



City of Grand Junction and Mesa County

The 29 Road Project

Benefit-Cost Analysis

Summary Results with 7% Discount Rate

Net Cost of Project	\$	20,365,015.70
Present Value of Benefits	\$	3,983,400,716.24
Net Present Value	\$	3,963,035,700.54
Benefit/Cost Ratio		<u>195.60</u>

<i>Present Value of Itemized Benefits</i>		
Vehicle Operation Benefits	\$	80,737,043.78
Vehicle Travel Time Benefits	\$	3,854,234,654.22
Transit Time Benefits	\$	32,056,479.21
Carbon Reduction Benefits	\$	8,489.14
Safety Benefits	\$	16,364,049.88
Present Value of Total Benefits	\$	3,983,400,716.24

<i>Present Value of Itemized Costs</i>		
Capital Cost Differential	\$	20,000,000.00
Maintenance Cost Differential	\$	365,015.70
Remaining Capital Value Differential	\$	-
Present Value of Total Costs	\$	20,365,015.70

Assuming 3% Discount Rate

Net Cost of Project	\$	20,578,467.54
Present Value of Benefits	\$	5,676,900,030.56
Net Present Value	\$	5,656,321,563.02
Benefit/Cost Ratio		<u>275.87</u>

<i>Present Value of Itemized Benefits</i>		
Vehicle Operation Benefits	\$	77,393,470.51
Travel Time Benefits	\$	5,529,075,915.95
Transit Time Benefits	\$	47,835,928.65
Carbon Benefits	\$	12,178.07
Safety Benefits	\$	22,582,537.36
Present Value of Total Benefits	\$	5,676,900,030.56

<i>Present Value of Itemized Costs</i>		
Capital Cost Differential	\$	20,000,000.00
Maintenance Cost Differential	\$	578,467.54
Remaining Capital Value Differential	\$	-
Present Value of Total Costs	\$	20,578,467.54

Vehicle-Miles Traveled

Important Note: Due to a present value calculation error, the previous Benefit-Cost Analysis stated an incorrect present value for Vehicle Operation and Time Travel Benefits. The error has been corrected, and the correct present value of the savings is listed in red.

7%

Year	Vehicle Miles Per Day (2), (3)		Difference in VMT	Annual Savings (1)	Present Value of Savings	
	Currently	W/ Viaduct				
2010	1	5,016,412.34	4,964,550.70	51,861.64	\$ 4,463,212.83	3,404,963.70
2011	2	5,104,412.41	5,051,640.99	52,771.42	\$ 4,541,508.44	3,464,695.04
2012	3	5,193,956.21	5,140,259.05	53,697.16	\$ 4,621,177.54	3,525,474.22
2013	4	5,285,070.83	5,230,431.69	54,639.14	\$ 4,702,244.23	3,587,319.61
2014	5	5,377,783.83	5,322,186.18	55,597.64	\$ 4,784,733.03	3,650,249.92
2015	6	5,472,123.23	5,415,550.27	56,572.96	\$ 4,868,668.88	3,714,284.18
2016	7	5,568,117.58	5,510,552.19	57,565.39	\$ 4,954,077.17	3,779,441.75
2017	8	5,665,795.90	5,607,220.68	58,575.22	\$ 5,040,983.73	3,845,742.35
2018	9	5,765,187.74	5,705,584.96	59,602.78	\$ 5,129,414.84	3,913,206.02
2019	10	5,866,323.15	5,805,674.79	60,648.35	\$ 5,219,397.25	3,981,853.17
2020	11	5,969,232.72	5,907,520.45	61,712.27	\$ 5,310,958.17	4,051,704.56
2021	12	6,073,947.57	6,011,152.72	62,794.86	\$ 5,404,125.29	4,122,781.31
2022	13	6,180,499.38	6,116,602.95	63,896.43	\$ 5,498,926.78	4,195,104.92
2023	14	6,288,920.37	6,223,903.04	65,017.33	\$ 5,595,391.33	4,268,697.26
2024	15	6,399,243.33	6,333,085.44	66,157.89	\$ 5,693,548.10	4,343,580.59
2025	16	6,511,501.61	6,444,183.15	67,318.46	\$ 5,793,426.78	4,419,777.55
2026	17	6,625,729.19	6,557,229.79	68,499.39	\$ 5,895,057.57	4,497,311.20
2027	18	6,741,960.59	6,672,259.55	69,701.04	\$ 5,998,471.21	4,576,204.97
2028	19	6,860,230.97	6,789,307.21	70,923.76	\$ 6,103,698.98	4,656,482.73
2029	20	6,980,576.10	6,908,408.16	72,167.94	\$ 6,210,772.71	4,738,168.76
						\$ 80,737,043.78

1. Composite costs per-hour were adopted from the standard vehicle operating costs in Appendix A1 from "Benefit-Cost Analysis for Transportation Projects," Minnesota Department of Transportation

Vehicle Operating Costs (Dollars per mile)

Auto	\$	0.30
Truck	\$	0.92

Composite: \$ 0.33 **Assuming 95/5 split.**

2. Vehicle-Miles Traveled data obtained from "2035 Regional Travel Demand Model."

3. 2010-2029 VMT projections reflect annual growth rate of 1.733% (Based upon 30 year projected growth rate of 52%: "2035 Regional Travel Demand Model.")

3%

Year	Vehicle Miles Per Day		Difference in VMT	Annual Savings (1)	Present Value of Savings	
	Currently	W/ Viaduct				
2010	1	5,016,412.34	4,964,550.70	51,861.64	\$ 4,463,212.83	4,333,216.34
2011	2	5,104,412.41	5,051,640.99	52,771.42	\$ 4,541,508.44	4,280,807.27
2012	3	5,193,956.21	5,140,259.05	53,697.16	\$ 4,621,177.54	4,229,032.08
2013	4	5,285,070.83	5,230,431.69	54,639.14	\$ 4,702,244.23	4,177,883.09
2014	5	5,377,783.83	5,322,186.18	55,597.64	\$ 4,784,733.03	4,127,352.74
2015	6	5,472,123.23	5,415,550.27	56,572.96	\$ 4,868,668.88	4,077,433.54
2016	7	5,568,117.58	5,510,552.19	57,565.39	\$ 4,954,077.17	4,028,118.09
2017	8	5,665,795.90	5,607,220.68	58,575.22	\$ 5,040,983.73	3,979,399.10
2018	9	5,765,187.74	5,705,584.96	59,602.78	\$ 5,129,414.84	3,931,269.36
2019	10	5,866,323.15	5,805,674.79	60,648.35	\$ 5,219,397.25	3,883,721.73
2020	11	5,969,232.72	5,907,520.45	61,712.27	\$ 5,310,958.17	3,836,749.18
2021	12	6,073,947.57	6,011,152.72	62,794.86	\$ 5,404,125.29	3,790,344.75
2022	13	6,180,499.38	6,116,602.95	63,896.43	\$ 5,498,926.78	3,744,501.56
2023	14	6,288,920.37	6,223,903.04	65,017.33	\$ 5,595,391.33	3,699,212.84
2024	15	6,399,243.33	6,333,085.44	66,157.89	\$ 5,693,548.10	3,654,471.87
2025	16	6,511,501.61	6,444,183.15	67,318.46	\$ 5,793,426.78	3,610,272.03
2026	17	6,625,729.19	6,557,229.79	68,499.39	\$ 5,895,057.57	3,566,606.78
2027	18	6,741,960.59	6,672,259.55	69,701.04	\$ 5,998,471.21	3,523,469.65
2028	19	6,860,230.97	6,789,307.21	70,923.76	\$ 6,103,698.98	3,480,854.24
2029	20	6,980,576.10	6,908,408.16	72,167.94	\$ 6,210,772.71	3,438,754.26
						\$ 77,393,470.51

Assumptions:

Growth Rate of 52% fir traffic volumns between 2005-2035. (2035 Transportation Plan, pg 16.)

Utilizing a constant growth factor, this would relate to an annual increase in growth of 1.733%

Vehicle-Hours Traveled

Important Note: Due to a calculation error, the previous Benefit-Cost Analysis stated an incorrect present value for Vehicle Operation and Time Travel Benefits. The error has been corrected, and the correct present value of the savings is listed in red.

7%						
Year	Vehicle Hours per Day (1), (2)			Annual Savings (1)	Present Value of Savings	
	Currently	W/ Viaduct	Difference in VHT			
2010	1	566,948.31	517,176.69	49,771.62	\$ 318,856,906.33	\$ 297,997,108.72
2011	2	576,893.96	526,249.23	50,644.74	\$ 324,450,431.77	\$ 283,387,572.51
2012	3	587,014.09	535,480.92	51,533.17	\$ 330,142,081.25	\$ 269,494,280.00
2013	4	597,311.74	544,874.56	52,437.18	\$ 335,933,576.10	\$ 256,282,116.77
2014	5	607,790.04	554,432.98	53,357.06	\$ 341,826,667.86	\$ 243,717,689.96
2015	6	618,452.16	564,159.08	54,293.07	\$ 347,823,138.77	\$ 231,769,243.78
2016	7	629,301.31	574,055.80	55,245.50	\$ 353,924,802.36	\$ 220,406,579.32
2017	8	640,340.78	584,126.14	56,214.65	\$ 360,133,503.97	\$ 209,600,978.17
2018	9	651,573.92	594,373.13	57,200.79	\$ 366,451,121.30	\$ 199,325,129.88
2019	10	663,004.11	604,799.88	58,204.23	\$ 372,879,565.00	\$ 189,553,062.92
2020	11	674,634.81	615,409.54	59,225.27	\$ 379,420,779.24	\$ 180,260,079.01
2021	12	686,469.55	626,205.32	60,264.23	\$ 386,076,742.27	\$ 171,422,690.75
2022	13	698,511.89	637,190.49	61,321.41	\$ 392,849,467.09	\$ 163,018,562.21
2023	14	710,765.49	648,368.36	62,397.13	\$ 399,741,001.96	\$ 155,026,452.50
2024	15	723,234.05	659,742.31	63,491.73	\$ 406,753,431.11	\$ 147,426,162.08
2025	16	735,921.33	671,315.80	64,605.53	\$ 413,888,875.32	\$ 140,198,481.71
2026	17	748,831.18	683,092.31	65,738.87	\$ 421,149,492.57	\$ 133,325,143.91
2027	18	761,967.50	695,075.41	66,892.09	\$ 428,537,478.71	\$ 126,788,776.74
2028	19	775,334.26	707,268.72	68,065.54	\$ 436,055,068.08	\$ 120,572,859.98
2029	20	788,935.51	719,675.94	69,259.57	\$ 443,704,534.25	\$ 114,661,683.29
						\$ 3,854,234,654.22

- Using the suggested vehicle cost per hour in Table VIII-5 on page VIII-60 of the Final Regulatory Impact Analysis of the National Highway Traffic Safety Administrations' rulemaking on Corporate Average Fuel Economy for MY 2011 Passenger Cars and Light Trucks
Value of Travel Time Per Hour: \$ 24.64
- Vehicle-Hours Traveled data obtained from "2035 Regional Travel Demand Model."
- 2010-2029 VHT projections reflect annual growth rate of 1.733% (Based upon 30 year projected growth rate of 52%: "2035 Regional Travel Demand Model.")

3%						
Year	Vehicle Hours per Day			Annual Savings (1)	Present Value of Savings	
	Currently	W/ Viaduct	Difference in VHT			
2010	1	566,948.31	517,176.69	49,771.62	\$ 318,856,906.33	309,569,811.97
2011	2	576,893.96	526,249.23	50,644.74	\$ 324,450,431.77	305,825,649.70
2012	3	587,014.09	535,480.92	51,533.17	\$ 330,142,081.25	302,126,772.06
2013	4	597,311.74	544,874.56	52,437.18	\$ 335,933,576.10	298,472,631.33
2014	5	607,790.04	554,432.98	53,357.06	\$ 341,826,667.86	294,862,686.43
2015	6	618,452.16	564,159.08	54,293.07	\$ 347,823,138.77	291,296,402.83
2016	7	629,301.31	574,055.80	55,245.50	\$ 353,924,802.36	287,773,252.45
2017	8	640,340.78	584,126.14	56,214.65	\$ 360,133,503.97	284,292,713.62
2018	9	651,573.92	594,373.13	57,200.79	\$ 366,451,121.30	280,854,270.95
2019	10	663,004.11	604,799.88	58,204.23	\$ 372,879,565.00	277,457,415.31
2020	11	674,634.81	615,409.54	59,225.27	\$ 379,420,779.24	274,101,643.70
2021	12	686,469.55	626,205.32	60,264.23	\$ 386,076,742.27	270,786,459.24
2022	13	698,511.89	637,190.49	61,321.41	\$ 392,849,467.09	267,511,371.03
2023	14	710,765.49	648,368.36	62,397.13	\$ 399,741,001.96	264,275,894.11
2024	15	723,234.05	659,742.31	63,491.73	\$ 406,753,431.11	261,079,549.40
2025	16	735,921.33	671,315.80	64,605.53	\$ 413,888,875.32	257,921,863.61
2026	17	748,831.18	683,092.31	65,738.87	\$ 421,149,492.57	254,802,369.17
2027	18	761,967.50	695,075.41	66,892.09	\$ 428,537,478.71	251,720,604.15
2028	19	775,334.26	707,268.72	68,065.54	\$ 436,055,068.08	248,676,112.25
2029	20	788,935.51	719,675.94	69,259.57	\$ 443,704,534.25	245,668,442.64
						\$ 5,529,075,915.95

- Using the suggested vehicle cost per hour in Table VIII-5 on page VIII-60 of the Final Regulatory Impact Analysis of the National Highway Traffic Safety Administrations' rulemaking on Corporate Average Fuel Economy for MY 2011
Value of Travel Time Per Hour: \$ 24.64

Reduction in Carbon Emissions

7%

	Year	Annual Miles Reduced	Gasoline Gallon Reduction	Kilogram Reduction in CO2	Metric Ton Reduction	Social Cost of Carbon Benefit	Present Value
1	2011	52,771.42	2,418.37	21,281.69	21.28	\$ 702.30	656.35
2	2012	53,697.16	2,460.80	21,655.02	21.66	\$ 714.62	624.17
3	2013	54,639.14	2,503.97	22,034.90	22.03	\$ 727.15	593.57
4	2014	55,597.64	2,547.89	22,421.45	22.42	\$ 739.91	564.47
5	2015	56,572.96	2,592.59	22,814.77	22.81	\$ 752.89	536.80
6	2016	57,565.39	2,638.07	23,215.00	23.22	\$ 766.10	510.48
7	2017	58,575.22	2,684.35	23,622.25	23.62	\$ 779.53	485.45
8	2018	59,602.78	2,731.44	24,036.64	24.04	\$ 793.21	461.65
9	2019	60,648.35	2,779.35	24,458.30	24.46	\$ 807.12	439.02
10	2020	61,712.27	2,828.11	24,887.36	24.89	\$ 821.28	417.50
11	2021	62,794.86	2,877.72	25,323.94	25.32	\$ 835.69	397.03
12	2022	63,896.43	2,928.20	25,768.19	25.77	\$ 850.35	377.57
13	2023	65,017.33	2,979.57	26,220.22	26.22	\$ 865.27	359.06
14	2024	66,157.89	3,031.84	26,680.19	26.68	\$ 880.45	341.45
15	2025	67,318.46	3,085.03	27,148.23	27.15	\$ 895.89	324.71
16	2026	68,499.39	3,139.14	27,624.47	27.62	\$ 911.61	308.79
17	2027	69,701.04	3,194.21	28,109.07	28.11	\$ 927.60	293.65
18	2028	70,923.76	3,250.25	28,602.17	28.60	\$ 943.87	279.26
19	2029	72,167.94	3,307.26	29,103.93	29.10	\$ 960.43	265.57
20	2030	73440.66427	3,365.59	29,617.19	29.62	\$ 977.37	252.57
							\$ 8,489.14

Assuming:

\$33 per metric ton of carbon (Federal Register Notice)

Fuel Economic Estimates (FHWA "Highway Statistics, 2001")

Passenger Car: 22.1 miles per gallon

Light Duty Truck: 17.6 miles per gallon

Assuming a 5%/95% split.

<http://www.epa.gov/OMS/climate/420f05004.pdf>

3%

	Year	Annual Miles Reduced	Gasoline Gallon Reduction	Kilogram Reduction in CO2	Metric Ton Reduction	Social Cost of Carbon Benefit	Present Value
1	2011	52,771.42	2,418.37	21,281.69	21.28	\$ 702.30	681.84
2	2012	53,697.16	2,460.80	21,655.02	21.66	\$ 714.62	673.59
3	2013	54,639.14	2,503.97	22,034.90	22.03	\$ 727.15	665.45
4	2014	55,597.64	2,547.89	22,421.45	22.42	\$ 739.91	657.40
5	2015	56,572.96	2,592.59	22,814.77	22.81	\$ 752.89	649.45
6	2016	57,565.39	2,638.07	23,215.00	23.22	\$ 766.10	641.59
7	2017	58,575.22	2,684.35	23,622.25	23.62	\$ 779.53	633.83
8	2018	59,602.78	2,731.44	24,036.64	24.04	\$ 793.21	626.17
9	2019	60,648.35	2,779.35	24,458.30	24.46	\$ 807.12	618.59
10	2020	61,712.27	2,828.11	24,887.36	24.89	\$ 821.28	611.11
11	2021	62,794.86	2,877.72	25,323.94	25.32	\$ 835.69	603.72
12	2022	63,896.43	2,928.20	25,768.19	25.77	\$ 850.35	596.42
13	2023	65,017.33	2,979.57	26,220.22	26.22	\$ 865.27	589.20
14	2024	66,157.89	3,031.84	26,680.19	26.68	\$ 880.45	582.08
15	2025	67,318.46	3,085.03	27,148.23	27.15	\$ 895.89	575.04
16	2026	68,499.39	3,139.14	27,624.47	27.62	\$ 911.61	568.08
17	2027	69,701.04	3,194.21	28,109.07	28.11	\$ 927.60	561.21
18	2028	70,923.76	3,250.25	28,602.17	28.60	\$ 943.87	554.43
19	2029	72,167.94	3,307.26	29,103.93	29.10	\$ 960.43	547.72
20	2030	73440.66427	3,365.59	29,617.19	29.62	\$ 977.37	541.14
							\$ 12,178.07

7%

		Daily Transit			
		Hours Reduced	Annual Transit Hour	Annual Economic	
		(1)	Reduction	Benefit	Present Value
1	2011	331.00	86,060.00	2,039,622.00	1,906,188.79
2	2012	347.55	90,363.00	2,141,603.10	1,870,559.09
3	2013	364.93	94,881.15	2,248,683.26	1,835,595.37
4	2014	383.17	99,625.21	2,361,117.42	1,801,285.17
5	2015	402.33	104,606.47	2,479,173.29	1,767,616.29
6	2016	422.45	109,836.79	2,603,131.95	1,734,576.73
7	2017	443.57	115,328.63	2,733,288.55	1,702,154.74
8	2018	465.75	121,095.06	2,869,952.98	1,670,338.76
9	2019	489.04	127,149.82	3,013,450.63	1,639,117.48
10	2020	513.49	133,507.31	3,164,123.16	1,608,479.77
11	2021	539.16	140,182.67	3,322,329.32	1,578,414.73
12	2022	566.12	147,191.81	3,488,445.78	1,548,911.65
13	2023	594.43	154,551.40	3,662,868.07	1,519,960.03
14	2024	624.15	162,278.97	3,846,011.47	1,491,549.56
15	2025	655.36	170,392.91	4,038,312.05	1,463,670.13
16	2026	688.13	178,912.56	4,240,227.65	1,436,311.81
17	2027	722.53	187,858.19	4,452,239.03	1,409,464.86
18	2028	758.66	197,251.10	4,674,850.99	1,383,119.72
19	2029	796.59	207,113.65	4,908,593.53	1,357,267.02
20	2030	836.42	217,469.33	5,154,023.21	1,331,897.54
					\$ 32,056,479.21

1. Transit hour reduction based upon the following:

Decrease in transit time for specified routes: 1 hour

Daily Ridership By Route:

6	123
10	208

<http://gvt.mesacounty.us/uploadedFiles/gvt/pdf/GVT%20Onboard%20Survey%20Final%20Report.pdf>

Economic Value of Time: 23.7 (BLS)

Estimated Annual Increase in Ridership: 5%

3%

		Daily Transit			
		Hours Reduced	Annual Transit Hour	Annual Economic	
		(1)	Reduction	Benefit	Present Value
1	2011	331.00	86,060.00	2,039,622.00	1,980,215.53
2	2012	347.55	90,363.00	2,141,603.10	2,018,666.32
3	2013	364.93	94,881.15	2,248,683.26	2,057,863.73
4	2014	383.17	99,625.21	2,361,117.42	2,097,822.24
5	2015	402.33	104,606.47	2,479,173.29	2,138,556.66
6	2016	422.45	109,836.79	2,603,131.95	2,180,082.03
7	2017	443.57	115,328.63	2,733,288.55	2,222,413.72
8	2018	465.75	121,095.06	2,869,952.98	2,265,567.38
9	2019	489.04	127,149.82	3,013,450.63	2,309,558.98

10	2020	513.49	133,507.31	3,164,123.16	2,354,404.79
11	2021	539.16	140,182.67	3,322,329.32	2,400,121.39
12	2022	566.12	147,191.81	3,488,445.78	2,446,725.68
13	2023	594.43	154,551.40	3,662,868.07	2,494,234.92
14	2024	624.15	162,278.97	3,846,011.47	2,542,666.67
15	2025	655.36	170,392.91	4,038,312.05	2,592,038.84
16	2026	688.13	178,912.56	4,240,227.65	2,642,369.69
17	2027	722.53	187,858.19	4,452,239.03	2,693,677.84
18	2028	758.66	197,251.10	4,674,850.99	2,745,982.26
19	2029	796.59	207,113.65	4,908,593.53	2,799,302.30
20	2030	836.42	217,469.33	5,154,023.21	2,853,657.69
					<u>\$ 47,835,928.65</u>

Project: 29 Road and I-70B

Subject: FHWA Benefit-to-Cost Analysis Worksheet At-Grade vs Grade Separated

National Cooperative Highway Research Program Report #50 Accident Prediction Formula

Source: Railroad-Highway Grade Crossing Handbook, Revised Second Edition 2007.

Expected Accident Frequency = A x B x Current Trains per day

1. Expected Accident Frequency

A Factor based on Vehicles per day (10 yr ADT) = 30,000 ADT	0.0348		
B factor based on existing devices = Gates, urban (.08)	0.08		
Current Trains per day	20		
Expected Accident Frequency	0.0556	One accident every	18.0 years

2. Accident type

% Fatal	70%
% Injury accidents	20%
% Property Damage Only	10%

3. Annual safety benefits in number of accidents prevented:

Severity Actual - Expected = Annual Benefit	At Grade	Grade Separated	Benefit
a) Fatal accidents (fatalities)	0.0389	0	0.0389
b) Injury accidents	0.0111	0	0.0111
c) Property Damage Only (PDO) accidents (involvements)	0.0056	0	0.0056
Total Expected Accident Frequency	0.0556	0	0.0556

4. Severity Cost

a) Fatal accident (fatality)	\$ 6,000,000
b) Injury accident (Severe injury) - .1875	\$ 1,125,000
c) Property Damage Only (PDO) accidents (involvement)	\$ 10,000

5. Annual safety benefits in dollars saved

Fatals (3a) x (4a)	\$ 233,567
Injury (3b) x (4b)	\$ 12,513
PDO (3c) x (4c)	\$ 56
Total Benefits	\$ 246,135

Population growth rate in this area

2.20%

7%						
	Year	Current losses	Potential losses W/ Viaduct	Annual Benefit	Present Value of Savings	
2010	1	\$246,135	\$0	\$246,135	\$246,135	
2011	2	\$251,550	\$0	\$251,550	\$235,094	
2012	3	\$257,084	\$0	\$257,084	\$224,547	
2013	4	\$262,740	\$0	\$262,740	\$214,474	
2014	5	\$268,520	\$0	\$268,520	\$204,853	
2015	6	\$274,428	\$0	\$274,428	\$195,663	
2016	7	\$280,465	\$0	\$280,465	\$186,886	
2017	8	\$286,635	\$0	\$286,635	\$178,502	
2018	9	\$292,941	\$0	\$292,941	\$170,495	
2019	10	\$299,386	\$0	\$299,386	\$162,846	
2020	11	\$305,973	\$0	\$305,973	\$155,541	
2021	12	\$312,704	\$0	\$312,704	\$148,563	
2022	13	\$319,584	\$0	\$319,584	\$141,899	
2023	14	\$326,614	\$0	\$326,614	\$135,533	
2024	15	\$333,800	\$0	\$333,800	\$129,453	
2025	16	\$341,144	\$0	\$341,144	\$123,646	
2026	17	\$348,649	\$0	\$348,649	\$118,099	
2027	18	\$356,319	\$0	\$356,319	\$112,801	
2028	19	\$364,158	\$0	\$364,158	\$107,741	
2029	20	\$372,169	\$0	\$372,169	\$102,908	
					\$3,295,681	

3%						
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	Year	Current losses	Potential losses W/ Viaduct	Annual Benefit	Present Value of Savings
2010	1	\$246,135	\$0	\$246,135	\$246,135
2011	2	\$251,550	\$0	\$251,550	\$244,223
2012	3	\$257,084	\$0	\$257,084	\$242,327
2013	4	\$262,740	\$0	\$262,740	\$240,444
2014	5	\$268,520	\$0	\$268,520	\$238,577
2015	6	\$274,428	\$0	\$274,428	\$236,724
2016	7	\$280,465	\$0	\$280,465	\$234,885
2017	8	\$286,635	\$0	\$286,635	\$233,061
2018	9	\$292,941	\$0	\$292,941	\$231,251
2019	10	\$299,386	\$0	\$299,386	\$229,455
2020	11	\$305,973	\$0	\$305,973	\$227,672
2021	12	\$312,704	\$0	\$312,704	\$225,904
2022	13	\$319,584	\$0	\$319,584	\$224,149
2023	14	\$326,614	\$0	\$326,614	\$222,409
2024	15	\$333,800	\$0	\$333,800	\$220,681
2025	16	\$341,144	\$0	\$341,144	\$218,967
2026	17	\$348,649	\$0	\$348,649	\$217,266
2027	18	\$356,319	\$0	\$356,319	\$215,579
2028	19	\$364,158	\$0	\$364,158	\$213,904
2029	20	\$372,169	\$0	\$372,169	\$212,243
					\$4,575,857

Goal - NFPA 1710 Standard 240 seconds (4 minutes)

Avg fire response times to Pear Park area for 2008	8 minutes
Number of 2008 Fire calls in Pear Park area	17
Structural fire calls per year	4
	% damaged Value of damage
Structure damage rate of fire calls if reached within 8 minutes	40% \$ 80,000
Structure damage rate of fire calls if reached within 6 minutes	20% \$ 40,000
Avg structure value	\$ 200,000
Improvement in 2 minute reduction in response times	\$ 40,000
Total value of improvement per year	\$ 160,000
Population growth rate (Fire increase) in this area	2.20%

7%

	Year	Current losses	Potential losses W/ Viaduct	Annual Benefit to Pear Park Community	Present Value of Savings
2010	1	\$320,000	\$160,000	\$160,000	\$160,000
2011	2	\$327,040	\$163,520	\$163,520	\$152,822
2012	3	\$334,235	\$167,117	\$167,117	\$145,967
2013	4	\$341,588	\$170,794	\$170,794	\$139,419
2014	5	\$349,103	\$174,551	\$174,551	\$133,164
2015	6	\$356,783	\$178,392	\$178,392	\$127,191
2016	7	\$364,632	\$182,316	\$182,316	\$121,485
2017	8	\$372,654	\$186,327	\$186,327	\$116,035
2018	9	\$380,853	\$190,426	\$190,426	\$110,830
2019	10	\$389,232	\$194,616	\$194,616	\$105,858
2020	11	\$397,795	\$198,897	\$198,897	\$101,109
2021	12	\$406,546	\$203,273	\$203,273	\$96,574
2022	13	\$415,490	\$207,745	\$207,745	\$92,241
2023	14	\$424,631	\$212,315	\$212,315	\$88,103
2024	15	\$433,973	\$216,986	\$216,986	\$84,151
2025	16	\$443,520	\$221,760	\$221,760	\$80,376
2026	17	\$453,278	\$226,639	\$226,639	\$76,770
2027	18	\$463,250	\$231,625	\$231,625	\$73,327
2028	19	\$473,441	\$236,721	\$236,721	\$70,037
2029	20	\$483,857	\$241,928	\$241,928	\$66,895
					\$2,142,355

3%

	Year	Current benefit	W/ Viaduct	Annual Benefit to Pear Park Community	Present Value of Savings
2010	1	\$320,000	\$160,000	\$160,000	\$160,000
2011	2	\$327,040	\$163,520	\$163,520	\$158,757
2012	3	\$334,235	\$167,117	\$167,117	\$157,524
2013	4	\$341,588	\$170,794	\$170,794	\$156,301
2014	5	\$349,103	\$174,551	\$174,551	\$155,087
2015	6	\$356,783	\$178,392	\$178,392	\$153,882
2016	7	\$364,632	\$182,316	\$182,316	\$152,687
2017	8	\$372,654	\$186,327	\$186,327	\$151,501
2018	9	\$380,853	\$190,426	\$190,426	\$150,324
2019	10	\$389,232	\$194,616	\$194,616	\$149,157
2020	11	\$397,795	\$198,897	\$198,897	\$147,998
2021	12	\$406,546	\$203,273	\$203,273	\$146,849
2022	13	\$415,490	\$207,745	\$207,745	\$145,708
2023	14	\$424,631	\$212,315	\$212,315	\$144,577
2024	15	\$433,973	\$216,986	\$216,986	\$143,454
2025	16	\$443,520	\$221,760	\$221,760	\$142,339
2026	17	\$453,278	\$226,639	\$226,639	\$141,234
2027	18	\$463,250	\$231,625	\$231,625	\$140,137
2028	19	\$473,441	\$236,721	\$236,721	\$139,048
					\$2,836,564

*Treatment of the Economic Value of a Statistical Life in Departmental Analyses - 2009 Annual Revision

Project: 29 Road and I-70B
Subject: Emergency Response time improvement for Pear Park area - EMS

Goal - NFPA 1710 Standard 240 seconds (4 minutes) for the arrival of First response personnel
Goal - NFPA 1710 Standard 480 seconds (8 minutes) for the arrival of the full EMS response resources

Avg EMS response times to Pear Park area		7 minutes		
2008 EMS calls to Pear Park area		68		
% of EMS calls that were cardiac calls		5.0%		
Cardiac calls per year		3.4		
Survival rate of cardiac calls if reached within 8 minutes		1%	0.034	1 victim in every 29.4 years will survive
Survival rate of cardiac calls if reached within 6 minutes		5%	0.17	1 victim in every 5.9 years will survive
Value of a statistical life*	\$	6,000,000		
Improvement in 2 minute reduction in response times		0.136		
Total value of improvement per year	\$	816,000		
Population growth rate (EMS increase) in this area		2.20%		

7%

	Year	Current benefit	W/ Viaduct	Annual Benefit to Pear Park Community	Present Value of Savings
2010	1	\$ 204,000	\$ 1,020,000	\$816,000	\$ 816,000
2011	2	\$ 208,488	\$ 1,042,440	\$833,952	\$779,394
2012	3	\$ 213,075	\$ 1,065,374	\$852,299	\$744,431
2013	4	\$ 217,762	\$ 1,088,812	\$871,050	\$711,036
2014	5	\$ 222,553	\$ 1,112,766	\$890,213	\$679,139
2015	6	\$ 227,449	\$ 1,137,247	\$909,797	\$648,673
2016	7	\$ 232,453	\$ 1,162,266	\$929,813	\$619,574
2017	8	\$ 237,567	\$ 1,187,836	\$950,269	\$591,780
2018	9	\$ 242,794	\$ 1,213,968	\$971,175	\$565,232
2019	10	\$ 248,135	\$ 1,240,676	\$992,540	\$539,876
2020	11	\$ 253,594	\$ 1,267,970	\$1,014,376	\$515,658
2021	12	\$ 259,173	\$ 1,295,866	\$1,036,693	\$492,525
2022	13	\$ 264,875	\$ 1,324,375	\$1,059,500	\$470,431
2023	14	\$ 270,702	\$ 1,353,511	\$1,082,809	\$449,327
2024	15	\$ 276,658	\$ 1,383,288	\$1,106,631	\$429,170
2025	16	\$ 282,744	\$ 1,413,721	\$1,130,977	\$409,918
2026	17	\$ 288,965	\$ 1,444,823	\$1,155,858	\$391,529
2027	18	\$ 295,322	\$ 1,476,609	\$1,181,287	\$373,965
2028	19	\$ 301,819	\$ 1,509,094	\$1,207,275	\$357,189
2029	20	\$ 308,459	\$ 1,542,294	\$1,233,835	\$341,166
					\$ 10,926,013

3%

	Year	Current benefit	W/ Viaduct	Annual Benefit to Pear Park Community	Present Value of Savings
2010	1	\$ 204,000	\$ 1,020,000	\$816,000	\$816,000
2011	2	\$ 208,488	\$ 1,042,440	\$833,952	\$809,662
2012	3	\$ 213,075	\$ 1,065,374	\$852,299	\$803,373
2013	4	\$ 217,762	\$ 1,088,812	\$871,050	\$797,134
2014	5	\$ 222,553	\$ 1,112,766	\$890,213	\$790,942
2015	6	\$ 227,449	\$ 1,137,247	\$909,797	\$784,799
2016	7	\$ 232,453	\$ 1,162,266	\$929,813	\$778,704
2017	8	\$ 237,567	\$ 1,187,836	\$950,269	\$772,655
2018	9	\$ 242,794	\$ 1,213,968	\$971,175	\$766,654
2019	10	\$ 248,135	\$ 1,240,676	\$992,540	\$760,700
2020	11	\$ 253,594	\$ 1,267,970	\$1,014,376	\$754,791
2021	12	\$ 259,173	\$ 1,295,866	\$1,036,693	\$748,929
2022	13	\$ 264,875	\$ 1,324,375	\$1,059,500	\$743,112
2023	14	\$ 270,702	\$ 1,353,511	\$1,082,809	\$737,340
2024	15	\$ 276,658	\$ 1,383,288	\$1,106,631	\$731,613
2025	16	\$ 282,744	\$ 1,413,721	\$1,130,977	\$725,931
2026	17	\$ 288,965	\$ 1,444,823	\$1,155,858	\$720,293
2027	18	\$ 295,322	\$ 1,476,609	\$1,181,287	\$714,698
2028	19	\$ 301,819	\$ 1,509,094	\$1,207,275	\$709,147
2029	20	\$ 308,459	\$ 1,542,294	\$1,233,835	\$703,639
					\$ 15,170,116

*Treatment of the Economic Value of a Statistical Life in Departmental Analyses - 2009 Annual Revision

Cost Summary

7%

Year	Capital Cost	Maintenance Cost	Present Value of Maintenance Cost	Remaining Capital Value	Present Value of Net Annual Costs
2010	1	20,000,000.00	17,500.00	16,355.14	20,016,355.14
2011	2		17,938.00	15,667.74	15,667.74
2012	3		18,386.00	15,008.45	15,008.45
2013	4		18,846.00	14,377.52	14,377.52
2014	5		19,317.00	13,772.75	13,772.75
2015	6		19,800.00	13,193.58	13,193.58
2016	7		20,295.00	12,638.71	12,638.71
2017	8		20,802.00	12,106.95	12,106.95
2018	9		21,322.00	11,597.76	11,597.76
2019	10		160,343.00	81,510.25	81,510.25
2020	11		22,401.00	10,642.55	10,642.55
2021	12		22,962.00	10,195.40	10,195.40
2022	13		23,536.00	9,766.60	9,766.60
2023	14		24,124.00	9,355.70	9,355.70
2024	15		24,727.00	8,962.20	8,962.20
2025	16		25,345.00	8,585.23	8,585.23
2026	17		25,979.00	8,224.29	8,224.29
2027	18		26,628.00	7,878.26	7,878.26
2028	19		27,294.00	7,547.02	7,547.02
2029	20		300,402.00	77,629.59	77,629.59
				<u>\$ 365,015.70</u>	<u>\$ 20,365,015.70</u>