Losses Prevented |  | 0 |
| Indirect Losses Prevented |  | 0 |
| Total |  | 0 |

## Resilience Dividend

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| One Time Cost Reductions |  |  |  | 0 |
| Recurring Cost Reductions |  |  |  | 0 |
| Total |  |  |  | 0 |

## Costs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| Direct Costs |  |  |  | 0 |
| Indirect Costs |  |  |  | 0 |
| OMR Costs: One-Time |  |  |  | 0 |
| OMR Costs: Recurring |  |  |  | 0 |
| Total |  |  |  | 0 |

## Externalities

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| One Time Positive Externalities |  |  |  | 0 |
| Recurring Positive Externalities |  |  |  | 0 |
| One Time Negative Externalities |  |  |  | 0 |
| Recurring Negative Externalities |  |  |  | 0 |
| Total |  |  |  | 0 |

# Retrofit

### Alternative 1

## Fatalities Averted

Number of Statistical Lives Saved: 0.20

Value of Statistical Lives Saved: $788,581

Description: Estimated reduction in the number of fatalities due to a seismic event with a 25 year return period.

## Disaster-Related Benefits

|  |  |  |
| --- | --- | --- |
| Title | Amount ($) | Effective Present Value ($) |
| Response and Recovery Cost Reductions |  | 630,865 |
| Retrofit Response and Recovery | 600,000 | 630,865 |
| Direct Losses Prevented |  | 273,375 |
| Retrofit Direct Loss Reduction | 260,000 | 273,375 |
| Indirect Losses Prevented |  | 2,102,883 |
| Retrofit Indirect Loss Reduction | 2,000,000 | 2,102,883 |
| Total |  | 3,007,123 |

Retrofit Indirect Loss Reduction: Estimated reduction in indirect losses as a result of a seismic event with a 25 year return period.

Retrofit Response and Recovery: Estimated reduction in response in recovery costs for a seismic event with a 25 year return period.

Retrofit Direct Loss Reduction: Estimated reduction in direct losses as a result of a seismic event with a 25 year return period.

## Resilience Dividend

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| One Time Cost Reductions |  |  |  | 0 |
| Recurring Cost Reductions |  |  |  | 0 |
| Total |  |  |  | 0 |

## Costs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| Direct Costs |  |  |  | 3,000,000 |
| Retrofit Direct Cost | Start-Up | N/A | 3,000,000 | 3,000,000 |
| Indirect Costs |  |  |  | 500,000 |
| Retrofit Indirect Cost | Start-Up | N/A | 500,000 | 500,000 |
| OMR Costs: One-Time |  |  |  | 0 |
| OMR Costs: Recurring |  |  |  | 0 |
| Total |  |  |  | 3,500,000 |

Retrofit Indirect Cost: Indirect costs for retrofitting the old bridge. This includes indirect costs of the retrofit actions as well as costs associated with diverted traffic.

Retrofit Direct Cost: Cost to retrofit the old bridge.

## Externalities

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| One Time Positive Externalities |  |  |  | 0 |
| Recurring Positive Externalities |  |  |  | 0 |
| One Time Negative Externalities |  |  |  | 0 |
| Recurring Negative Externalities |  |  |  | 0 |
| Total |  |  |  | 0 |

# New Bridge

### Alternative 2

## Fatalities Averted

Number of Statistical Lives Saved: 0.40

Value of Statistical Lives Saved: $1,577,162

Description: Estimated reduction in the number of fatalities due to a seismic event with a 25 year return period.

## Disaster-Related Benefits

|  |  |  |
| --- | --- | --- |
| Title | Amount ($) | Effective Present Value ($) |
| Response and Recovery Cost Reductions |  | 1,051,442 |
| New Bridge Response and Recovery | 1,000,000 | 1,051,442 |
| Direct Losses Prevented |  | 0 |
| Indirect Losses Prevented |  | 3,680,045 |
| New Bridge Indirect Loss Reduction | 3,500,000 | 3,680,045 |
| Total |  | 4,731,487 |

New Bridge Indirect Loss Reduction: Estimated reduction in indirect losses as a result of a seismic event with a 25 year return period.

New Bridge Response and Recovery: Estimated reduction in response in recovery costs for a seismic event with a 25 year return period.

## Resilience Dividend

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| One Time Cost Reductions |  |  |  | 0 |
| Recurring Cost Reductions |  |  |  | 2,550,917 |
| Reduced Commute Time | 1 | 1 | 100,000 | 2,550,917 |
| Total |  |  |  | 2,550,917 |

Reduced Commute Time: Estimated benefit incurred due to the reduction of vehicle-hours in traffic as a result of an additional crossing. This benefit is separate from the externalities which focus on community level environmental and social impacts which are not internalized. Instead represent the value of a reduction in travel time itself internalized into the design process.,

## Costs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| Direct Costs |  |  |  | 6,750,000 |
| Additional Roadwork Direct Cost | Start-Up | N/A | 2,500,000 | 2,500,000 |
| Bridge Construction Direct Cost | Start-Up | N/A | 4,250,000 | 4,250,000 |
| Indirect Costs |  |  |  | 295,000 |
| Additional Roadwork Indirect Cost | Start-Up | N/A | 120,000 | 120,000 |
| Bridge Construction Indirect Cost | Start-Up | N/A | 175,000 | 175,000 |
| OMR Costs: One-Time |  |  |  | 0 |
| OMR Costs: Recurring |  |  |  | 732,368 |
| New Bridge OMR | 1 | 1 | 25,000 | 637,729 |
| Additional Roadwork OMR | 1 | 1 | 3,710 | 94,639 |
| Total |  |  |  | 7,777,368 |

New Bridge OMR: Cost of operating and maintaining new bridge. Includes costs of inspection as well as maintenance and deck and superstructure repair.

Additional Roadwork Indirect Cost: Indirect costs to construct and update roadways to accommodate the new bridge.

Bridge Construction Indirect Cost: Indirect costs associated with the construction of the new bridge including the costs of an environmental impact study.

Additional Roadwork Direct Cost: Cost to construct and update roadways to accommodate the new bridge.

Bridge Construction Direct Cost: Cost of new bridge including any right of way or land acquisition costs.

Additional Roadwork OMR: Cost of operations and maintenance for upgraded and newly constructed roads to accommodate the new bridge.

## Externalities

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Title | Start Year | Recurrence (Years) | Amount ($) | Effective Present Value ($) |
| One Time Positive Externalities |  |  |  | 0 |
| Recurring Positive Externalities |  |  |  | 3,984,762 |
| Greenhous Gas Emissions | 1.0 | 1.0 | 77,329 | 1,972,598 |
| Water Pollution | 1.0 | 1.0 | 39,081 | 996,924 |
| Better linking of communities | 1.0 | 1.0 | 39,799 | 1,015,239 |
| One Time Negative Externalities |  |  |  | 0 |
| Recurring Negative Externalities |  |  |  | 0 |
| Total |  |  |  | 3,984,762 |

Greenhous Gas Emissions: The reduction in greenhouse gas emissions incurred due to fewer vehicle-hours in traffic over the year. This assumes that traffic remains at pre-action levels (i.e. a more efficient road network won't attract more motorists).,

Water Pollution: The reduction in water pollution incurred due to fewer vehicle-hours in traffic over the year. This assumes that traffic remains at pre-action levels (i.e. a more efficient road network won't attract more motorists).,

Better linking of communities: More efficient traffic flow and the inclusion of a pedestrian crossing help strengthen the link between communities on the two sides of the river.,