

2015 TIGER GRANT APPLICATION  
Oklahoma Urban Railroad Crossing Safety Improvement Project  
Oklahoma DOT

## BCA Results

**Table 3: Benefit-Cost Analysis Summary Results**

Category	Present Value at 7%	Present Value at 3%
<b>Evaluated Costs</b>		
Capital Costs	\$10,405,629	\$11,565,153
Maintenance Costs	(\$33,137)	(\$54,196)
<b>TOTAL COSTS</b>	<b>\$10,372,493</b>	<b>\$11,510,957</b>
<b>Evaluated Benefits</b>		
Accident Reduction	\$32,993,442	\$54,590,541
Rail Emissions Reduction	\$1,082,160	\$1,813,552
Rail Operating Cost Savings	\$448,391	\$751,441
Road Vehicle Travel Time Savings	\$4,516,280	\$7,876,786
Road Vehicle Operating Cost Savings	\$210,961	\$362,432
Road Vehicle Emissions Reduction	\$54,379	\$94,782
<b>TOTAL BENEFITS</b>	<b>\$39,305,613</b>	<b>\$65,489,534</b>
<b>NET PRESENT VALUE</b>	<b>\$28,933,120</b>	<b>\$53,978,577</b>
<b>BENEFIT/COST RATIO</b>	<b>3.79</b>	<b>5.69</b>

**Table 14: Detailed Benefits Forecast – Accident Reduction**

Year	Fatality Reduction	Accident Reduction (incl. fatalities)	Value of Accident Reduction, Undiscounted	Value of Accident Reduction, Discounted
	# of fatalities	# of accidents	2014\$	2014\$, disc. 7%
2019	0.36	3.06	3,798,542	2,708,308
2020	0.36	3.09	3,836,165	2,556,199
2021	0.37	3.12	3,874,017	2,412,543
2022	0.37	3.16	3,912,098	2,276,876
2023	0.37	3.19	3,950,404	2,148,758
2024	0.38	3.22	3,988,933	2,027,771
2025	0.38	3.25	4,027,684	1,913,524
2026	0.39	3.28	4,066,655	1,805,643
2027	0.39	3.31	4,105,842	1,703,778
2028	0.39	3.34	4,145,244	1,607,597
2029	0.40	3.38	4,184,857	1,516,785
2030	0.40	3.41	4,224,680	1,431,045
2031	0.40	3.44	4,264,710	1,350,098
2032	0.41	3.47	4,304,944	1,273,678
2033	0.41	3.50	4,345,379	1,201,533
2034	0.42	3.54	4,386,011	1,133,429
2035	0.42	3.57	4,426,839	1,069,140
2036	0.42	3.60	4,467,859	1,008,455
2037	0.43	3.64	4,509,067	951,174
2038	0.43	3.67	4,550,460	897,108
<b>TOTAL</b>	<b>8.02</b>	<b>67.25</b>	<b>83,370,390</b>	<b>32,993,442</b>

**Table 15: Detailed Benefits Forecast – Road Vehicle Travel Time Savings**

Year	Travel Time Savings per Vehicle	Travel Time Savings per Person	Value of Travel Time Savings, Undiscounted	Value of Travel Time Savings, Discounted
	Vehicle-hours	Person-hours	2014\$	2014\$, disc. 7%
2019	16,910	24,573	367,328	261,900
2020	17,594	25,567	386,760	257,728
2021	18,306	26,602	407,263	253,523
2022	19,047	27,679	428,831	249,583
2023	19,818	28,799	451,540	245,608
2024	20,620	29,965	475,453	241,696
2025	21,454	31,177	500,632	237,846
2026	22,323	32,439	527,144	234,058
2027	23,226	33,752	555,060	230,330
2028	24,166	35,118	584,454	226,661
2029	25,144	36,539	615,405	223,051
2030	26,162	38,018	647,996	219,499
2031	27,221	39,557	682,312	216,002
2032	28,322	41,158	718,445	212,562
2033	29,468	42,823	756,492	209,176
2034	30,661	44,556	796,554	205,845
2035	31,902	46,360	838,737	202,566
2036	33,193	48,236	883,155	199,340
2037	34,537	50,188	929,924	196,165
2038	35,934	52,219	979,170	193,040
<b>TOTAL</b>	<b>506,007</b>	<b>735,326</b>	<b>12,532,676</b>	<b>4,516,280</b>

**Table 16: Rail Emissions Reduction**

Year	Rail Transport Time Savings	Value of Rail Emissions Reduction, Undiscounted	Value of Rail Emissions Reduction, Discounted
	Hours	2014\$	2014\$, disc. 7%
2019	189.4	115,074	82,046
2020	193.2	117,383	78,218
2021	197.1	119,739	74,568
2022	201.0	122,143	71,088
2023	205.1	124,594	67,771
2024	209.2	127,095	64,608
2025	213.4	129,645	61,594
2026	217.7	132,247	58,719
2027	222.0	134,902	55,979
2028	226.5	137,609	53,367
2029	231.0	140,371	50,877
2030	235.7	143,188	48,503
2031	240.4	146,062	46,240
2032	245.2	148,994	44,082
2033	250.1	151,984	42,025
2034	255.2	155,034	40,064
2035	260.3	158,146	38,194
2036	265.5	161,320	36,412
2037	270.8	164,558	34,713
2038	276.3	167,860	33,093
<b>TOTAL</b>	<b>4,605.1</b>	<b>2,797,949</b>	<b>1,082,160</b>

**Table 17: Rail Operating Cost Savings**

Year	Rail Transport Time Savings	Value of Rail Operating Cost Savings, Undiscounted	Value of Rail Operating Cost Savings, Discounted
	Hours	2014\$	2014\$, disc. 7%
2019	189.4	47,681	33,996
2020	193.2	48,638	32,409
2021	197.1	49,614	30,897
2022	201.0	50,609	29,455
2023	205.1	51,625	28,081
2024	209.2	52,661	26,770
2025	213.4	53,718	25,521
2026	217.7	54,796	24,330
2027	222.0	55,896	23,195
2028	226.5	57,018	22,113
2029	231.0	58,162	21,081
2030	235.7	59,330	20,097
2031	240.4	60,521	19,159
2032	245.2	61,735	18,265
2033	250.1	62,974	17,413
2034	255.2	64,238	16,600
2035	260.3	65,527	15,826
2036	265.5	66,843	15,087
2037	270.8	68,184	14,383
2038	276.3	69,553	13,712
<b>TOTAL</b>	<b>4,605.1</b>	<b>1,159,323</b>	<b>448,391</b>

**Table 18: Detailed Benefits Forecast  
Road Vehicle Operating Cost Savings**

Year	Reduced Idling – Automobiles	Reduced Idling – Trucks	Reduced Idling – Buses	Value of Road Vehicle Cost Savings, Undiscounted	Value of Road Vehicle Cost Savings, Discounted
	Vehicle-hours	Vehicle-hours	Vehicle-hours	2014\$	2014\$, disc. 7%
2019	15,297	1,528	84	19,051	13,583
2020	15,916	1,590	87	19,822	13,208
2021	16,560	1,654	91	20,624	12,844
2022	17,231	1,721	95	21,459	12,489
2023	17,928	1,791	98	22,327	12,144
2024	18,654	1,864	102	23,231	11,809
2025	19,409	1,939	107	24,171	11,483
2026	20,194	2,017	111	25,149	11,166
2027	21,011	2,099	115	26,167	10,858
2028	21,862	2,184	120	27,226	10,559
2029	22,747	2,272	125	28,328	10,267
2030	23,667	2,364	130	29,474	9,984
2031	24,625	2,460	135	30,667	9,708
2032	25,622	2,560	141	31,908	9,441
2033	26,659	2,663	146	33,200	9,180
2034	27,738	2,771	152	34,543	8,927
2035	28,860	2,883	159	35,941	8,680
2036	30,028	3,000	165	37,396	8,441
2037	31,243	3,121	172	38,909	8,208
2038	32,508	3,248	179	40,484	7,981
<b>TOTAL</b>	<b>457,760</b>	<b>45,732</b>	<b>2,515</b>	<b>570,077</b>	<b>210,961</b>

**Table 19: Road Vehicle Emissions Reduction**

Year	Emissions Reduction – CO <sub>2</sub> only	Emissions Reduction – total incl. CO <sub>2</sub>	Value of Road Vehicle Emissions Reduction, Undiscounted	Value of Road Vehicle Emissions Reduction, Discounted
	Tons	Tons	2014\$	2014\$, disc. 7%
2019	50.37	50.56	4,446	3,170
2020	52.41	52.60	4,679	3,118
2021	54.53	54.73	4,869	3,032
2022	56.74	56.95	5,181	3,015
2023	59.03	59.25	5,451	2,965
2024	61.42	61.65	5,734	2,915
2025	63.91	64.15	6,031	2,865
2026	66.49	66.74	6,342	2,816
2027	69.18	69.44	6,740	2,797
2028	71.98	72.25	7,085	2,748
2029	74.90	75.18	7,448	2,700
2030	77.93	78.22	7,829	2,652
2031	81.08	81.39	8,146	2,579
2032	84.36	84.68	8,647	2,558
2033	87.78	88.11	9,086	2,512
2034	91.33	91.67	9,547	2,467
2035	95.03	95.38	10,030	2,422
2036	98.87	99.24	10,536	2,378
2037	102.87	103.26	11,172	2,357
2038	107.04	107.44	11,732	2,313
<b>TOTAL</b>	<b>1,507.25</b>	<b>1,512.89</b>	<b>150,730</b>	<b>54,379</b>

**Table 20: Detailed Costs Forecast**

Year	Capital Costs, Undiscounted	Net O&M Costs, Undiscounted	Total Undiscounted Costs	Total Discounted Costs
	2014\$	2014\$	2014\$	2014\$, disc. 7%
2015	-	-	-	-
2016	5,024,000	-	5,024,000	4,388,156
2017	5,024,000	-	5,024,000	4,101,081
2018	2,512,000	-	2,512,000	1,916,393
2019	-	(4,100)	(4,100)	(2,923)
2020	-	(4,100)	(4,100)	(2,732)
2021	-	(4,100)	(4,100)	(2,553)
2022	-	(4,100)	(4,100)	(2,386)
2023	-	(4,100)	(4,100)	(2,230)
2024	-	(4,100)	(4,100)	(2,084)
2025	-	(4,100)	(4,100)	(1,948)
2026	-	(4,100)	(4,100)	(1,820)
2027	-	(4,100)	(4,100)	(1,701)
2028	-	(4,100)	(4,100)	(1,590)
2029	-	(4,100)	(4,100)	(1,486)
2030	-	(4,100)	(4,100)	(1,389)
2031	-	(4,100)	(4,100)	(1,298)
2032	-	(4,100)	(4,100)	(1,213)
2033	-	(4,100)	(4,100)	(1,134)
2034	-	(4,100)	(4,100)	(1,060)
2035	-	(4,100)	(4,100)	(990)
2036	-	(4,100)	(4,100)	(925)
2037	-	(4,100)	(4,100)	(865)
2038	-	(4,100)	(4,100)	(808)
<b>TOTAL</b>	<b>12,560,000</b>	<b>(82,000)</b>	<b>12,478,000</b>	<b>10,372,493</b>

**Table 21: Costs and Benefits by Year**

Year	Total Undiscounted Costs	Total Undiscounted Benefits	Net Undiscounted Benefits	Total Discounted Costs	Total Discounted Benefits	Net Discounted Benefits
	2014\$	2014\$	2014\$	2014\$ disc. 7%	2014\$ disc. 7%	2014\$ disc. 7%
2015	-	-	-	-	-	-
2016	5,024,000	-	(5,024,000)	4,388,156	-	(4,388,156)
2017	5,024,000	-	(5,024,000)	4,101,081	-	(4,101,081)
2018	2,512,000	-	(2,512,000)	1,916,393	-	(1,916,393)
2019	(4,100)	4,352,121	4,356,221	(2,923)	3,103,002	3,105,925
2020	(4,100)	4,413,467	4,417,567	(2,732)	2,940,880	2,943,612
2021	(4,100)	4,476,126	4,480,226	(2,553)	2,787,506	2,790,060
2022	(4,100)	4,540,320	4,544,420	(2,386)	2,642,508	2,644,894
2023	(4,100)	4,605,941	4,610,041	(2,230)	2,505,327	2,507,557
2024	(4,100)	4,673,106	4,677,206	(2,084)	2,375,570	2,377,655
2025	(4,100)	4,741,881	4,745,981	(1,948)	2,252,834	2,254,781
2026	(4,100)	4,812,334	4,816,434	(1,820)	2,136,734	2,138,554
2027	(4,100)	4,884,606	4,888,706	(1,701)	2,026,938	2,028,639
2028	(4,100)	4,958,637	4,962,737	(1,590)	1,923,045	1,924,635
2029	(4,100)	5,034,572	5,038,672	(1,486)	1,824,761	1,826,247
2030	(4,100)	5,112,497	5,116,597	(1,389)	1,731,780	1,733,169
2031	(4,100)	5,192,418	5,196,518	(1,298)	1,643,786	1,645,084
2032	(4,100)	5,274,673	5,278,773	(1,213)	1,560,585	1,561,799
2033	(4,100)	5,359,115	5,363,215	(1,134)	1,481,840	1,482,974
2034	(4,100)	5,445,928	5,450,028	(1,060)	1,407,331	1,408,391
2035	(4,100)	5,535,221	5,539,321	(990)	1,336,828	1,337,818
2036	(4,100)	5,627,108	5,631,208	(925)	1,270,112	1,271,038
2037	(4,100)	5,721,814	5,725,914	(865)	1,206,999	1,207,864
2038	(4,100)	5,819,260	5,823,360	(808)	1,147,247	1,148,056
<b>TOTAL</b>	<b>12,478,000</b>	<b>100,581,145</b>	<b>88,103,145</b>	<b>10,372,493</b>	<b>39,305,613</b>	<b>28,933,120</b>