Appendix B - Benefit-Cost Analysis

The Benefit Cost Analysis (BCA) was performed in accordance with the ARRA guidance provided in the Federal Register. These benefits and costs were quantified in accordance with the Federal Register Volume 77, Number 20, Docket No. DOT-OST-2012-0012 and Circulars A-4 and A-94 (See http://www.whitehouse.gov/omb/circulars/).

The purpose of the BCA is to systemically compare the benefits and costs of constructing a six mile segment of Highway 71 on new location near Fort Smith, Arkansas, in Sebastian County, completing a portion of Future Interstate 49. The BCA compares the construction costs and road user benefits to the cost of not doing anything within the project area. The analysis considers that the project is constructed in 2013, open to traffic in 2014 and has a 20-year project life (2014 through 2033) for purposes of the BCA.

The analysis considered typical roadway construction costs in Arkansas. Table 1 summarizes the findings of the BCA analysis. Road User Benefits that were considered include the value of travel time savings, vehicle operating cost benefits, and the value to society of enhancing safety of the improved highway network. A three percent inflation rate was applied to calculate future benefits in current dollars. Additionally, three percent and seven percent discount rates were used to bring future benefits and costs to present value.

The additional benefits of completing the Interstate 49 corridor are not addressed in this analysis. Many benefits do not easily lend themselves to simple quantification. The economic benefits of completing a north-south interstate quality transportation corridor through Arkansas as well as providing a safer and more efficient transportation network for the region have not been quantified beyond the impacts of construction activities and travel time savings for this particular segment. Providing an improved transportation network in the region does make an impact in terms of improving the per capita income in areas of the country that are below the national average, which is a goal of the TIGER Discretionary Grant program.

The BCA was calculated using the following key factors for evaluation:

Construction Costs

o Vehicles Miles Traveled

Forecasted Traffic

- o Traffic Distribution by Vehicle Type
- o Travel Speeds and Congestion
- Value of Time

o Historic Crash Data

The Construction Cost Estimate for the six mile segment of Highway 71 is \$34.1 million. These costs reflect basic construction costs that would be incurred if the project were built using traditional construction methods and schedules, as described in the application. The project's construction cost is reported in Attachment 1.

For comparison of Build and No-Build transportation networks, vehicle miles traveled (VMT) within the study area was calculated. The VMT was then applied to the various user benefit and cost valuations. Attachment 2 shows calculations for the change in VMT.

Table 1

Highway 71 Benefits and Costs Summary

 Base Year
 2013

 Discount
 3.00%

 Discount
 7.00%

Inflation 3.00% General Economy

Year	Construction	on and Mainte	nance Costs	1	Travel Time Bene	fit	Vehicle	Operation Cost	Benefit		Safety Benefits	i .	Emission	s (non Carbon	Dioxide)
		Discounted												Discounted	Discounted
	Non-Disc.	3%	Discounted 7%	Non-Disc.	Discounted 3%	Discounted 7%	Non-Disc.	Discounted 3%	Discounted 7%	Non-Disc.	Discounted 3%	Discounted 7%	Non-Disc.	3%	7%
2013	\$34,100,000	\$34,100,000	\$34,100,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2014	\$0	\$0	\$0	\$15,862,613	\$15,400,596	\$14,824,872	\$6,377,851	\$6,192,088	\$5,960,608	\$6,239,409	\$6,057,678	\$5,831,223	\$38,817	\$37,687	\$36,278
2015	\$0	\$0	\$0	\$16,610,800	\$15,657,272	\$14,508,516	\$6,678,673	\$6,295,290	\$5,833,412	\$6,533,701	\$6,158,640	\$5,706,787	\$39,795	\$37,511	\$34,759
2016	\$0	\$0	\$0	\$17,389,601	\$15,913,949	\$14,195,095	\$6,991,804	\$6,398,491	\$5,707,395	\$6,840,035	1 - 7 7	\$5,583,506	\$40,768	\$37,308	\$33,278
2017	\$0	\$0	\$0	\$18,250,045	\$16,214,928	\$13,922,872	\$7,337,761	\$6,519,506	\$5,597,943	\$7,178,482	\$6,377,988	\$5,476,430	\$41,847	\$37,181	\$31,925
2018	\$0	\$0	\$0	\$19,043,745	\$16,427,302	\$13,577,927	\$7,656,883	\$6,604,894	\$5,459,251	\$7,490,677	\$6,461,524	\$5,340,749	\$42,689	\$36,824	\$30,437
2019	\$0	\$0	\$0	\$19,921,543	\$16,683,978	\$13,274,565	\$8,009,817	\$6,708,096	\$5,337,279	\$7,835,950	\$6,562,485	\$5,221,424	\$43,633	\$36,542	\$29,075
2020	\$0	\$0	\$0	\$20,834,869	\$16,940,655	\$12,974,909	\$8,377,036	\$6,811,297	\$5,216,797	\$8,195,198	\$6,663,446	\$5,103,558	\$44,564	\$36,234	\$27,752
2021	\$0	\$0	\$0	\$21,844,750	\$17,244,448	\$12,713,844	\$8,783,077	\$6,933,442	\$5,111,831	\$8,592,426	\$6,782,940	\$5,000,870	\$45,602	\$35,998	\$26,541
2022	\$0	\$0	\$0	\$22,773,522	\$17,454,008	\$12,387,287	\$9,156,507	\$7,017,700	\$4,980,533	\$8,957,749	\$6,865,369	\$4,872,422	\$46,371	\$35,539	\$25,223
2023	\$0	\$0	\$0	\$23,801,679	\$17,710,685	\$12,099,567	\$9,569,896	\$7,120,902	\$4,864,850	\$9,362,165	\$6,966,330	\$4,759,250	\$47,241	\$35,152	\$24,015
2024	\$0	\$0	\$0	\$24,871,030	\$17,967,361	\$11,816,047	\$9,999,848	\$7,224,103	\$4,750,856	\$9,782,784	\$7,067,291	\$4,647,730	\$48,086	\$34,739	\$22,845
2025	\$0	\$0	\$0	\$26,054,307	\$18,273,967	\$11,568,424	\$10,475,606	\$7,347,379	\$4,651,294	\$10,248,215	\$7,187,892	\$4,550,330	\$49,036	\$34,393	\$21,772
2026	\$0	\$0	\$0	\$27,139,552	\$18,480,715	\$11,261,949	\$10,911,949	\$7,430,506	\$4,528,071	\$10,675,086	\$7,269,214	\$4,429,781	\$49,684	\$33,833	\$20,617
2027	\$0	\$0	\$0	\$28,341,985	\$18,737,391	\$10,991,511	\$11,395,409	\$7,533,707	\$4,419,336	\$11,148,051	\$7,370,175	\$4,323,407	\$50,430	\$33,340	\$19,558
2028	\$0	\$0	\$0	\$29,592,139	\$18,994,068	\$10,725,553	\$11,898,055	\$7,636,909	\$4,312,403	\$11,639,787	\$7,471,137	\$4,218,795	\$51,134	\$32,821	\$18,533
2029	\$0	\$0	\$0	\$30,976,429	\$19,303,486	\$10,492,788	\$12,454,634	\$7,761,316	\$4,218,815	\$12,184,285	\$7,592,843	\$4,127,239	\$51,935	\$32,364	\$17,592
2030	\$0	\$0	\$0	\$32,242,795	\$19,507,421	\$10,207,243	\$12,963,799	\$7,843,312	\$4,104,007	\$12,682,398	\$7,673,059	\$4,014,922	\$52,402	\$31,704	\$16,589
2031	\$0	\$0	\$0	\$33,647,053	\$19,764,098	\$9,954,949	\$13,528,407	\$7,946,513	\$4,002,567	\$13,234,750	\$7,774,020	\$3,915,685	\$52,956	\$31,106	\$15,668
2032	\$0	\$0	\$0	\$35,106,549	\$20,020,774	\$9,707,253	\$14,115,224	\$8,049,715	\$3,902,977	\$13,808,828	\$7,874,982	\$3,818,256	\$53,449	\$30,481	\$14,779
2033	\$0	\$0	\$0	\$36,723,669	\$20,333,005	\$9,490,094	\$14,765,416	\$8,175,253	\$3,815,664	\$14,444,907	\$7,997,795	\$3,732,839	\$54,025	\$29,912	\$13,961
TOTAL		\$34,100,000	\$34,100,000		\$357,030,107	\$240,695,265		\$143,550,420	\$96,775,890		\$140,434,409	\$94,675,202		\$690,669	\$481,197
		3% Discount	7% Discount												
		\$641,705,606	\$432,837,027	Dicounted Ber	efit										
		\$34,100,000	\$34,100,000	Discounted Co	sts										
		18.82	12.69	Overall B/C											

The BCA Value of Time analysis quantifies the road user impacts that the six mile Highway 71 new location roadway improvements would have in terms of travel time savings by first determining the amount of travel time saved per VMT and then assigning a dollar value for this time. This includes differentiating time valuations by trip type. A vehicle occupancy rate of 1.1 persons per passenger car was assumed. All trucks were assumed to be operating for commercial purposes, for which 100% total compensation was assumed. A vehicle occupancy rate of 1.0 person per truck was used. Detailed worksheets showing factors considered for the Value of Time are included in Attachment 3.

The impacts of the Vehicle Operating Costs account for the actual cost to operate the vehicle, aside from the travel time costs. The detailed worksheets for this calculation are shown in Attachment 4.

The Value of Safety Improvements considers cost savings that can be attributed to the reduction in net system VMT as the result of building the project. Crash rate reductions were estimated by determining the net reduction in vehicle miles traveled in the existing network (no build) compared to the proposed network with the project in place, and then applying the appropriate crash rate. To ensure the best statistically relevant data were considered, statewide average crash rates based on facility type were applied when determining savings in Value of Safety. Detailed worksheets illustrating this analysis are included in Attachment 5.

Construction of this six mile segment of Highway 71 exhibits a net positive benefit cost ratio of 18.82, given a three percent discount rate. The sensitivity analysis conducted using a seven percent discount rate shows that the benefit cost ratio would be 12.69, still exhibiting a strong return to the public.

REFERENCES

- User Benefit Analysis for Highways, August 2003, AASHTO
- Manual on User Benefit Analysis for Highway and Bus Transit Improvements, 1977, AASHTO
- Circular A-94, Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs, Office of Management and Budget
- BCA.NET-Highway Project Benefit-Cost Analysis System User's Manual, Federal Highway Administration
- Memorandum: Department Guidance for the Valuation of Travel Time in Economic Analysis; Guidance for Conducting Economic Evaluations, April 9, 1997, US Department of Transportation, update of November 28, 2011
- Memorandum to Secretarial Officers Modal Administrators; Re: Treatment of the Economic Value of a Statistical Life in Departmental Analyses – 2011 Annual Revision; July 29, 2011
- Circular A-4: To the Heads of Executive Agencies and Establishments; Subject: Regulatory Analysis, September 17, 2003, Office of Management and Budget
- Federal Register (Volume 77, Number 20): Notice of Fund Availability for the Department of Transportation's National Infrastructure Investments Under the Full-Year Continuing Appropriations, 2012; and Request for Comments
- TIGER Benefit-Cost Analysis (BCA) Resource Guide (http://www.dot.gov/tiger)

	Build	No-Build	DIFFERENCE	2013 Base Year S
2012	\$0	\$0	\$0	
2013	\$34,100,000		\$34,100,000	\$34,100,000
2014			\$0	\$0
2015			\$0	\$0
2016			\$0	\$0
2017			\$0	\$0
2018			\$0	\$0
2019			\$0	\$0
2020			\$0	\$0
2021			\$0	\$0
2022			\$0	\$0
2023			\$0	\$0
2024			\$0	\$0
2025			\$0	\$0
2026			\$0	\$0
2027			\$0	\$0
2028			\$0	\$0
2029			\$0	\$0
2030			\$0	\$0
2031			\$0	\$0
2032			\$0	\$0
2033			\$0	\$0

Maintenance of Traffic costs are assummed to be negligable since highway is on new location

icile: itially Divide eway livided way DaysinYea	-4.38 -1.05 -2.87 -2.72 6	South End	-4.38 -1.05 -2.87 1.28 6	ADT h End Truck	North		Urban Four-Lane Partially Divided	Urban Four-Lane Freeway	Urban Four Lane Undivided	Urban Two Lane	Rural Four-Lane Freeway	Urban Four-Lane Partially Divided	Urban Four-Lane Freeway	Urban Four Lane Undivided	Urban Two Lane	Rural Four-Lane Freeway
tially Divide eway livided way DaysinYea	-4.38 -1.05 -2.87 -2.72 6	-0.38 -1.05 -2.87 -2.72 6	-4.38 -1.05 -2.87 1.28 6	h End			Urban Four-Lane Partially Divided	Urban Four-Lane Freeway	Urban Four Lane Undivided	Urban Two Lane		Partially Divided	Urban Four-Lane Freeway	Urban Four Lane	Urban Two Lane	Rural Four-Lane Freeway
eway livided way DaysinYea	-1.05 -2.87 -2.72 6	-1.05 -2.87 -2.72 6	-1.05 -2.87 1.28 6	h End			Urban Four-Lane Partially Divided	Urban Four-Lane Freeway	Urban Four Lane Undivided	Urban Two Lane		Partially Divided	Urban Four-Lane Freeway	Urban Four Lane	Urban Two Lane	Rural Four-Lane Freeway
way DaysinYea	-2.87 -2.72 6	-2.87 -2.72 6	-2.87 1.28 6	h End			Urban Four-Lane Partially Divided	Urban Four-Lane Freeway	Urban Four Lane Undivided	Urban Two Lane		Partially Divided	Urban Four-Lane Freeway	Urban Four Lane	Urban Two Lane	Rural Four-Lane Freeway
way	6	-2.72 6	1.28 6	h End			Urban Four-Lane Partially Divided	Urban Four-Lane Freeway	Urban Four Lane Undivided	Urban Two Lane		Partially Divided	Urban Four-Lane Freeway	Urban Four Lane	Urban Two Lane	Rural Four-Lane Freeway
DaysinYea	6	6 Thru	South	h End			Urban Four-Lane Partially Divided	Urban Four-Lane Freeway	Urban Four Lane Undivided	Urban Two Lane		Partially Divided	Urban Four-Lane Freeway	Urban Four Lane	Urban Two Lane	Rural Four-Lane Freeway
DaysinYea		Thru	Souti	h End			Urban Four-Lane Partially Divided	Urban Four-Lane Freeway	Urban Four Lane Undivided	Urban Two Lane		Partially Divided	Urban Four-Lane Freeway	Urban Four Lane	Urban Two Lane	Rural Four-Lane Freeway
			South	h End			Urban Four-Lane Partially Divided	Urban Four-Lane Freeway	Urban Four Lane Undivided	Urban Two Lane		Partially Divided	Urban Four-Lane Freeway	Urban Four Lane	Urban Two Lane	Rural Four-Lane Freeway
			South	h End			Urban Four-Lane Partially Divided	Urban Four-Lane Freeway	Urban Four Lane Undivided	Urban Two Lane		Partially Divided	Urban Four-Lane Freeway	Urban Four Lane	Urban Two Lane	Rural Four-Lane Freeway
			South	h End			Urban Four-Lane Partially Divided	Urban Four-Lane Freeway	Urban Four Lane Undivided	Urban Two Lane	Rural Four-Lane Freeway	Urban Four-Lane Partially Divided	Urban Four-Lane Freeway	Urban Four Lane	Urban Two Lane	Rural Four-Lane Freeway
	Car	Truck	Car	Truck	Car	T										
						Truck			Car					Truck		
365	3555	945	1778	473	1778	473	-8771607	-2724908	-7448081	-4463658	15570900	-2331693	-724343	-1979870	-1186542	4139100
365	3614	961	1807	480	1807	480	-8917800				15830415				-1206318	
365	3674	977	1837	488	1837	488	-9063994	-2815738			16089930				-1226093	
366	3733	992	1866	496	1866	496	-9235421	-2868992			16394238				-1249282	
365	3792	1008	1896	504	1896	504	-9356381	-2906568	-7944619	-4761235	16608960	-2487139	-772632	-2111861	-1265645	4415040
365	3851	1024	1926	512	1926	512	-9502574	-2951983			16868475				-1285421	
365	3911	1040	1955	520	1955	520	-9648768	-2997398	-8192889	-4910024	17127990	-2564862	-796777	-2177856	-1305196	4553010
366	3970	1055	1985	528	1985	528	-9821797	-3051150	-8339810	-4998074	17435142	-2610857	-811065	-2216911	-1328602	4634658
365	4029	1071	2015	536	2015	536	-9941155	-3088229	-8441158	-5058812	17647020	-2642585	-820922	-2243852	-1344748	4690980
365	4088	1087	2044	543	2044	543	-10087348	-3133644	-8565293	-5133207	17906535	-2681447	-832994	-2276850	-1364523	4759965
365	4148	1103	2074	551	2074	551	-10233542	-3179059	-8689427	-5207601	18166050	-2720309	-845066	-2309848	-1384299	4828950
366	4207	1118	2103	559	2103	559	-10408173	-3233308	-8837709	-5296467	18476046	-2766729	-859487	-2349264	-1407921	4911354
365	4266	1134	2133	567	2133	567	-10525928	-3269889	-8937697	-5356390	18685080	-2798032	-869211	-2375843	-1423850	4966920
365	4325	1150	2163	575	2163	575	-10672122	-3315304	-9061831	-5430784	18944595	-2836893	-881283	-2408841	-1443626	5035905
365	4385	1166	2192	583	2192	583	-10818315	-3360719	-9185966	-5505178	19204110	-2875755	-893356	-2441839	-1463402	5104890
366	4444	1181	2222	591	2222	591	-10994549	-3415466	-9335608	-5594859	19516950	-2922602	-907909	-2481617	-1487241	5188050
365	4503	1197	2252	599	2252	599	-11110702	-3451550	-9434235	-5653967	19723140	-2953478	-917501	-2507835	-1502953	5242860
				606												
	366 365 365 365 366 365 365 365 366 365 365	366 3970 365 4029 365 4088 365 4148 366 4207 365 4266 365 4325 366 4444 365 4503 365 4562 366 4681	366 3970 1055 365 4029 1071 365 4088 1087 365 4148 1103 366 4207 1118 365 4266 1134 365 4325 1150 365 4385 1166 366 4444 1181 365 4503 1197 365 4562 1213 365 4622 1229 366 4681 1244	366 3970 1055 1985 365 4029 1071 2015 365 4088 1087 2044 365 4148 1103 2074 366 4207 1118 2103 365 4266 1134 2133 365 4325 1150 2163 365 4385 1166 2192 366 4444 1181 2222 365 4503 1197 2252 365 4562 1213 2281 365 4622 1229 2311 366 4681 1244 2340	366 3970 1055 1985 528 365 4029 1071 2015 536 365 4088 1087 2044 543 365 4148 1103 2074 551 366 4207 1118 2103 559 365 4266 1134 2133 567 365 4325 1150 2163 575 365 4385 1166 2192 583 366 4444 1181 2222 591 365 4503 1197 2252 599 365 4562 1213 2281 606 365 4622 1229 2311 614 366 4681 1244 2340 622	366 3970 1055 1985 528 1985 365 4029 1071 2015 536 2015 365 4088 1087 2044 543 2044 365 4148 1103 2074 551 2074 366 4207 1118 2103 559 2103 365 4266 1134 2133 567 2133 365 4325 1150 2163 575 2163 365 4385 1166 2192 583 2192 366 4444 1181 2222 591 2222 365 4503 1197 2252 599 2252 365 4562 1213 2281 606 2281 365 4622 1229 2311 614 2311 366 4681 1244 2340 622 2340	366 3970 1055 1985 528 1985 528 365 4029 1071 2015 536 2015 536 365 4088 1087 2044 543 2044 543 365 4148 1103 2074 551 2074 551 366 4207 1118 2103 559 2103 559 365 4266 1134 2133 567 2133 567 365 4325 1150 2163 575 2163 575 365 4385 1166 2192 583 2192 583 366 4444 1181 2222 591 2222 591 365 4503 1197 2252 599 2252 599 365 4562 1213 2281 606 2281 606 365 4622 1229 2311 614 2311 614	366 3970 1055 1985 528 1985 528 -9821797 365 4029 1071 2015 536 2015 536 -9941155 365 4088 1087 2044 543 2044 543 -10087348 365 4148 1103 2074 551 2074 551 -10233542 366 4207 1118 2103 559 2103 559 -10408173 365 4266 1134 2133 567 2133 567 -10525928 365 4325 1150 2163 575 2163 575 -10672122 365 4385 1166 2192 583 2192 583 -10818315 366 4444 1181 2222 591 2222 591 -10994549 365 4503 1197 2252 599 2252 599 -11110702 365 4562 1213 2281 606 2281 606 -11256896 365 4622 <td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 365 4029 1071 2015 536 2015 536 -9941155 -3088229 365 4088 1087 2044 543 2044 543 -10087348 -3133644 365 4148 1103 2074 551 2074 551 -10233542 -3179059 366 4207 1118 2103 559 2103 559 -10408173 -3233308 365 4266 1134 2133 567 2133 567 -10525928 -3269889 365 4325 1150 2163 575 2163 575 -10672122 -3315304 365 4385 1166 2192 583 2192 583 -10818315 -3360719 366 4444 1181 2222 591 2222 591 -10994549 -3415466 365 <</td> <td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 366 4207 1118 2103 559 2103 559 -10408173 -3233308 -8837709 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 365 4325 1150 2163 575 2163 575 -10672122 -3315304 -9061831 365 4385 1166 2192 583 2192 583 -10818315 -3360719 -9185966 366 4444</td> <td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 366 4207 1118 2103 559 2103 559 -10408173 -3233308 -8837709 -5296467 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 365 4325 1150 2163 575 2163 575 -10672122 -3315304 -9061831 -5430784 365 4385 1166 2192 583 2192 583 -10818315 -3360719 -9185966 -5505178</td> <td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 17906535 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 18166050 366 4207 1118 2103 559 2103 559 -10408173 -3233308 -8837709 -5296467 18476046 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 365 4325 1150 2163 575 2163 575 -10672122 -3315304 -9061831 -5430784 18944595 365 4385 1166 2192 <td< td=""><td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 17906535 -2681447 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 366 4207 1118 2103 559 2103 559 -10408173 -3233308 -8837709 -5296467 18476046 -2766729 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 -2798032 365 4325 1150 <t< td=""><td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 -811065 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 -820922 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 17906535 -2681447 -832994 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 -845066 366 4207 1118 2103 559 2103 559 -10408173 -323308 -8837709 -5296467 18476046 -2766729 -859487 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080<!--</td--><td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 -811065 -2216911 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 -820922 -2243852 365 4088 1087 2044 543 2044 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 -84506 -2309848 366 4207 1118 2103 559 2103 559 -10408173 -3233308 -8837709 -5296467 18476046 -2766729 -859487 -2349264 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 -2798032 -869211 -2375843 365 4325 1150 2163 575 2163 575 -10672122 -3315304 -9061831 -5430784 18944595 -2836893</td><td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 -811065 -2216911 -1328602 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 -820922 -2243852 -1344748 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 17906535 -2681447 -832994 -2276850 -1364523 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 -845066 -2309848 -1384299 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 -2798032 -869211 -2375843 -1423850 365 4325 1150 2163 575 2163 575 -10672122</td></td></t<></td></td<></td>	366 3970 1055 1985 528 1985 528 -9821797 -3051150 365 4029 1071 2015 536 2015 536 -9941155 -3088229 365 4088 1087 2044 543 2044 543 -10087348 -3133644 365 4148 1103 2074 551 2074 551 -10233542 -3179059 366 4207 1118 2103 559 2103 559 -10408173 -3233308 365 4266 1134 2133 567 2133 567 -10525928 -3269889 365 4325 1150 2163 575 2163 575 -10672122 -3315304 365 4385 1166 2192 583 2192 583 -10818315 -3360719 366 4444 1181 2222 591 2222 591 -10994549 -3415466 365 <	366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 366 4207 1118 2103 559 2103 559 -10408173 -3233308 -8837709 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 365 4325 1150 2163 575 2163 575 -10672122 -3315304 -9061831 365 4385 1166 2192 583 2192 583 -10818315 -3360719 -9185966 366 4444	366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 366 4207 1118 2103 559 2103 559 -10408173 -3233308 -8837709 -5296467 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 365 4325 1150 2163 575 2163 575 -10672122 -3315304 -9061831 -5430784 365 4385 1166 2192 583 2192 583 -10818315 -3360719 -9185966 -5505178	366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 17906535 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 18166050 366 4207 1118 2103 559 2103 559 -10408173 -3233308 -8837709 -5296467 18476046 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 365 4325 1150 2163 575 2163 575 -10672122 -3315304 -9061831 -5430784 18944595 365 4385 1166 2192 <td< td=""><td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 17906535 -2681447 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 366 4207 1118 2103 559 2103 559 -10408173 -3233308 -8837709 -5296467 18476046 -2766729 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 -2798032 365 4325 1150 <t< td=""><td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 -811065 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 -820922 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 17906535 -2681447 -832994 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 -845066 366 4207 1118 2103 559 2103 559 -10408173 -323308 -8837709 -5296467 18476046 -2766729 -859487 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080<!--</td--><td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 -811065 -2216911 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 -820922 -2243852 365 4088 1087 2044 543 2044 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 -84506 -2309848 366 4207 1118 2103 559 2103 559 -10408173 -3233308 -8837709 -5296467 18476046 -2766729 -859487 -2349264 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 -2798032 -869211 -2375843 365 4325 1150 2163 575 2163 575 -10672122 -3315304 -9061831 -5430784 18944595 -2836893</td><td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 -811065 -2216911 -1328602 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 -820922 -2243852 -1344748 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 17906535 -2681447 -832994 -2276850 -1364523 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 -845066 -2309848 -1384299 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 -2798032 -869211 -2375843 -1423850 365 4325 1150 2163 575 2163 575 -10672122</td></td></t<></td></td<>	366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 17906535 -2681447 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 366 4207 1118 2103 559 2103 559 -10408173 -3233308 -8837709 -5296467 18476046 -2766729 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 -2798032 365 4325 1150 <t< td=""><td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 -811065 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 -820922 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 17906535 -2681447 -832994 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 -845066 366 4207 1118 2103 559 2103 559 -10408173 -323308 -8837709 -5296467 18476046 -2766729 -859487 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080<!--</td--><td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 -811065 -2216911 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 -820922 -2243852 365 4088 1087 2044 543 2044 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 -84506 -2309848 366 4207 1118 2103 559 2103 559 -10408173 -3233308 -8837709 -5296467 18476046 -2766729 -859487 -2349264 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 -2798032 -869211 -2375843 365 4325 1150 2163 575 2163 575 -10672122 -3315304 -9061831 -5430784 18944595 -2836893</td><td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 -811065 -2216911 -1328602 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 -820922 -2243852 -1344748 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 17906535 -2681447 -832994 -2276850 -1364523 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 -845066 -2309848 -1384299 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 -2798032 -869211 -2375843 -1423850 365 4325 1150 2163 575 2163 575 -10672122</td></td></t<>	366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 -811065 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 -820922 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 17906535 -2681447 -832994 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 -845066 366 4207 1118 2103 559 2103 559 -10408173 -323308 -8837709 -5296467 18476046 -2766729 -859487 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 </td <td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 -811065 -2216911 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 -820922 -2243852 365 4088 1087 2044 543 2044 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 -84506 -2309848 366 4207 1118 2103 559 2103 559 -10408173 -3233308 -8837709 -5296467 18476046 -2766729 -859487 -2349264 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 -2798032 -869211 -2375843 365 4325 1150 2163 575 2163 575 -10672122 -3315304 -9061831 -5430784 18944595 -2836893</td> <td>366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 -811065 -2216911 -1328602 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 -820922 -2243852 -1344748 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 17906535 -2681447 -832994 -2276850 -1364523 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 -845066 -2309848 -1384299 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 -2798032 -869211 -2375843 -1423850 365 4325 1150 2163 575 2163 575 -10672122</td>	366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 -811065 -2216911 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 -820922 -2243852 365 4088 1087 2044 543 2044 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 -84506 -2309848 366 4207 1118 2103 559 2103 559 -10408173 -3233308 -8837709 -5296467 18476046 -2766729 -859487 -2349264 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 -2798032 -869211 -2375843 365 4325 1150 2163 575 2163 575 -10672122 -3315304 -9061831 -5430784 18944595 -2836893	366 3970 1055 1985 528 1985 528 -9821797 -3051150 -8339810 -4998074 17435142 -2610857 -811065 -2216911 -1328602 365 4029 1071 2015 536 2015 536 -9941155 -3088229 -8441158 -5058812 17647020 -2642585 -820922 -2243852 -1344748 365 4088 1087 2044 543 2044 543 -10087348 -3133644 -8565293 -5133207 17906535 -2681447 -832994 -2276850 -1364523 365 4148 1103 2074 551 2074 551 -10233542 -3179059 -8689427 -5207601 18166050 -2720309 -845066 -2309848 -1384299 365 4266 1134 2133 567 2133 567 -10525928 -3269889 -8937697 -5356390 18685080 -2798032 -869211 -2375843 -1423850 365 4325 1150 2163 575 2163 575 -10672122

		To	otal Value of Tir	ne		
	_					
		eway		erial		
	Auto	Truck	Auto	Truck		
Speed	65	65	30		(Average running, MP	H)
Hours/Mile	0.0154	_			(Hours per Mile)	
Value of Hour	\$21.70				(Based on September	28, 2011 memo)
Occupancy	1.1	1	1.1	1		
Time Cost per VMT	 (Hours/Mile*Value*C	Occupancy)				
	Auto	Truck				
Freeway	\$0.367	\$0.431				
Arterial	\$0.796	\$0.933				
	Change in Fi	reeway VMT	Change in A	rterial VMT		Benefit with
Year	Auto	Truck	Auto	Truck	Increase in Cost	Inflation
2013						
2014	12845993	3414758	-20683346	-5498105	-\$15,400,595.50	\$15,862,61
2015	13060092	3471670	-21028068	-5589740	-\$15,657,272.09	\$16,610,80
2016	13274192	3528583	-21372790	-5681375	-\$15,913,948.68	\$17,389,60
2017	13525246	3595319	-21777013	-5788826	-\$16,214,928.36	\$18,250,04
2018	13702392	3642408	-22062235	-5864645	-\$16,427,301.87	\$19,043,74
2019	13916492	3699321	-22406958	-5956280	-\$16,683,978.46	\$19,921,54
2020	14130592	3756233	-22751680	-6047915	-\$16,940,655.05	\$20,834,86
2021	14383992	3823593	-23159680	-6156371	-\$17,244,447.62	\$21,844,75
2022	14558792	3870059	-23441125	-6231185	-\$17,454,008.23	\$22,773,52
2023	14772891	3926971	-23785847	-6322820	-\$17,710,684.83	\$23,801,67
2024	14986991	3983884	-24130570	-6414455	-\$17,967,361.42	\$24,871,03
2025	15242738	4051867	-24542348	-6523915	-\$18,273,966.88	\$26,054,30
2026	15415191	4097709	-24820015	-6597725	-\$18,480,714.60	\$27,139,55
2027	15629291	4154622	-25164737	-6689360	-\$18,737,391.19	\$28,341,98
2028	15843391	4211534	-25509459	-6780996	-\$18,994,067.78	\$29,592,13
2029	16101484	4280141	-25925015	-6891460	-\$19,303,486.14	\$30,976,42
2030	16271591	4325360	-26198904	-6964266	-\$19,507,420.97	\$32,242,79
2031	16485690	4382272	-26543627	-7055901	-\$19,764,097.56	\$33,647,05
2032	16699790	4439185	-26888349	-7147536	-\$20,020,774.15	\$35,106,54
2033	16960230	4508415	-27307683	-7259004	-\$20,333,005.40	\$36,723,66
2034	17127990	4553010	-27577794	-7330806	-\$20,534,127.33	\$38,199,52

ksheet 5-2: Operat	al Informat				Site I	nformation			
Genera	aı intormat Analyst					Hwy 71			
							-	-	
Agency/	/Company				Segment		Freeway		
		TIGER 4			s Time Period		/ I		
Date F	erformed	3/15/20	12		Analysis Year				
				Segmer	t Length (mi.)	6			
			Inp	outs					
		F	inance Rate:	3.0%					
	Autos					rucks			
	S	Speed (mph):		5	Speed (mph):		
	without im	nprovement	65		without in	nprovement	65		
	with im	nprovement	65		with in	nprovement	65		
						İ			
	Fuel Cost	Per Gallon	\$3.42		Fuel Cost	Per Gallon	\$3.83	Ì	
Fuel Consumption			70	Fuel Consump			70.00	-	
r dei Consumption			0.039	i dei consump		. ,	0.150		
		nprovement				nprovement	0.158		
	with im	nprovement	0.039		with in	nprovement	0.158		
Other Operating Costs	s per Mile ((Table 5-4)	\$0.050	Other	Operating Cos	sts per Mile	\$0.050	1	
(tire:	s, mainten	ance, etc.)			tires, mainten	ance, etc.)			
	Vehicle L	ife (years)	6		Vehicle L	ife (years)	8		
		ehicle Cost	\$25,000			ehicle Cost	\$60,000		
Salvage		End of Life	\$5,000	Salt	age Value at		\$5,000		
Caivage		s per Year	15,000	Jai	-	es per Year	50,000		
	IVIIIC	s per rear	13,000			argo Value	\$0		
						argo value	\$0		
Insurance	per Year ((Table 5-3)	\$1,000		Insuranc	e per Year	\$1,500		
			Calcu	lations					
	Autos					rucks			
Fuel Cost per				Fuel Cost	per VMT (Equ				
	without im	nprovement	\$0.1334		without in	nprovement	\$0.6051		
	with im	nprovement	\$0.1334		with in	nprovement	\$0.6051		
(cost per gallo	on X gallon	s per mile)		(cost per	gallon X gallor	ns per mile)			
Total Ope	rating Cos	st per VMT:		Total	Operating Cos	st per VMT:			
	without im	nprovement	\$0.1834		without in	nprovement	\$0.6551		
	with im	nprovement	\$0.1834		with in	nprovement	\$0.6551		
(fuel cost per VIV	1T + other	oper. cost)		(fuel cost per	VMT + other	oper. cost)			
Amortized Ve	hicle Cost	t Per Year:	\$3,842	Amortize	d Vehicle Cos	t Per Year:	\$7,985		
			(Equation 5-	6)			(Equation 5-6)		
ksheet 5-2: Operat	ing and C	Ownership	Cost						
					Inventory Co	st per Hour	\$0.0000		
							(Equation 5-10)		
							,		
					Inventory Co	st per Mile:			
						nprovement	\$0.0000		
						nprovement	\$0.0000		
				(cost r	er hour / mile	•			
				(,			
Amortized \	/ehicle Co	st per VMT	\$0.2561		Vehicle Co	st per VMT	\$0.1597		
		st per VMT	\$0.0667		Insurance Co		\$0.0300		
							\$3,3300		
Own	ership Co	st per VMT			Ownership Co	st per VMT			
J.III		nprovement	\$0.3228			nprovement	\$0.1897		
		nprovement	\$0.3228			nprovement	\$0.1897		
		insurance)	- J.J.Z.Z.O	(vehicle	+ insurance +	•	\$5.1007		
				(voi noie	. modranos t	vo. noi y)			
	(10111010					st ner \/MT			
		st ner VMT		Oner and i)wnershin (`o				
Oper. and Own	nership Co		\$0.5062	Oper. and			\$0.8448		
	nership Co	nprovement	\$0.5062 \$0.5062	Oper. and	without in	nprovement	\$0.8448 \$0.8448	This value	اج رادعط
Oper. and Own	nership Cos without im with im	nprovement nprovement	\$0.5062 \$0.5062	Oper. and	without in with in	nprovement nprovement		This value	
Oper. and Own	nership Cos without im with im	nprovement	_	Oper. and	without in	nprovement nprovement		This value as the per	
Oper. and Own	nership Cos without im with im perating + o	nprovement nprovement ownership)	_		without in with in	nprovement nprovement ownership)		as the per	

Gene	al Informa	ation				Site Ir	nformation			
001101	Analyst						Hwy 71			
Agency	/Company							Arterial		
Agency					Analysis Ti	-				
		TIGER 4			Analysis Tir		annual	,		
Date	Performed	3/15/201	.2			lysis Year	2013			
					Segment Le	ngth (mi.)	6			
		,		puts						
		Fi	nance Rate:	:	3.0%					
	Autos					Т	rucks			
	S	Speed (mph)	:			S	peed (mph):		
	without im	nprovement	65			without im	provement	65		
	with im	nprovement	65			with im	provement	65		
	Fuel Cost	Per Gallon	\$3.42			Fuel Cost	Per Gallon	\$3.83		
Fuel Consumption			Ψ3.12	Fuel	Consumption			ψ3.03		
ruei Consumption			0.040	ruei	Consumption			0.170		
		nprovement	0.042				provement	0.170		
	with im	nprovement	0.042			with im	provement	0.170		
ther Operating Cost	s per Mile ((Table 5-4)	\$0.050		Other Ope	rating Cos	ts per Mile	\$0.050		
(tire	s, mainten	ance, etc.)			(tire:	s, mainten	ance, etc.)			
,,		. /			, ,		. ,			
	Vehicle I	ife (years)	6			Vehicle I	ife (years)	8		
		ehicle Cost	\$25,000				ehicle Cost	\$60,000		
• •					<u> </u>					
Salvag		End of Life	\$5,000		Salvage		End of Life	\$5,000		
	Mile	s per Year	15,000			Mile	s per Year	50,000		
						C	argo Value	\$0		
Insurance	per Year	(Table 5-3)	\$1,000			Insuranc	e per Year	\$1,500		
		, ,	Calcı	ulations						
	Autos					т	rucks			
Fuel Cost pe		uation 5-3):			Fuel Cost per					
. do. 000. po		nprovement	\$0.1436		. 46. 666. 66.		provement	\$0.6511		
		nprovement	\$0.1436				provement	\$0.6511		
(cost per gall			ψυ. 1430		(cost per gallo			ψ0.0511		
(cost per gail	JII A Yalloli	is per mile)			(cost per gail	II A gallon	s per mile)			
T-4-1 O-		4 \ /\ AT-			T-4-1 O		4 \ /\ AT-			
тотаг Орг	erating Cos		£0.4006		Total Ope		t per VMT:	¢0.7011		
		nprovement	\$0.1936				provement	\$0.7011		
		nprovement	\$0.1936				provement	\$0.7011		
(fuel cost per VI	/IT + other	oper. cost)		(fue	el cost per VIV	T + other	oper. cost)			
			*						1	
Amortized V	ehicle Cost		\$3,842		Amortized Ve	hicle Cost	Per Year:	\$7,985		
			(Equation 5-	-6)				(Equation 5-6)		
ksheet 5-2: Oper	ating and	Ownership	Cost							
					Inv	entory Cos	st per Hour	\$0.0000		
								(Equation 5-10)		
					Inv	entory Cos	st per Mile:			
						without im	provement	\$0.0000		
						with im	provement	\$0.0000		
					(cost per h	our / miles	s per hour)			
							Ĺ			
Amortized '	Vehicle Co	st per VMT	\$0.2561		\	ehicle Co	st per VMT	\$0.1597		
		st per VMT	\$0.0667				st per VMT	\$0.0300		
Ow	nership Co	st per VMT			Own	ership Co	st per VMT			
011		nprovement	\$0.3228		J.III		provement	\$0.1897		
		nprovement	\$0.3228				provement	\$0.1897		
		insurance)	ψυ.υΖΖΟ		(vehicle + in			ψυ. 1097		
	(verileie +	moundiice)			(verile + III	oui ai ice +	iiiveiiloiy)			
Onor 1 O	norobi- C	ot nor \ /\ fT			nor or -1 0	orobi- O	nt nor \ /\ ==			
Oper. and Ow		st per VIVII	\$0.E464	C	per. and Own			\$0.8908		
			\$0.5164				provement		This I	in
		nprovement	\$0.5164		,		provement	\$0.8908	This value	
,					l (Or	erating + (ownership)		as the per	mue co
(0	perating +	ownersnip)			(-)					
Oper. and Own			\$0.0000		per. and Own	_		\$0.0000		

	To	otal Owner	ship and C	Operating	Costs	
Ownership	Costs per VIV	I T				
	Auto	Truck				
Freeway	\$0.506	\$0.845	(From Unit Co	ost Workshee	ts)	
Arterial	\$0.516	\$0.891	(From Unit Co	ost Workshee	ts)	
	Change in Fi	reeway VMT	Change in A	rterial VMT	Increase in	Benefit with
Year	Auto	Truck	Auto	Truck	Cost	Inflation
2013						
2014	12845993	3414758	-20683346	-5498105	-\$6,192,088	\$6,377,851
2015	13060092	3471670	-21028068	-5589740	-\$6,295,290	\$6,678,673
2016	13274192	3528583	-21372790	-5681375	-\$6,398,491	\$6,991,804
2017	13525246	3595319	-21777013	-5788826	-\$6,519,506	\$7,337,761
2018	13702392	3642408	-22062235	-5864645	-\$6,604,894	\$7,656,883
2019	13916492	3699321	-22406958	-5956280	-\$6,708,096	\$8,009,817
2020	14130592	3756233	-22751680	-6047915	-\$6,811,297	\$8,377,036
2021	14383992	3823593	-23159680	-6156371	-\$6,933,442	\$8,783,077
2022	14558792	3870059	-23441125	-6231185	-\$7,017,700	\$9,156,507
2023	14772891	3926971	-23785847	-6322820	-\$7,120,902	\$9,569,896
2024	14986991	3983884	-24130570	-6414455	-\$7,224,103	\$9,999,848
2025	15242738	4051867	-24542348	-6523915	-\$7,347,379	\$10,475,606
2026	15415191	4097709	-24820015	-6597725	-\$7,430,506	\$10,911,949
2027	15629291	4154622	-25164737	-6689360	-\$7,533,707	\$11,395,409
2028	15843391	4211534	-25509459	-6780996	-\$7,636,909	\$11,898,055
2029	16101484	4280141	-25925015	-6891460	-\$7,761,316	\$12,454,634
2030	16271591	4325360	-26198904	-6964266	-\$7,843,312	\$12,963,799
2031	16485690	4382272	-26543627	-7055901	-\$7,946,513	\$13,528,407
2032	16699790	4439185	-26888349	-7147536	-\$8,049,715	\$14,115,224
2033	16960230	4508415	-27307683	-7259004	-\$8,175,253	\$14,765,416
2034	17127990	4553010	-27577794	-7330806	-\$8,256,118	\$15,358,811

Calculation of Saf	ety Costs	per VM	Т
Accident Costs			
Fatal	\$6,200,000		
Non-Fatal	\$85,408		
Statewide Average Crash Rates (Cras	hes per MVM)	
	Total	Fatal	Non-Fatal
Urban Four-Lane Partially Divided	2.17	0.00102	2.16898
Urban Four-Lane Freeway	1.12	0.00070	1.11930
Urban Four Lane Undivided	4.59	0.00095	4.58905
Urban Two Lane	1.01	0.00274	1.00726
Rural Four-Lane Freeway	0.39	0.00075	0.38925
Costs per VMT	Fatal	Non-Fatal	Total
Urban Four-Lane Partially Divided	\$0.0063	\$0.1852	\$0.1916
Urban Four-Lane Freeway	\$0.0043	\$0.0956	\$0.0999
Urban Four Lane Undivided	\$0.0059	\$0.3919	\$0.3978
Urban Two Lane	\$0.0170	\$0.0860	\$0.1030
Rural Four-Lane Freeway	\$0.0047	\$0.0332	\$0.0379

			Total Sa	fety Cos	ts		
_							
Safety Cos	ts per VMT						
		Total					
	r-Lane Parti						
	r-Lane Free،						
	r Lane Undiv						
Urban Two		\$0.103					
Rural Four	-Lane Freew	\$0.038					
		Total Chan	ge in VMT (Al	Modes)			
Year	Urban Four-Lane Partially Divided	Urban Four-Lane Freeway	Urban Four Lane Undivided	Urban Two Lane	Rural Four-Lane Freeway	Total Cost	Benefit with Inflation
2013							
2014	-11103300	-3449250	-9427950	-5650200	19710000	-\$6,057,678	\$6,239,409
2015	-11288355	-3506738	-9585083	-5744370	20038500	-\$6,158,640	\$6,533,701
2016	-11473410	-3564225	-9742215	-5838540	20367000	-\$6,259,601	\$6,840,035
2017	-11690406	-3631635	-9926469	-5948964	20752200	-\$6,377,988	\$7,178,482
2018	-11843520	-3679200	-10056480	-6026880	21024000	-\$6,461,524	\$7,490,677
2019	-12028575	-3736688	-10213613	-6121050	21352500	-\$6,562,485	\$7,835,950
2020	-12213630	-3794175	-10370745	-6215220	21681000	-\$6,663,446	\$8,195,198
2021	-12432654	-3862215	-10556721	-6326676	22069800	-\$6,782,940	\$8,592,426
	-12583740	-3909150	-10685010	-6403560	22338000	-\$6,865,369	\$8,957,749
2023	-12768795	-3966638	-10842143	-6497730	22666500	-\$6,966,330	\$9,362,165
2024	-12953850	-4024125	-10999275	-6591900	22995000	-\$7,067,291	\$9,782,784
	-13174902	-4092795	-11186973	-6704388	23387400	-\$7,187,892	\$10,248,215
2026	-13323960	-4139100	-11313540	-6780240	23652000	-\$7,269,214	\$10,675,086
2027	-13509015	-4196588	-11470673	-6874410	23980500	-\$7,370,175	\$11,148,051
2028	-13694070	-4254075	-11627805	-6968580	24309000	-\$7,471,137	
2029	-13917150	-4323375	-11817225	-7082100	24705000	-\$7,592,843	\$12,184,285
2030	-14064180	-4369050	-11942070	-7156920	24966000	-\$7,673,059	\$12,682,398
2031	-14249235	-4426538	-12099203	-7251090	25294500	-\$7,774,020	\$13,234,750
2032	-14434290	-4484025	-12256335	-7345260	25623000	-\$7,874,982	\$13,808,828
2033	-14659398	-4553955	-12447477	-7459812	26022600	-\$7,997,795	\$14,444,907
2034	-14804400	-4599000	-12570600	-7533600	26280000	-\$8,076,904	\$15,025,421

			Total E	missions	Costs			
Tons of En	nissions per \	VMT (2013)						
		VOC	NO _X					
Freeway	2013	0.0000066	1.408E-06					
	2033	3.63E-07	4.07E-07					
Arterial	2013	7.04E-07	1.056E-06					
	2033	3.85E-07	3.63E-07					
Cost ner To	on of Emissic	ons (2007)						
cost per 1	VOC	NO _X						
Freeway	\$1,300	\$5,300						
Arterial	\$1,300							
Arteriai	\$1,500	\$5,500						
Cost per To	on of Emissic	ons (inflated to	base year)					
	VOC	NO _X						
Freeway	\$1,421	\$5,794						
Arterial	\$1,421	\$5,794						
			Tons per	VMT (Interp	olate betweer	n years)		Inflated
	Change	e in VMT	VO	C	NC) _X		Total
Year	Freeway	Arterial	Freeway	Arterial	Freeway	Arterial	Total Cost	Benefit
2013								
2014	16260750	-26181450	6.451E-07	6.881E-07	1.358E-06	1.021E-06	-\$37,687	\$38,81
2015	16531763	-26617808	6.303E-07	6.721E-07	1.308E-06	9.867E-07	-\$37,511	\$39,79
2016	16802775	-27054165	6.154E-07	6.562E-07	1.258E-06	9.521E-07	-\$37,308	\$40,76
2017	17120565	-27565839	6.006E-07	6.402E-07	1.208E-06	9.174E-07	-\$37,181	\$41,84
2018	17344800	-27926880	5.858E-07	6.243E-07	1.158E-06	8.827E-07	-\$36,824	\$42,68
2019	17615813	-28363238	5.709E-07	6.083E-07	1.108E-06	8.481E-07	-\$36,542	\$43,63
2020	17886825	-28799595	5.561E-07	5.924E-07	1.058E-06	8.134E-07	-\$36,234	\$44,56
2021	18207585	-29316051	5.412E-07	5.764E-07	1.008E-06	7.788E-07	-\$35,998	\$45,60
2022	18428850	-29672310	5.263E-07	5.605E-07	9.576E-07	7.442E-07	-\$35,539	\$46,37
2023	18699863	-30108668	5.115E-07	5.445E-07	9.075E-07	7.095E-07	-\$35,152	\$47,24
2024	18970875	-30545025	4.966E-07	5.286E-07	8.575E-07	6.748E-07	-\$34,739	\$48,08
2025	19294605	-31066263	4.818E-07	5.126E-07	8.074E-07	6.402E-07	-\$34,393	\$49,03
2026	19512900	-31417740	4.67E-07	4.967E-07	7.574E-07	6.055E-07	-\$33,833	\$49,68
2027	19783913	-31854098	4.521E-07	4.807E-07	7.073E-07	5.709E-07	-\$33,340	\$50,43
2028	20054925	-32290455	4.373E-07	4.648E-07	6.573E-07	5.363E-07	-\$32,821	\$51,13
2029	20381625	-32816475	4.224E-07	4.488E-07	6.072E-07	5.016E-07	-\$32,364	\$51,93
2030	20596950	-33163170	4.075E-07	4.329E-07	5.572E-07	4.67E-07	-\$31,704	\$52,40
2031	20867963	-33599528	3.927E-07	4.169E-07	5.071E-07	4.323E-07	-\$31,106	\$52,95
2032	21138975	-34035885	3.778E-07	4.01E-07	4.571E-07	3.976E-07	-\$30,481	\$53,44
2033	21468645	-34566687	3.63E-07	3.85E-07	4.07E-07	3.63E-07	-\$29,912	\$54,02
2034	21681000	-34908600	3.481E-07	3.691E-07	3.57E-07	3.283E-07	-\$29,154	\$54,23
							, -,=-	,=0