

2015 TIGER GRANT APPLICATION
 Oklahoma Rural 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%
Evaluated Costs		
Capital Costs	\$2,982,505	\$3,314,853
Maintenance Costs	\$55,767	\$91,207
TOTAL COSTS	\$3,038,272	\$3,406,060
Evaluated Benefits		
Accident Reduction	\$9,682,826	\$16,071,536
Rail Emissions Reduction	\$10,388,740	\$17,410,100
Rail Operating Cost Savings	\$4,304,550	\$7,213,834
Road Vehicle Travel Time Savings	\$124,235	\$216,676
Road Vehicle Operating Cost Savings	\$5,803	\$9,970
Road Vehicle Emissions Reduction	\$1,496	\$2,607
TOTAL BENEFITS	\$24,507,649	\$40,924,723
NET PRESENT VALUE	\$21,469,377	\$37,518,663
BENEFIT/COST RATIO	8.07	12.02

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	0.10	0.88	1,093,434	779,604
2020	0.10	0.89	1,106,999	737,640
2021	0.11	0.90	1,120,702	697,917
2022	0.11	0.92	1,134,544	660,315
2023	0.11	0.93	1,148,525	624,722
2024	0.11	0.94	1,162,646	591,030
2025	0.11	0.95	1,176,908	559,140
2026	0.11	0.96	1,191,310	528,956
2027	0.11	0.97	1,205,855	500,387
2028	0.12	0.98	1,220,541	473,347
2029	0.12	1.00	1,235,370	447,755
2030	0.12	1.01	1,250,341	423,534
2031	0.12	1.02	1,265,456	400,611
2032	0.12	1.03	1,280,715	378,917
2033	0.12	1.05	1,296,118	358,388
2034	0.12	1.06	1,311,666	338,959
2035	0.13	1.07	1,327,359	320,575
2036	0.13	1.08	1,343,197	303,177
2037	0.13	1.10	1,359,180	286,715
2038	0.13	1.11	1,375	271,137
TOTAL	2.33	19.85	24,606,176	9,682,826

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	465	676	10,105	7,204
2020	484	703	10,640	7,090
2021	504	732	11,203	6,977
2022	524	761	11,796	6,866
2023	545	792	12,421	6,756
2024	567	824	13,079	6,649
2025	590	858	13,771	6,543
2026	614	892	14,501	6,439
2027	639	928	15,269	6,336
2028	665	966	16,077	6,235
2029	692	1,005	16,929	6,136
2030	720	1,046	17,825	6,038
2031	749	1,088	18,769	5,942
2032	780	1,132	19,763	5,847
2033	811	1,178	20,810	5,754
2034	843	1,226	21,912	5,662
2035	878	1,275	23,072	5,572
2036	913	1,327	24,294	5,483
2037	950	1,381	25,581	5,396
2038	988	1,436	26,935	5,310
TOTAL	13,919	20,227	344,751	124,235

**Table 16: Detailed Benefits Forecast
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	1,818.0	1,104,709	787,642
2020	1,855.0	1,126,881	750,888
2021	1,892.0	1,149,497	715,849
2022	1,930.0	1,172,568	682,445
2023	1,969.0	1,196,102	650,600
2024	2,008.0	1,220,108	620,241
2025	2,048.0	1,244,596	591,299
2026	2,090.0	1,269,575	563,707
2027	2,131.0	1,295,056	537,402
2028	2,174.0	1,321,048	512,325
2029	2,218.0	1,347,562	488,418
2030	2,262.0	1,374,608	465,627
2031	2,308.0	1,402,197	443,900
2032	2,354.0	1,430,339	423,186
2033	2,401.0	1,459,046	403,438
2034	2,450.0	1,488,330	384,613
2035	2,499.0	1,518,201	366,665
2036	2,549.0	1,548,672	349,556
2037	2,600.0	1,579,754	333,244
2038	2,652.0	1,611,460	317,694
TOTAL	44,209.0	26,860,309	10,388,740

Table 17: Detailed Benefits Forecast – 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	1,818.0	457,733	326,358
2020	1,855.0	466,920	311,129
2021	1,892.0	476,292	296,610
2022	1,930.0	485,851	282,770
2023	1,969.0	495,602	269,575
2024	2,008.0	505,549	256,995
2025	2,048.0	515,695	245,003
2026	2,090.0	526,045	233,570
2027	2,131.0	536,603	222,671
2028	2,174.0	547,373	212,281
2029	2,218.0	558,359	202,375
2030	2,262.0	569,565	192,932
2031	2,308.0	580,997	183,929
2032	2,354.0	592,658	175,346
2033	2,401.0	604,552	167,164
2034	2,450.0	616,686	159,363
2035	2,499.0	629,063	151,927
2036	2,549.0	641,688	144,838
2037	2,600.0	654,567	138,079
2038	2,652.0	667,705	131,636
TOTAL	44,209.0	11,129,505	4,304,550

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	421	42	2	524	374
2020	438	44	2	545	363
2021	456	45	3	567	353
2022	474	47	3	590	344
2023	493	49	3	614	334
2024	513	51	3	639	325
2025	534	53	3	665	316
2026	556	56	3	692	307
2027	578	58	3	720	299
2028	601	60	3	749	290
2029	626	63	3	779	282
2030	651	65	4	811	275
2031	677	68	4	844	267
2032	705	70	4	878	260
2033	733	73	4	913	253
2034	763	76	4	950	246
2035	794	79	4	989	239
2036	826	83	5	1,029	232
2037	860	86	5	1,070	226
2038	894	89	5	1,114	220
TOTAL	12,592	1,258	69	15,682	5,803

Table 19: Detailed Benefits Forecast – Road Vehicle Emissions Reduction

Year	Emissions Reduction – CO2 only	Emissions Reduction – total incl. CO2	Value of Road Vehicle Emissions Reduction, Undiscounted	Value of Road Vehicle Emissions Reduction, Discounted
	Tons	Tons	2014\$	2014\$, disc. 7%
2019	1.39	1.39	122	87
2020	1.44	1.45	129	86
2021	1.50	1.51	134	83
2022	1.56	1.57	143	83
2023	1.62	1.63	150	82
2024	1.69	1.70	158	80
2025	1.76	1.76	166	79
2026	1.83	1.84	174	77
2027	1.90	1.91	185	77
2028	1.98	1.99	195	76
2029	2.06	2.07	205	74
2030	2.14	2.15	215	73
2031	2.23	2.24	224	71
2032	2.32	2.33	238	70
2033	2.41	2.42	250	69
2034	2.51	2.52	263	68
2035	2.61	2.62	276	67
2036	2.72	2.73	290	65
2037	2.83	2.84	307	65
2038	2.94	2.96	323	64
TOTAL	41.46	41.62	4,146	1,496

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	1,440,000	-	1,440,000	1,257,752
2017	1,440,000	-	1,440,000	1,175,469
2018	720,000	-	720,000	549,285
2019	-	6,900	6,900	4,920
2020	-	6,900	6,900	4,598
2021	-	6,900	6,900	4,297
2022	-	6,900	6,900	4,016
2023	-	6,900	6,900	3,753
2024	-	6,900	6,900	3,508
2025	-	6,900	6,900	3,278
2026	-	6,900	6,900	3,064
2027	-	6,900	6,900	2,863
2028	-	6,900	6,900	2,676
2029	-	6,900	6,900	2,501
2030	-	6,900	6,900	2,337
2031	-	6,900	6,900	2,184
2032	-	6,900	6,900	2,041
2033	-	6,900	6,900	1,908
2034	-	6,900	6,900	1,783
2035	-	6,900	6,900	1,666
2036	-	6,900	6,900	1,557
2037	-	6,900	6,900	1,456
2038	-	6,900	6,900	1,360
TOTAL	3,600,000	138,000	3,738,000	3,038,272

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	1,440,000	-	(1,440,000)	1,257,752	-	(1,257,752)
2017	1,440,000	-	(1,440,000)	1,175,469	-	(1,175,469)
2018	720,000	-	(720,000)	549,285	-	(549,285)
2019	6,900	2,666,627	2,659,727	4,920	1,901,269	1,896,349
2020	6,900	2,712,114	2,705,214	4,598	1,807,196	1,802,598
2021	6,900	2,758,395	2,751,495	4,297	1,717,790	1,713,493
2022	6,900	2,805,492	2,798,592	4,016	1,632,822	1,628,806
2023	6,900	2,853,414	2,846,514	3,753	1,552,068	1,548,315
2024	6,900	2,902,179	2,895,279	3,508	1,475,320	1,471,813
2025	6,900	2,951,801	2,944,901	3,278	1,402,380	1,399,101
2026	6,900	3,002,298	2,995,398	3,064	1,333,056	1,329,993
2027	6,900	3,053,688	3,046,788	2,863	1,267,172	1,264,309
2028	6,900	3,105,983	3,099,083	2,676	1,204,554	1,201,878
2029	6,900	3,159,203	3,152,303	2,501	1,145,041	1,142,540
2030	6,900	3,213,366	3,206,466	2,337	1,088,478	1,086,141
2031	6,900	3,268,487	3,261,587	2,184	1,034,719	1,032,535
2032	6,900	3,324,591	3,317,691	2,041	983,626	981,585
2033	6,900	3,381,690	3,374,790	1,908	935,065	933,158
2034	6,900	3,439,806	3,432,906	1,783	888,911	887,128
2035	6,900	3,498,959	3,492,059	1,666	845,044	843,378
2036	6,900	3,559,169	3,552,269	1,557	803,351	801,794
2037	6,900	3,620,459	3,613,559	1,456	763,725	762,269
2038	6,900	3,682,845	3,675,945	1,360	726,060	724,700
TOTAL	3,738,000	62,960,568	59,222,568	3,038,272	24,507,649	21,469,377