

Base Year 2015

Discount 3.00% Discount rate is above and beyond inflation (as stated in regulations)
 Alt. Disc. 7.00%

Year	Construction Costs			Travel Time Benefit			Vehicle Operation Cost Benefit			Safety Benefit		
	Non-Disc.	Disc (3%)	Disc. (7%)	Non-Disc.	Disc (3%)	Disc. (7%)	Non-Disc.	Disc (3%)	Disc. (7%)	Non-Disc.	Disc (3%)	Disc. (7%)
2014	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2015	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2016	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2017	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2018	\$162,500,000	\$148,710,520	\$132,648,405	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2019	\$162,500,000	\$144,379,145	\$123,970,472	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2020	\$162,500,000	\$140,173,927	\$115,860,254	\$62,800,851	\$54,172,566	\$44,776,139	\$3,698,047	\$3,189,968	\$2,636,657	\$3,514,475	\$3,031,617	\$2,505,772
2021	\$162,500,000	\$136,091,192	\$108,280,611	\$75,361,021	\$63,113,669	\$50,216,230	\$4,437,657	\$3,716,468	\$2,956,998	\$4,217,371	\$3,531,981	\$2,810,212
2022	\$0	\$0	\$0	\$87,921,191	\$71,487,974	\$54,752,899	\$5,177,266	\$4,209,591	\$3,224,141	\$4,920,266	\$4,000,626	\$3,064,094
2023	\$0	\$0	\$0	\$100,481,361	\$79,320,915	\$58,481,067	\$5,916,876	\$4,670,836	\$3,443,676	\$5,623,161	\$4,438,975	\$3,272,731
2024	\$0	\$0	\$0	\$113,041,532	\$86,636,921	\$61,487,103	\$6,656,485	\$5,101,642	\$3,620,687	\$6,326,056	\$4,848,395	\$3,440,955
2025	\$0	\$0	\$0	\$125,601,702	\$93,459,462	\$63,849,536	\$7,396,095	\$5,503,389	\$3,759,800	\$7,028,951	\$5,230,200	\$3,573,162
2026	\$0	\$0	\$0	\$138,161,872	\$99,811,076	\$65,639,710	\$8,135,704	\$5,877,406	\$3,865,214	\$7,731,846	\$5,585,650	\$3,673,344
2027	\$0	\$0	\$0	\$150,722,042	\$105,713,408	\$66,922,389	\$8,875,314	\$6,224,967	\$3,940,745	\$8,434,741	\$5,915,958	\$3,745,126
2028	\$0	\$0	\$0	\$163,282,212	\$111,187,241	\$67,756,313	\$9,614,923	\$6,547,295	\$3,989,851	\$9,137,636	\$6,222,286	\$3,791,794
2029	\$0	\$0	\$0	\$175,842,382	\$116,252,530	\$68,194,708	\$10,354,533	\$6,845,566	\$4,015,666	\$9,840,531	\$6,505,750	\$3,816,328
2030	\$0	\$0	\$0	\$188,402,553	\$120,928,429	\$68,285,755	\$11,094,142	\$7,120,908	\$4,021,028	\$10,543,426	\$6,767,424	\$3,821,423
2031	\$0	\$0	\$0	\$200,962,723	\$125,233,325	\$68,073,027	\$11,833,752	\$7,374,403	\$4,008,501	\$11,246,322	\$7,008,336	\$3,809,518
2032	\$0	\$0	\$0	\$213,522,893	\$129,184,862	\$67,595,880	\$12,573,361	\$7,607,090	\$3,980,404	\$11,949,217	\$7,229,473	\$3,782,816
2033	\$0	\$0	\$0	\$226,083,063	\$132,799,972	\$66,889,820	\$13,312,971	\$7,819,967	\$3,938,828	\$12,652,112	\$7,431,782	\$3,743,303
2034	\$0	\$0	\$0	\$238,643,233	\$136,094,901	\$65,986,843	\$14,052,580	\$8,013,990	\$3,885,656	\$13,355,007	\$7,616,174	\$3,692,771
2035	\$0	\$0	\$0	\$251,203,403	\$139,085,234	\$64,915,733	\$14,792,190	\$8,190,077	\$3,822,583	\$14,057,902	\$7,783,519	\$3,632,829
2036	\$0	\$0	\$0	\$263,763,574	\$141,785,918	\$63,702,355	\$15,531,799	\$8,349,107	\$3,751,133	\$14,760,797	\$7,934,656	\$3,564,926
2037	\$0	\$0	\$0	\$276,323,744	\$144,211,290	\$62,369,907	\$16,271,409	\$8,491,926	\$3,672,671	\$15,463,692	\$8,070,385	\$3,490,359
2038	\$0	\$0	\$0	\$288,883,914	\$146,375,095	\$60,939,161	\$17,011,018	\$8,619,342	\$3,588,421	\$16,166,587	\$8,191,476	\$3,410,291
2039	\$0	\$0	\$0	\$301,444,084	\$148,290,515	\$59,428,682	\$17,750,628	\$8,732,133	\$3,499,476	\$16,869,482	\$8,298,667	\$3,325,761
2040	\$0	\$0	\$0	\$314,004,254	\$149,970,181	\$57,855,026	\$18,490,237	\$8,831,040	\$3,406,811	\$17,572,377	\$8,392,665	\$3,237,696
2041	\$0	\$0	\$0	\$339,124,595	\$157,250,286	\$58,395,727	\$19,969,456	\$9,259,731	\$3,438,650	\$18,978,168	\$8,800,076	\$3,267,955
TOTAL	\$650,000,000	\$569,354,784	\$480,759,742	\$4,295,578,198	\$2,552,365,769	\$1,366,514,017	\$252,946,442	\$150,296,843	\$80,467,597	\$240,390,123	\$142,836,073	\$76,473,168
							No Disc.	3% Disc.	7% Disc.			
							Costs	650,000,000	569,354,784	480,759,742		
							Benefits	4,788,914,763	2,845,498,684	1,523,454,775		
							B/C Ratio	7.37	5.00	3.17		

Benefits per VHT and VMT

Value of Time					
Automobiles			Trucks		
Value of Time ¹	\$15.05	per hour	Value of Time ¹	\$25.80	per hour
Occupancy	1.1		Occupancy	1.05	
			Inventory Costs ²	\$1.03	
TOTAL COST	\$16.56	per VHT	TOTAL COST	\$28.12	per VHT
Vehicle Operating Costs					
Automobiles			Trucks		
Fuel Economy	25	MPG	Fuel Economy	6	MPG
Fuel Price	\$3.00	per gallon	Fuel Price	\$3.00	per gallon
Other Maint. ³	\$0.061	per mile	Other Maint. ⁶	\$0.150	per mile
Vehicle Life	10	years	Vehicle Life	5	years
Vehicle Cost	\$20,000		Vehicle Cost ⁶	\$150,000	
Salvage Value	\$2,000		Salvage Value	\$15,000	
Miles per Year	15,000	miles	Miles per Year ⁶	125,000	miles
Finance Rate	3.0%		Finance Rate	3.0%	
Owner. Cost ⁴	\$2,170	per year	Owner. Cost ⁶	\$29,928	per year
Insurance ⁵	\$1,092	per year	Insurance ⁶	\$6,500	per year
Fuel Cost	\$0.120	per VMT	Fuel Cost	\$0.500	per VMT
Other Maint.	\$0.061	per VMT	Other Maint.	\$0.150	per VMT
Ownership	\$0.145	per VMT	Ownership	\$0.239	per VMT
Insurance	\$0.073	per VMT	Insurance	\$0.052	per VMT
TOTAL COST	\$0.398	per VMT	TOTAL COST	\$0.941	per VMT
Safety Costs					
All Vehicles				Cost of Crash ¹	
	Crash Rate (per MVM) ⁷		Crash Cost ¹	AIS 0	\$0
	Build	No-Build		AIS 1	\$28,200
Fatal Crashes	0.00965	0.00965	\$9,400,000	AIS 2	\$441,800
Non-Fatal Crash	2.224	2.224	\$129,490	AIS 3	\$987,000
	Crash Cost (per VMT)			AIS 4	\$2,500,400
Fatal Crashes	\$0.091	\$0.091		AIS 5	\$5,574,200
Non-Fatal Crash	\$0.288	\$0.288		AIS 6	\$9,400,000
TOTAL COST	\$0.379	\$0.379			

1 - Tiger Benefit Cost Analysis (BCA) Resource Guide, 2015, pages 2-3

2 - AASHTO, Equation 5-12, 3% interest rate, \$300,000 Value of Cargo

3 - AASHTO Table 5-4, Avg. of Maint. and Tires for 5 vehicle types, adjust for inflation

4 - AASHTO, Equation 5-6

5 - AASHTO, Table 5-4, Avg. of Insurance for 5 Vehicle Types, adjusted for inflation

6 - From <http://www.thetruckersreport.com/infographics/cost-of-trucking/>

7 - Based on 2012 statewide average crash rates in urban areas

User and Non-User Benefit Analysis for Highways, American Association of State Highway and Transportation Officials (AASHTO)

Estimates of Daily VMT and VHT

Corridor Vehicle Miles and Vehicle Hours Traveled as Shown in PEL						
	Daily VMT			Daily VHT		
	Build	No-Build	Reduction	Build	No-Build	Reduction
2014	801,400	801,400	0	1,045,304	1,045,304	0
2041	1,102,000	964,700	-137,300	1,202,182	1,258,304	56,123
Estimates of VMT and VHT by years using linear interpolation						
	Daily VMT			Daily VHT		
	Build ¹	No-Build	Reduction	Build ¹	No-Build	Reduction
2014	801,400	801,400	0	1,045,304	1,045,304	0
2015	807,448	807,448	0	1,053,193	1,053,193	0
2016	813,496	813,496	0	1,061,082	1,061,082	0
2017	819,544	819,544	0	1,068,971	1,068,971	0
2018	825,593	825,593	0	1,076,860	1,076,860	0
2019	857,067	831,641	-25,426	1,074,356	1,084,749	10,393
2020	868,200	837,689	-30,511	1,080,166	1,092,638	12,472
2021	879,333	843,737	-35,596	1,085,976	1,100,527	14,550
2022	890,467	849,785	-40,681	1,091,787	1,108,415	16,629
2023	901,600	855,833	-45,767	1,097,597	1,116,304	18,708
2024	912,733	861,881	-50,852	1,103,407	1,124,193	20,786
2025	923,867	867,930	-55,937	1,109,217	1,132,082	22,865
2026	935,000	873,978	-61,022	1,115,028	1,139,971	24,943
2027	946,133	880,026	-66,107	1,120,838	1,147,860	27,022
2028	957,267	886,074	-71,193	1,126,648	1,155,749	29,101
2029	968,400	892,122	-76,278	1,132,458	1,163,638	31,179
2030	979,533	898,170	-81,363	1,138,269	1,171,527	33,258
2031	990,667	904,219	-86,448	1,144,079	1,179,415	35,336
2032	1,001,800	910,267	-91,533	1,149,889	1,187,304	37,415
2033	1,012,933	916,315	-96,619	1,155,700	1,195,193	39,494
2034	1,024,067	922,363	-101,704	1,161,510	1,203,082	41,572
2035	1,035,200	928,411	-106,789	1,167,320	1,210,971	43,651
2036	1,046,333	934,459	-111,874	1,173,130	1,218,860	45,729
2037	1,057,467	940,507	-116,959	1,178,941	1,226,749	47,808
2038	1,068,600	946,556	-122,044	1,184,751	1,234,638	49,887
2039	1,079,733	952,604	-127,130	1,190,561	1,242,527	51,965
2040	1,090,867	958,652	-132,215	1,196,372	1,250,415	54,044
2041	1,102,000	964,700	-137,300	1,202,182	1,258,304	56,123

1. VMT and VHT for build scenario is equal to no-build until project opens.

Construction and Maintenance Costs

Year	Build			No-Build			ANNUAL COST (Current Dollars)
	Activity	Costs	User Delay	Activity	Costs	User Delay	
2014		\$0	\$0		\$0	\$0	\$0
2015		\$0	\$0		\$0	\$0	\$0
2016		\$0	\$0		\$0	\$0	\$0
2017		\$0	\$0		\$0	\$0	\$0
2018	ROW, Const & Eng	\$162,500,000	\$0		\$0	\$0	\$162,500,000
2019	Const & Eng	\$162,500,000	\$0		\$0	\$0	\$162,500,000
2020	Const & Eng	\$162,500,000	\$0		\$0	\$0	\$162,500,000
2021	Const & Eng	\$162,500,000	\$0		\$0	\$0	\$162,500,000
2022		\$0	\$0		\$0	\$0	\$0
2023		\$0	\$0		\$0	\$0	\$0
2024		\$0	\$0		\$0	\$0	\$0
2025		\$0	\$0		\$0	\$0	\$0
2026		\$0	\$0		\$0	\$0	\$0
2027		\$0	\$0		\$0	\$0	\$0
2028		\$0	\$0		\$0	\$0	\$0
2029		\$0	\$0		\$0	\$0	\$0
2030		\$0	\$0		\$0	\$0	\$0
2031		\$0	\$0		\$0	\$0	\$0
2032		\$0	\$0		\$0	\$0	\$0
2033		\$0	\$0		\$0	\$0	\$0
2034		\$0	\$0		\$0	\$0	\$0
2035		\$0	\$0		\$0	\$0	\$0
2036		\$0	\$0		\$0	\$0	\$0
2037		\$0	\$0		\$0	\$0	\$0
2038		\$0	\$0		\$0	\$0	\$0
2039		\$0	\$0		\$0	\$0	\$0
2040		\$0	\$0		\$0	\$0	\$0
2041		\$0	\$0		\$0	\$0	\$0

Assumes 31% of construction in 2017, 31% of construction in 2018, and 38% in 2019.

Project is design/bid/build. No distinction was made between ROW, C & E, and construction costs.

Travel Time Benefits

Year	Reduction of VHT		Benefit per Auto VHT	Benefit per Truck VHT	DALIY BENEFIT (Current Dollars)	ANNUAL BENEFIT (Current Dollars)
	Auto	Truck				
2014	0.0	0.0	\$16.555	\$28.117	\$0	\$0
2015	0.0	0.0	\$16.555	\$28.117	\$0	\$0
2016	0.0	0.0	\$16.555	\$28.117	\$0	\$0
2017	0.0	0.0	\$16.555	\$28.117	\$0	\$0
2018	0.0	0.0	\$16.555	\$28.117	\$0	\$0
2019	0.0	0.0	\$16.555	\$28.117	\$0	\$0
2020	10393.1	0.0	\$16.555	\$28.117	\$172,057	\$62,800,851
2021	12471.7	0.0	\$16.555	\$28.117	\$206,469	\$75,361,021
2022	14550.3	0.0	\$16.555	\$28.117	\$240,880	\$87,921,191
2023	16628.9	0.0	\$16.555	\$28.117	\$275,291	\$100,481,361
2024	18707.5	0.0	\$16.555	\$28.117	\$309,703	\$113,041,532
2025	20786.1	0.0	\$16.555	\$28.117	\$344,114	\$125,601,702
2026	22864.7	0.0	\$16.555	\$28.117	\$378,526	\$138,161,872
2027	24943.3	0.0	\$16.555	\$28.117	\$412,937	\$150,722,042
2028	27022.0	0.0	\$16.555	\$28.117	\$447,349	\$163,282,212
2029	29100.6	0.0	\$16.555	\$28.117	\$481,760	\$175,842,382
2030	31179.2	0.0	\$16.555	\$28.117	\$516,171	\$188,402,553
2031	33257.8	0.0	\$16.555	\$28.117	\$550,583	\$200,962,723
2032	35336.4	0.0	\$16.555	\$28.117	\$584,994	\$213,522,893
2033	37415.0	0.0	\$16.555	\$28.117	\$619,406	\$226,083,063
2034	39493.6	0.0	\$16.555	\$28.117	\$653,817	\$238,643,233
2035	41572.2	0.0	\$16.555	\$28.117	\$688,229	\$251,203,403
2036	43650.9	0.0	\$16.555	\$28.117	\$722,640	\$263,763,574
2037	45729.5	0.0	\$16.555	\$28.117	\$757,051	\$276,323,744
2038	47808.1	0.0	\$16.555	\$28.117	\$791,463	\$288,883,914
2039	49886.7	0.0	\$16.555	\$28.117	\$825,874	\$301,444,084
2040	51965.3	0.0	\$16.555	\$28.117	\$860,286	\$314,004,254
2041	56122.5	0.0	\$16.555	\$28.117	\$929,108	\$339,124,595

Assumes that a minimal amount of reduced VHT will be from trucks

Vehicle Operating Benefits

Year	Reduction of VMT		Benefit per Auto VMT	Benefit per Truck VMT	DALIY BENEFIT (2014)	ANNUAL BENEFIT (2014)
	Auto	Truck				
2014						
2015	0	0	\$0.398	\$0.941	\$0	\$0
2016	0	0	\$0.398	\$0.941	\$0	\$0
2017	0	0	\$0.398	\$0.941	\$0	\$0
2018	0	0	\$0.398	\$0.941	\$0	\$0
2019	0	0	\$0.398	\$0.941	\$0	\$0
2020	-25426	0	\$0.398	\$0.941	\$10,132	\$3,698,047
2021	-30511	0	\$0.398	\$0.941	\$12,158	\$4,437,657
2022	-35596	0	\$0.398	\$0.941	\$14,184	\$5,177,266
2023	-40681	0	\$0.398	\$0.941	\$16,211	\$5,916,876
2024	-45767	0	\$0.398	\$0.941	\$18,237	\$6,656,485
2025	-50852	0	\$0.398	\$0.941	\$20,263	\$7,396,095
2026	-55937	0	\$0.398	\$0.941	\$22,290	\$8,135,704
2027	-61022	0	\$0.398	\$0.941	\$24,316	\$8,875,314
2028	-66107	0	\$0.398	\$0.941	\$26,342	\$9,614,923
2029	-71193	0	\$0.398	\$0.941	\$28,369	\$10,354,533
2030	-76278	0	\$0.398	\$0.941	\$30,395	\$11,094,142
2031	-81363	0	\$0.398	\$0.941	\$32,421	\$11,833,752
2032	-86448	0	\$0.398	\$0.941	\$34,448	\$12,573,361
2033	-91533	0	\$0.398	\$0.941	\$36,474	\$13,312,971
2034	-96619	0	\$0.398	\$0.941	\$38,500	\$14,052,580
2035	-101704	0	\$0.398	\$0.941	\$40,527	\$14,792,190
2036	-106789	0	\$0.398	\$0.941	\$42,553	\$15,531,799
2037	-111874	0	\$0.398	\$0.941	\$44,579	\$16,271,409
2038	-116959	0	\$0.398	\$0.941	\$46,606	\$17,011,018
2039	-122044	0	\$0.398	\$0.941	\$48,632	\$17,750,628
2040	-127130	0	\$0.398	\$0.941	\$50,658	\$18,490,237
2041	-137300	0	\$0.398	\$0.941	\$54,711	\$19,969,456

Assumes that only a minimal portion of reduced VMT will be from trucks

Safety Benefits

Year	Build VMT	No-Build VMT	Build Cost per Mile	No-Build Cost per Mile	DALIY BENEFIT (Current Dollars)	ANNUAL BENEFIT (Current Dollars)
	All	All				
2014						
2015	801,400	801,400	\$0.379	\$0.379	\$0	\$0
2016	807,448	807,448	\$0.379	\$0.379	\$0	\$0
2017	813,496	813,496	\$0.379	\$0.379	\$0	\$0
2018	819,544	819,544	\$0.379	\$0.379	\$0	\$0
2019	825,593	825,593	\$0.379	\$0.379	\$0	\$0
2020	857,067	831,641	\$0.379	\$0.379	\$9,629	\$3,514,475
2021	868,200	837,689	\$0.379	\$0.379	\$11,554	\$4,217,371
2022	879,333	843,737	\$0.379	\$0.379	\$13,480	\$4,920,266
2023	890,467	849,785	\$0.379	\$0.379	\$15,406	\$5,623,161
2024	901,600	855,833	\$0.379	\$0.379	\$17,332	\$6,326,056
2025	912,733	861,881	\$0.379	\$0.379	\$19,257	\$7,028,951
2026	923,867	867,930	\$0.379	\$0.379	\$21,183	\$7,731,846
2027	935,000	873,978	\$0.379	\$0.379	\$23,109	\$8,434,741
2028	946,133	880,026	\$0.379	\$0.379	\$25,035	\$9,137,636
2029	957,267	886,074	\$0.379	\$0.379	\$26,960	\$9,840,531
2030	968,400	892,122	\$0.379	\$0.379	\$28,886	\$10,543,426
2031	979,533	898,170	\$0.379	\$0.379	\$30,812	\$11,246,322
2032	990,667	904,219	\$0.379	\$0.379	\$32,738	\$11,949,217
2033	1,001,800	910,267	\$0.379	\$0.379	\$34,663	\$12,652,112
2034	1,012,933	916,315	\$0.379	\$0.379	\$36,589	\$13,355,007
2035	1,024,067	922,363	\$0.379	\$0.379	\$38,515	\$14,057,902
2036	1,035,200	928,411	\$0.379	\$0.379	\$40,441	\$14,760,797
2037	1,046,333	934,459	\$0.379	\$0.379	\$42,366	\$15,463,692
2038	1,057,467	940,507	\$0.379	\$0.379	\$44,292	\$16,166,587
2039	1,068,600	946,556	\$0.379	\$0.379	\$46,218	\$16,869,482
2040	1,079,733	952,604	\$0.379	\$0.379	\$48,143	\$17,572,377
2041	1,102,000	964,700	\$0.379	\$0.379	\$51,995	\$18,978,168