

Base Year 2015

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

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%)
2015	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2016	\$2,352,000	\$2,283,495	\$2,198,131	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2017	\$4,620,000	\$4,354,793	\$4,035,287	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2018	\$9,240,000	\$8,455,909	\$7,542,592	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2019	\$4,620,000	\$4,104,810	\$3,524,576	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2020	\$0	\$0	\$0	\$482,147	\$415,904	\$343,764	\$0	\$0	\$0	\$687,829	\$593,327	\$490,412
2021	\$0	\$0	\$0	\$490,062	\$410,419	\$326,549	\$0	\$0	\$0	\$699,119	\$585,502	\$465,853
2022	\$0	\$0	\$0	\$497,976	\$404,900	\$310,115	\$0	\$0	\$0	\$710,410	\$577,629	\$442,408
2023	\$0	\$0	\$0	\$505,891	\$399,355	\$294,433	\$0	\$0	\$0	\$721,701	\$569,718	\$420,037
2024	\$0	\$0	\$0	\$513,805	\$393,789	\$279,476	\$0	\$0	\$0	\$732,992	\$561,777	\$398,699
2025	\$0	\$0	\$0	\$521,720	\$388,209	\$265,216	\$0	\$0	\$0	\$744,283	\$553,816	\$378,356
2026	\$0	\$0	\$0	\$529,634	\$382,619	\$251,626	\$0	\$0	\$0	\$755,574	\$545,843	\$358,968
2027	\$0	\$0	\$0	\$537,549	\$377,026	\$238,678	\$0	\$0	\$0	\$766,865	\$537,864	\$340,497
2028	\$0	\$0	\$0	\$545,464	\$371,434	\$226,348	\$0	\$0	\$0	\$778,156	\$529,886	\$322,907
2029	\$0	\$0	\$0	\$553,378	\$365,848	\$214,610	\$0	\$0	\$0	\$789,447	\$521,917	\$306,161
2030	\$0	\$0	\$0	\$561,293	\$360,272	\$203,438	\$0	\$0	\$0	\$800,737	\$513,963	\$290,224
2031	\$0	\$0	\$0	\$569,207	\$354,711	\$192,810	\$0	\$0	\$0	\$812,028	\$506,029	\$275,062
2032	\$0	\$0	\$0	\$577,122	\$349,168	\$182,702	\$0	\$0	\$0	\$823,319	\$498,122	\$260,642
2033	\$0	\$0	\$0	\$585,036	\$343,647	\$173,091	\$0	\$0	\$0	\$834,610	\$490,245	\$246,931
2034	\$0	\$0	\$0	\$592,951	\$338,152	\$163,956	\$0	\$0	\$0	\$845,901	\$482,405	\$233,899
2035	\$0	\$0	\$0	\$600,866	\$332,685	\$155,275	\$0	\$0	\$0	\$857,192	\$474,606	\$221,515
2036	\$0	\$0	\$0	\$608,780	\$327,249	\$147,028	\$0	\$0	\$0	\$868,483	\$466,852	\$209,750
2037	\$0	\$0	\$0	\$616,695	\$321,848	\$139,196	\$0	\$0	\$0	\$879,774	\$459,147	\$198,576
2038	\$0	\$0	\$0	\$624,609	\$316,484	\$131,759	\$0	\$0	\$0	\$891,064	\$451,495	\$187,967
2039	\$0	\$0	\$0	\$632,524	\$311,160	\$124,700	\$0	\$0	\$0	\$902,355	\$443,899	\$177,896
TOTAL	\$20,832,000	\$19,199,007	\$17,300,586	\$11,146,710	\$7,264,881	\$4,364,771	\$0	\$0	\$0	\$15,901,839	\$10,364,043	\$6,226,759
							No Disc.	3% Disc.	7% Disc.			
							Costs	\$20,832,000	\$19,199,007	\$17,300,586		
							Benefits	\$27,048,549	\$17,628,924	\$10,591,530		
							B/C Ratio	1.30	0.92	0.61		

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	0.0083	0.0139	\$9,400,000	AIS 2	\$441,800
Non-Fatal Crash	2.24	2.79	\$129,490	AIS 3	\$987,000
	Crash Cost (per VMT)			AIS 4	\$2,500,400
Fatal Crashes	\$0.078	\$0.131		AIS 5	\$5,574,200
Non-Fatal Crash	\$0.290	\$0.361		AIS 6	\$9,400,000
TOTAL COST	\$0.368	\$0.492			

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, Average of Maintenance and Tires for 5 vehicle types, adjust for in

4 - AASHTO, Equation 5-6

5 - AASHTO, Table 5-4, Average 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)

Development of Project VHT and VMT

		ADT	ATS (mph)	Distance (mi)	Hours Per Veh	VHT	VMT
2018	No Build	10,900	40	1.5	0.0375	409	16,350
	Build		50	1.5	0.0300	335	16,350
2038	No Build	14,600	40	1.5	0.0375	548	21,900
	Build		50	1.5	0.0300	449	21,900

- Step 1 Developed ADT values for 2018 and 2038 Traffic
- Step 2 Analyzed 15 minute class counts (Station 041936)
- Step 3 Determined vehicle-hours traveled based on average travel speeds and ADT
- Step 4 Determined vehicle-miles traveled based on ADT and distance

Estimates of VMT and VHT

	Daily VMT			Daily VHT		
	Build	No-Build	Reduction	Build	No-Build	Reduction
2018	16,350	16,350	0	335	409	74
2038	21,900	21,900	0	449	548	99
	Estimates of VMT and VHT by years using linear interpolation					
	Daily VMT			Daily VHT		
	Build ¹	No-Build	Reduction	Build ¹	No-Build	Reduction
2015	15,518	15,518	0	388	388	0
2016	15,795	15,795	0	395	395	0
2017	16,073	16,073	0	402	402	0
2018	16,350	16,350	0	409	409	0
2019	16,628	16,628	0	416	416	0
2020	16,905	16,905	0	347	423	76
2021	17,183	17,183	0	352	430	77
2022	17,460	17,460	0	358	437	79
2023	17,738	17,738	0	364	443	80
2024	18,015	18,015	0	369	450	81
2025	18,293	18,293	0	375	457	82
2026	18,570	18,570	0	381	464	84
2027	18,848	18,848	0	386	471	85
2028	19,125	19,125	0	392	478	86
2029	19,403	19,403	0	398	485	87
2030	19,680	19,680	0	403	492	89
2031	19,958	19,958	0	409	499	90
2032	20,235	20,235	0	415	506	91
2033	20,513	20,513	0	421	513	92
2034	20,790	20,790	0	426	520	94
2035	21,068	21,068	0	432	527	95
2036	21,345	21,345	0	438	534	96
2037	21,623	21,623	0	443	541	97
2038	21,900	21,900	0	449	548	99
2039	22,178	22,178	0	455	554	100

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

2. Assumes 10 percent of traffic uses old route under build alternative.

Construction and Maintenance Costs

Year	Build			No-Build			ANNUAL COST (Current Dollars)
	Activity	Costs	User Delay	Activity	Costs	User Delay	
2015		\$0	\$0		\$0	\$0	\$0
2016	ROW	\$2,352,000	\$0		\$0	\$0	\$2,352,000
2017	Const & Eng	\$4,620,000	\$0		\$0	\$0	\$4,620,000
2018	Const & Eng	\$9,240,000	\$0		\$0	\$0	\$9,240,000
2019	Const & Eng	\$4,620,000	\$0		\$0	\$0	\$4,620,000
2020		\$0	\$0		\$0	\$0	\$0
2021		\$0	\$0		\$0	\$0	\$0
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

Assumes 25% of construction in 2016, 50% of construction in 2017, and 25% in 2018

Assumes right-of way aquisition = 14% of construction costs

Assumes engineering = 10% of project 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 ¹				
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	70.7	5.3	\$16.555	\$28.117	\$1,321	\$482,147
2021	71.9	5.4	\$16.555	\$28.117	\$1,343	\$490,062
2022	73.1	5.5	\$16.555	\$28.117	\$1,364	\$497,976
2023	74.2	5.6	\$16.555	\$28.117	\$1,386	\$505,891
2024	75.4	5.7	\$16.555	\$28.117	\$1,408	\$513,805
2025	76.6	5.8	\$16.555	\$28.117	\$1,429	\$521,720
2026	77.7	5.8	\$16.555	\$28.117	\$1,451	\$529,634
2027	78.9	5.9	\$16.555	\$28.117	\$1,473	\$537,549
2028	80.0	6.0	\$16.555	\$28.117	\$1,494	\$545,464
2029	81.2	6.1	\$16.555	\$28.117	\$1,516	\$553,378
2030	82.4	6.2	\$16.555	\$28.117	\$1,538	\$561,293
2031	83.5	6.3	\$16.555	\$28.117	\$1,559	\$569,207
2032	84.7	6.4	\$16.555	\$28.117	\$1,581	\$577,122
2033	85.8	6.5	\$16.555	\$28.117	\$1,603	\$585,036
2034	87.0	6.5	\$16.555	\$28.117	\$1,625	\$592,951
2035	88.2	6.6	\$16.555	\$28.117	\$1,646	\$600,866
2036	89.3	6.7	\$16.555	\$28.117	\$1,668	\$608,780
2037	90.5	6.8	\$16.555	\$28.117	\$1,690	\$616,695
2038	91.7	6.9	\$16.555	\$28.117	\$1,711	\$624,609
2039	92.8	7.0	\$16.555	\$28.117	\$1,733	\$632,524

1. Assumes 7 percent of VHT is trucks

Vehicle Operating Benefits

Year	Reduction of VMT		Benefit per Auto VMT	Benefit per Truck VMT	DALIY BENEFIT (2014)	ANNUAL BENEFIT (2014)
	Auto	Truck				
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	0	0	\$0.398	\$0.941	\$0	\$0
2021	0	0	\$0.398	\$0.941	\$0	\$0
2022	0	0	\$0.398	\$0.941	\$0	\$0
2023	0	0	\$0.398	\$0.941	\$0	\$0
2024	0	0	\$0.398	\$0.941	\$0	\$0
2025	0	0	\$0.398	\$0.941	\$0	\$0
2026	0	0	\$0.398	\$0.941	\$0	\$0
2027	0	0	\$0.398	\$0.941	\$0	\$0
2028	0	0	\$0.398	\$0.941	\$0	\$0
2029	0	0	\$0.398	\$0.941	\$0	\$0
2030	0	0	\$0.398	\$0.941	\$0	\$0
2031	0	0	\$0.398	\$0.941	\$0	\$0
2032	0	0	\$0.398	\$0.941	\$0	\$0
2033	0	0	\$0.398	\$0.941	\$0	\$0
2034	0	0	\$0.398	\$0.941	\$0	\$0
2035	0	0	\$0.398	\$0.941	\$0	\$0
2036	0	0	\$0.398	\$0.941	\$0	\$0
2037	0	0	\$0.398	\$0.941	\$0	\$0
2038	0	0	\$0.398	\$0.941	\$0	\$0
2039	0	0	\$0.398	\$0.941	\$0	\$0

Assumes 7 percent of VMT is 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				
2015	15,518	15,518	\$0.492	\$0.492	\$0	\$0
2016	15,795	15,795	\$0.492	\$0.492	\$0	\$0
2017	16,073	16,073	\$0.492	\$0.492	\$0	\$0
2018	16,350	16,350	\$0.492	\$0.492	\$0	\$0
2019	16,628	16,628	\$0.492	\$0.492	\$0	\$0
2020	16,905	16,905	\$0.368	\$0.492	\$1,884	\$687,829
2021	17,183	17,183	\$0.368	\$0.492	\$1,915	\$699,119
2022	17,460	17,460	\$0.368	\$0.492	\$1,946	\$710,410
2023	17,738	17,738	\$0.368	\$0.492	\$1,977	\$721,701
2024	18,015	18,015	\$0.368	\$0.492	\$2,008	\$732,992
2025	18,293	18,293	\$0.368	\$0.492	\$2,039	\$744,283
2026	18,570	18,570	\$0.368	\$0.492	\$2,070	\$755,574
2027	18,848	18,848	\$0.368	\$0.492	\$2,101	\$766,865
2028	19,125	19,125	\$0.368	\$0.492	\$2,132	\$778,156
2029	19,403	19,403	\$0.368	\$0.492	\$2,163	\$789,447
2030	19,680	19,680	\$0.368	\$0.492	\$2,194	\$800,737
2031	19,958	19,958	\$0.368	\$0.492	\$2,225	\$812,028
2032	20,235	20,235	\$0.368	\$0.492	\$2,256	\$823,319
2033	20,513	20,513	\$0.368	\$0.492	\$2,287	\$834,610
2034	20,790	20,790	\$0.368	\$0.492	\$2,318	\$845,901
2035	21,068	21,068	\$0.368	\$0.492	\$2,348	\$857,192
2036	21,345	21,345	\$0.368	\$0.492	\$2,379	\$868,483
2037	21,623	21,623	\$0.368	\$0.492	\$2,410	\$879,774
2038	21,900	21,900	\$0.368	\$0.492	\$2,441	\$891,064
2039	22,178	22,178	\$0.368	\$0.492	\$2,472	\$902,355

Under Build Alternative, assumes that 10 percent of traffic remains on old route

2015 Cost Estimates

1	\$	2,147,727.00
2	\$	10,628,655.00
3	\$	489,624.00
4	\$	418,700.00
5	\$	1,225,460.00
6	\$	180,000.00
7	\$	1,532,950.00
8	\$	180,000.00
		<hr/>
		\$ 16,803,116.00