

NICTD
WEST LAKE CORRIDOR
BENEFIT-COST ANALYSIS (2018 \$)

Year	Calendar Year	Capital Costs ¹ (Design/Const)	O&M Costs ²	Farm Crops Production Loss Costs ³	Ecological Acreage Loss (Project)	Ecological Value Per Acre	Ecological Land Loss Costs ⁴	Ecological Acreage Loss Induced Development	Ecological Value Per Acre	Ecological Land Loss Induced Development Costs ⁴	Chicago UZA Estimated Population	Chicago UZA Estimated AVMT-No Build	Per Capita VMT-No Build	AVMT Change ⁵	Proportion Auto Traffic	Auto AVMT Change	VMT Value	Auto VMT Benefits ⁵
0	2017	(\$14,600,000)		\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	8,827,492	67,623,104,735	7,661					
0	2018	(\$68,600,000)		\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	8,859,271	67,866,547,912	7,661					
0	2019	(\$228,660,000)		\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	8,891,164	68,110,867,485	7,661					
0	2020	(\$251,000,000)		\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	8,923,173	68,356,066,607	7,661					
0	2021	(\$74,600,000)		\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	8,955,296	68,602,148,447	7,661					
1	2022	(\$1,130,000)	(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	8,987,535	68,849,116,182	7,661	-55,785,576	1.00	-55,785,576	(\$0.28)	\$15,363,348
2	2023		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,019,890	69,096,973,000	7,661	-55,986,404	1.00	-55,986,404	(\$0.28)	\$15,418,656
3	2024		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,052,362	69,345,722,103	7,661	-56,187,955	1.00	-56,187,955	(\$0.28)	\$15,474,163
4	2025		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,084,950	69,595,366,702	7,661	-56,390,232	1.00	-56,390,232	(\$0.28)	\$15,529,870
5	2026		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,117,656	69,845,910,022	7,661	-56,593,237	1.00	-56,593,237	(\$0.28)	\$15,585,777
6	2027		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,150,480	70,097,355,299	7,661	-56,796,972	1.00	-56,796,972	(\$0.28)	\$15,641,886
7	2028		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,183,421	70,349,705,778	7,661	-57,001,441	1.00	-57,001,441	(\$0.28)	\$15,698,197
8	2029		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,216,482	70,602,964,718	7,661	-57,206,647	1.00	-57,206,647	(\$0.28)	\$15,754,710
9	2030		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,249,661	70,857,135,391	7,661	-57,412,590	1.00	-57,412,590	(\$0.28)	\$15,811,427
10	2031		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,282,960	71,112,221,079	7,661	-57,619,276	1.00	-57,619,276	(\$0.28)	\$15,868,349
11	2032		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,316,378	71,368,225,075	7,661	-57,826,705	1.00	-57,826,705	(\$0.28)	\$15,925,475
12	2033		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,349,917	71,625,150,685	7,661	-58,034,881	1.00	-58,034,881	(\$0.28)	\$15,982,806
13	2034		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,383,577	71,883,001,227	7,661	-58,243,807	1.00	-58,243,807	(\$0.28)	\$16,040,344
14	2035		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,417,358	72,141,780,032	7,661	-58,453,485	1.00	-58,453,485	(\$0.28)	\$16,098,090
15	2036		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,451,260	72,401,490,440	7,661	-58,663,917	1.00	-58,663,917	(\$0.28)	\$16,156,043
16	2037		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,485,285	72,662,135,806	7,661	-58,875,107	1.00	-58,875,107	(\$0.28)	\$16,214,205
17	2038		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,519,432	72,923,719,494	7,661	-59,087,058	1.00	-59,087,058	(\$0.28)	\$16,272,576
18	2039		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,553,702	73,186,244,885	7,661	-59,299,771	1.00	-59,299,771	(\$0.28)	\$16,331,157
19	2040		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,588,095	73,449,715,366	7,661	-59,513,250	1.00	-59,513,250	(\$0.28)	\$16,389,949
20	2041		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,622,612	73,714,134,341	7,661	-59,727,498	1.00	-59,727,498	(\$0.28)	\$16,448,953
21	2042		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,657,254	73,979,505,225	7,661	-59,942,517	1.00	-59,942,517	(\$0.28)	\$16,508,169
22	2043		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,692,020	74,245,831,444	7,661	-60,158,310	1.00	-60,158,310	(\$0.28)	\$16,567,599
23	2044		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,726,911	74,513,116,437	7,661	-60,374,880	1.00	-60,374,880	(\$0.28)	\$16,627,242
24	2045		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,761,928	74,781,363,656	7,661	-60,592,229	1.00	-60,592,229	(\$0.28)	\$16,687,100
25	2046		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,797,071	75,050,576,565	7,661	-60,810,361	1.00	-60,810,361	(\$0.28)	\$16,747,173
26	2047		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,832,341	75,320,758,641	7,661	-61,029,279	1.00	-61,029,279	(\$0.28)	\$16,807,463
27	2048		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,867,737	75,591,913,372	7,661	-61,248,984	1.00	-61,248,984	(\$0.28)	\$16,867,970
28	2049		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,903,261	75,864,044,260	7,661	-61,469,480	1.00	-61,469,480	(\$0.28)	\$16,928,695
29	2050		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,938,913	76,137,154,820	7,661	-61,690,770	1.00	-61,690,770	(\$0.28)	\$16,989,638
30	2051		(\$9,800,000)	\$0	96	(\$11,969)	(\$1,149,024)	0	\$0	\$0	9,974,693	76,411,248,577	7,661	-61,912,857	1.00	-61,912,857	(\$0.28)	\$17,050,801
TOTALS		(\$638,590,000)	(\$294,000,000)	\$0			(\$40,215,840)			\$0		2,517,562,315,809		-1,763,935,476		-1,763,935,476		\$485,787,830
3% Discount		(\$611,069,059)	(\$175,784,560)	\$0			(\$26,158,451)			\$0								\$288,178,148
5% Discount		(\$594,001,915)	(\$130,135,180)	\$0			(\$20,685,075)			\$0								\$212,306,788
7% Discount		(\$577,887,093)	(\$99,265,180)	\$0			(\$16,952,011)			\$0								\$161,229,649

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Year	Calendar Year	Proportion Heavy Tk	Diesel Bus VMT Decrease	VMT Value	Diesel Bus VMT Benefits ⁵	Train Miles Traveled	Annual Ridership	Seat Miles	Vehicle Revenue Miles	Auto Drivers Convert to Riding Train	Assumed 20% Drivers Working 1/2 hr on train	Productivity Rate Per Hour	Increased Worker Productivity Benefits ^{5a}	Auto Noise Value (per VMT)	Auto Noise Benefits ⁶	Bus Noise Value (per VMT)	Bus Noise Benefits ⁶	Train Noise Value (per VMT)	Train Noise Costs ⁶	CO ₂ Change (MT)	CO ₂ Change Train (MT)	CO ₂ Value (per MT)	
0	2017																						
0	2018																						
0	2019																						
0	2020																						
0	2021																						\$63.47
1	2022	1.00	0	(\$11.23)	\$0	211,120	1,013,754	214,023,744,480	1,227,395	811,003	162,201	\$27.22	\$2,207,551	(\$0.0153)	\$853,519	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-20,551	633	\$65.66	
2	2023	1.00	0	(\$11.23)	\$0	211,120	1,017,404	214,794,229,960	1,231,814	813,923	162,785	\$27.22	\$2,215,498	(\$0.0153)	\$856,592	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-20,625	633	\$66.76	
3	2024	1.00	0	(\$11.23)	\$0	211,120	1,021,066	215,567,489,188	1,236,249	816,853	163,371	\$27.22	\$2,223,474	(\$0.0153)	\$859,676	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-20,700	633	\$67.85	
4	2025	1.00	0	(\$11.23)	\$0	211,120	1,024,742	216,343,532,149	1,240,699	819,794	163,959	\$27.22	\$2,231,478	(\$0.0153)	\$862,771	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-20,774	633	\$68.94	
5	2026	1.00	0	(\$11.23)	\$0	211,120	1,028,431	217,122,368,865	1,245,166	822,745	164,549	\$27.22	\$2,239,512	(\$0.0153)	\$865,877	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-20,849	633	\$68.94	
6	2027	1.00	0	(\$11.23)	\$0	211,120	1,032,133	217,904,009,393	1,249,648	825,707	165,141	\$27.22	\$2,247,574	(\$0.0153)	\$868,994	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-20,924	633	\$71.13	
7	2028	1.00	0	(\$11.23)	\$0	211,120	1,035,849	218,688,463,827	1,254,147	828,679	165,736	\$27.22	\$2,255,665	(\$0.0153)	\$872,122	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-20,999	633	\$72.23	
8	2029	1.00	0	(\$11.23)	\$0	211,120	1,039,578	219,475,742,296	1,258,662	831,663	166,333	\$27.22	\$2,263,785	(\$0.0153)	\$875,262	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-21,075	633	\$73.32	
9	2030	1.00	0	(\$11.23)	\$0	211,120	1,043,321	220,265,854,969	1,263,193	834,657	166,931	\$27.22	\$2,271,935	(\$0.0153)	\$878,413	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-21,151	633	\$74.42	
10	2031	1.00	0	(\$11.23)	\$0	211,120	1,047,077	221,058,812,046	1,267,741	837,661	167,532	\$27.22	\$2,280,114	(\$0.0153)	\$881,575	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-21,227	633	\$75.51	
11	2032	1.00	0	(\$11.23)	\$0	211,120	1,050,846	221,854,623,770	1,272,304	840,677	168,135	\$27.22	\$2,288,322	(\$0.0153)	\$884,749	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-21,303	633	\$77.70	
12	2033	1.00	0	(\$11.23)	\$0	211,120	1,054,629	222,653,300,415	1,276,885	843,703	168,741	\$27.22	\$2,296,560	(\$0.0153)	\$887,934	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-21,380	633	\$78.79	
13	2034	1.00	0	(\$11.23)	\$0	211,120	1,058,426	223,454,852,297	1,281,481	846,741	169,348	\$27.22	\$2,304,828	(\$0.0153)	\$891,130	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-21,457	633	\$79.89	
14	2035	1.00	0	(\$11.23)	\$0	211,120	1,062,236	224,259,289,765	1,286,095	849,789	169,958	\$27.22	\$2,313,125	(\$0.0153)	\$894,338	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-21,534	633	\$80.98	
15	2036	1.00	0	(\$11.23)	\$0	211,120	1,066,060	225,066,623,208	1,290,725	852,848	170,570	\$27.22	\$2,321,453	(\$0.0153)	\$897,558	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-21,612	633	\$83.17	
16	2037	1.00	0	(\$11.23)	\$0	211,120	1,081,495	228,325,224,400	1,309,412	865,196	173,039	\$27.22	\$2,355,064	(\$0.0153)	\$900,789	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-21,690	633	\$84.26	
17	2038	1.00	0	(\$11.23)	\$0	211,120	1,085,388	229,147,195,208	1,314,126	868,311	173,662	\$27.22	\$2,363,542	(\$0.0153)	\$904,032	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-21,768	633	\$85.36	
18	2039	1.00	0	(\$11.23)	\$0	211,120	1,089,296	229,972,125,111	1,318,857	871,437	174,287	\$27.22	\$2,372,050	(\$0.0153)	\$907,286	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-21,846	633	\$86.45	
19	2040	1.00	0	(\$11.23)	\$0	211,120	1,093,217	230,800,024,761	1,323,605	874,574	174,915	\$27.22	\$2,380,590	(\$0.0153)	\$910,553	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-21,925	633	\$87.55	
20	2041	1.00	0	(\$11.23)	\$0	211,120	1,097,153	231,630,904,850	1,328,370	877,722	175,544	\$27.22	\$2,389,160	(\$0.0153)	\$913,831	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-22,004	633	\$89.74	
21	2042	1.00	0	(\$11.23)	\$0	211,120	1,101,103	232,464,776,108	1,333,152	880,882	176,176	\$27.22	\$2,397,761	(\$0.0153)	\$917,121	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-22,083	633	\$90.83	
22	2043	1.00	0	(\$11.23)	\$0	211,120	1,105,067	233,301,649,302	1,337,951	884,053	176,811	\$27.22	\$2,406,393	(\$0.0153)	\$920,422	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-22,162	633	\$91.93	
23	2044	1.00	0	(\$11.23)	\$0	211,120	1,109,045	234,141,535,239	1,342,768	887,236	177,447	\$27.22	\$2,415,056	(\$0.0153)	\$923,736	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-22,242	633	\$93.02	
24	2045	1.00	0	(\$11.23)	\$0	211,120	1,113,037	234,984,444,766	1,347,602	890,430	178,086	\$27.22	\$2,423,750	(\$0.0153)	\$927,061	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-22,322	633	\$94.11	
25	2046	1.00	0	(\$11.23)	\$0	211,120	1,117,044	235,830,388,767	1,352,453	893,635	178,727	\$27.22	\$2,432,476	(\$0.0153)	\$930,399	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-22,403	633	\$95.21	
26	2047	1.00	0	(\$11.23)	\$0	211,120	1,121,066	236,679,378,167	1,357,322	896,853	179,371	\$27.22	\$2,441,233	(\$0.0153)	\$933,748	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-22,483	633	\$96.30	
27	2048	1.00	0	(\$11.23)	\$0	211,120	1,125,101	237,531,423,928	1,362,209	900,081	180,016	\$27.22	\$2,450,021	(\$0.0153)	\$937,109	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-22,564	633	\$97.40	
28	2049	1.00	0	(\$11.23)	\$0	211,120	1,129,152	238,386,537,054	1,367,113	903,321	180,664	\$27.22	\$2,458,841	(\$0.0153)	\$940,483	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-22,645	633	\$97.40	
29	2050	1.00	0	(\$11.23)	\$0	211,120	1,133,217	239,244,728,588	1,372,034	906,573	181,315	\$27.22	\$2,467,693	(\$0.0153)	\$943,869	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-22,727	633	\$97.40	
30	2051	1.00	0	(\$11.23)	\$0	211,120	1,137,296	240,106,009,610	1,376,973	909,837	181,967	\$27.22	\$2,476,577	(\$0.0153)	\$947,267	(\$0.1558)	\$0	\$0.9945	(\$209,959)	-22,809	633	\$97.40	
TOTALS			0		\$0	6,333,600	32,233,229						\$70,191,079		\$26,988,213		\$0		(\$6,298,765)	-608,657	18,982		
3% Discount					\$0								\$41,589,413		\$16,009,897		\$0		(\$3,766,074)				
5% Discount					\$0								\$30,617,584		\$11,794,822		\$0		(\$2,788,064)				
7% Discount					\$0								\$23,236,474		\$8,957,203		\$0		(\$2,126,694)				

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Year	Calendar Year	Undiscounted CO2 Value @ 3% Avg SCC	NPV CO2 Benefits @ 3% Avg SCC ⁷ [Undisc/(1.03 ^A)]	NO _x Change Auto (MT)	NO _x Change Train (MT)	NO _x Value (per MT)	NO _x Benefits ⁸	PM ₁₀ Change Auto (per MT)	PM _{2.5} Change Auto (per MT)	PM ₁₀ Change Train (per MT)	PM _{2.5} Change Train (per MT)	PM Value (per MT)	PM Benefit ⁹	VOC Change Auto (MT)	VOC Value (per MT)	VOC Benefits ¹⁰	Resource Externalities Value	Resource Consumption Benefits ¹¹	Parking Internal + External Benefits Value	Total Parking Benefits ¹²
0	2017																			
0	2018																			
0	2019																			
0	2020																			
0	2021																			
1	2022	\$1,307,860	\$1,269,767	-38.66	0.64	(\$8,498)	\$323,091	-0.25	-0.23	0.05	0.03	(\$388,785)	\$151,396	-57.68	(\$2,157)	\$124,421	(0.05)	\$2,945,478	(\$0.148)	\$0
2	2023	\$1,334,709	\$1,258,092	-38.80	0.64	(\$8,498)	\$324,273	-0.25	-0.23	0.05	0.03	(\$388,785)	\$152,060	-57.89	(\$2,157)	\$124,869	(0.05)	\$2,956,082	(\$0.148)	\$0
3	2024	\$1,361,539	\$1,246,001	-38.94	0.64	(\$8,498)	\$325,460	-0.25	-0.23	0.05	0.03	(\$388,785)	\$152,726	-58.10	(\$2,157)	\$125,318	(0.05)	\$2,966,724	(\$0.148)	\$0
4	2025	\$1,388,550	\$1,233,708	-39.08	0.64	(\$8,498)	\$326,651	-0.25	-0.23	0.05	0.03	(\$388,785)	\$153,394	-58.31	(\$2,157)	\$125,769	(0.05)	\$2,977,404	(\$0.148)	\$0
5	2026	\$1,393,705	\$1,202,223	-39.22	0.64	(\$8,498)	\$327,847	-0.25	-0.23	0.05	0.03	(\$388,785)	\$154,065	-58.52	(\$2,157)	\$126,222	(0.05)	\$2,988,123	(\$0.148)	\$0
6	2027	\$1,443,318	\$1,208,756	-39.36	0.64	(\$8,498)	\$329,047	-0.25	-0.23	0.05	0.03	(\$388,785)	\$154,739	-58.73	(\$2,157)	\$126,676	(0.05)	\$2,998,880	(\$0.148)	\$0
7	2028	\$1,471,079	\$1,196,122	-39.50	0.64	(\$8,498)	\$330,251	-0.25	-0.23	0.05	0.03	(\$388,785)	\$155,414	-58.94	(\$2,157)	\$127,132	(0.05)	\$3,009,676	(\$0.148)	\$0
8	2029	\$1,498,821	\$1,183,183	-39.64	0.64	(\$8,498)	\$331,459	-0.25	-0.23	0.05	0.03	(\$388,785)	\$156,092	-59.15	(\$2,157)	\$127,590	(0.05)	\$3,020,511	(\$0.148)	\$0
9	2030	\$1,526,954	\$1,170,283	-39.79	0.64	(\$8,498)	\$332,672	-0.25	-0.24	0.05	0.03	(\$388,785)	\$156,773	-59.36	(\$2,157)	\$128,049	(0.05)	\$3,031,385	(\$0.148)	\$0
10	2031	\$1,555,068	\$1,157,117	-39.93	0.64	(\$8,498)	\$333,889	-0.25	-0.24	0.05	0.03	(\$388,785)	\$157,456	-59.58	(\$2,157)	\$128,510	(0.05)	\$3,042,298	(\$0.148)	\$0
11	2032	\$1,606,107	\$1,160,286	-40.07	0.64	(\$8,498)	\$335,111	-0.25	-0.24	0.05	0.03	(\$388,785)	\$158,141	-59.79	(\$2,157)	\$128,973	(0.05)	\$3,053,250	(\$0.148)	\$0
12	2033	\$1,634,681	\$1,146,532	-40.22	0.64	(\$8,498)	\$336,337	-0.26	-0.24	0.05	0.03	(\$388,785)	\$158,829	-60.01	(\$2,157)	\$129,437	(0.05)	\$3,064,242	(\$0.148)	\$0
13	2034	\$1,663,652	\$1,132,866	-40.36	0.64	(\$8,498)	\$337,567	-0.26	-0.24	0.05	0.03	(\$388,785)	\$159,520	-60.22	(\$2,157)	\$129,903	(0.05)	\$3,075,273	(\$0.148)	\$0
14	2035	\$1,692,605	\$1,119,012	-40.51	0.64	(\$8,498)	\$338,802	-0.26	-0.24	0.05	0.03	(\$388,785)	\$160,213	-60.44	(\$2,157)	\$130,371	(0.05)	\$3,086,344	(\$0.148)	\$0
15	2036	\$1,744,827	\$1,119,938	-40.65	0.64	(\$8,498)	\$340,041	-0.26	-0.24	0.05	0.03	(\$388,785)	\$160,908	-60.66	(\$2,157)	\$130,840	(0.05)	\$3,097,455	(\$0.148)	\$0
16	2037	\$1,774,250	\$1,105,654	-40.80	0.64	(\$8,498)	\$341,285	-0.26	-0.24	0.05	0.03	(\$388,785)	\$161,606	-60.88	(\$2,157)	\$131,311	(0.05)	\$3,108,606	(\$0.148)	\$0
17	2038	\$1,804,078	\$1,091,497	-40.95	0.64	(\$8,498)	\$342,533	-0.26	-0.24	0.05	0.03	(\$388,785)	\$162,306	-61.10	(\$2,157)	\$131,784	(0.05)	\$3,119,797	(\$0.148)	\$0
18	2039	\$1,833,889	\$1,077,217	-41.09	0.64	(\$8,498)	\$343,786	-0.26	-0.24	0.05	0.03	(\$388,785)	\$163,009	-61.32	(\$2,157)	\$132,259	(0.05)	\$3,131,028	(\$0.148)	\$0
19	2040	\$1,864,110	\$1,063,076	-41.24	0.64	(\$8,498)	\$345,043	-0.26	-0.24	0.05	0.03	(\$388,785)	\$163,715	-61.54	(\$2,157)	\$132,735	(0.05)	\$3,142,300	(\$0.148)	\$0
20	2041	\$1,917,822	\$1,061,852	-41.39	0.64	(\$8,498)	\$346,305	-0.26	-0.24	0.05	0.03	(\$388,785)	\$164,423	-61.76	(\$2,157)	\$133,213	(0.05)	\$3,153,612	(\$0.148)	\$0
21	2042	\$1,948,311	\$1,047,313	-41.54	0.64	(\$8,498)	\$347,571	-0.26	-0.25	0.05	0.03	(\$388,785)	\$165,134	-61.98	(\$2,157)	\$133,692	(0.05)	\$3,164,965	(\$0.148)	\$0
22	2043	\$1,979,214	\$1,032,937	-41.69	0.64	(\$8,498)	\$348,842	-0.26	-0.25	0.05	0.03	(\$388,785)	\$165,847	-62.20	(\$2,157)	\$134,173	(0.05)	\$3,176,359	(\$0.148)	\$0
23	2044	\$2,010,103	\$1,018,503	-41.84	0.64	(\$8,498)	\$350,117	-0.27	-0.25	0.05	0.03	(\$388,785)	\$166,562	-62.43	(\$2,157)	\$134,656	(0.05)	\$3,187,794	(\$0.148)	\$0
24	2045	\$2,041,193	\$1,004,132	-41.99	0.64	(\$8,498)	\$351,397	-0.27	-0.25	0.05	0.03	(\$388,785)	\$167,281	-62.65	(\$2,157)	\$135,141	(0.05)	\$3,199,270	(\$0.148)	\$0
25	2046	\$2,072,702	\$989,934	-42.14	0.64	(\$8,498)	\$352,682	-0.27	-0.25	0.05	0.03	(\$388,785)	\$168,001	-62.88	(\$2,157)	\$135,628	(0.05)	\$3,210,787	(\$0.148)	\$0
26	2047	\$2,104,198	\$975,706	-42.29	0.64	(\$8,498)	\$353,971	-0.27	-0.25	0.05	0.03	(\$388,785)	\$168,725	-63.10	(\$2,157)	\$136,116	(0.05)	\$3,222,346	(\$0.148)	\$0
27	2048	\$2,136,117	\$961,657	-42.45	0.64	(\$8,498)	\$355,265	-0.27	-0.25	0.05	0.03	(\$388,785)	\$169,451	-63.33	(\$2,157)	\$136,606	(0.05)	\$3,233,946	(\$0.148)	\$0
28	2049	\$2,144,029	\$937,105	-42.60	0.64	(\$8,498)	\$356,564	-0.27	-0.25	0.05	0.03	(\$388,785)	\$170,180	-63.56	(\$2,157)	\$137,098	(0.05)	\$3,245,589	(\$0.148)	\$0
29	2050	\$2,151,969	\$913,180	-42.75	0.64	(\$8,498)	\$357,867	-0.27	-0.25	0.05	0.03	(\$388,785)	\$170,911	-63.79	(\$2,157)	\$137,591	(0.05)	\$3,257,273	(\$0.148)	\$0
30	2051	\$2,159,938	\$889,866	-42.91	0.64	(\$8,498)	\$359,175	-0.27	-0.25	0.05	0.03	(\$388,785)	\$171,645	-64.02	(\$2,157)	\$138,087	(0.05)	\$3,268,999	(\$0.148)	\$0
TOTALS			\$32,973,513	-1,222	19		\$10,224,906	-7.76	-7.23	1.58	0.88		\$4,840,523	-1,824		\$3,934,172		\$93,135,793		\$0
3% Discount			\$32,973,513				\$6,064,835						\$2,866,850			\$2,333,822		\$55,249,841		\$0
5% Discount			\$32,973,513				\$4,467,739						\$2,109,945			\$1,719,375		\$40,703,698		\$0
7% Discount			\$32,973,513				\$3,392,639						\$1,600,858			\$1,305,725		\$30,911,131		\$0

NICTD
WEST LAKE CORRIDOR
BENEFIT-COST ANALYSIS (2018 \$)

Year	Calendar Year	Walking Health Costs Value - External	Bicycling Health Costs Value - External	Health Benefits - Increased Cardiovascular Activity ¹³	Walking Mortality Costs Value - Internal	Bicycling Mortality Costs Value - Internal	Mortality Benefits - Increased Cardiovascular Activity ¹³	Barrier Effect Value-Car	Barrier Effect Value-Heavy Bus	Barrier Effect Benefits ¹⁴	Transport Diversity Value	Transport Diversity Benefits-Auto ¹⁵	Uncompensated Moving Costs Value per HH	Number of HHs	Uncompensated HH Displacement Moving Costs ¹⁶	Travel Time Savings (Vehicle Hours Traveled-VHT)	Time Value (per hr)	Travel Time Savings ¹⁷	Property Value Increase Less Travel Time Savings Benefit
0	2017																		
0	2018																		
0	2019																		
0	2020																		
0	2021																		
1	2022	(\$0.28109)	(\$0.11615)	\$30,203	(\$0.28109)	(\$0.11615)	\$30,203	(\$0.01690)	(\$0.02745)	\$942,776	(\$0.00845)	\$471,388				2,399,875	\$14.03	\$33,670,246	
2	2023	(\$0.28109)	(\$0.11615)	\$30,312	(\$0.28109)	(\$0.11615)	\$30,312	(\$0.01690)	(\$0.02745)	\$946,170	(\$0.00845)	\$473,085				2,399,875	\$14.03	\$33,670,246	
3	2024	(\$0.28109)	(\$0.11615)	\$30,421	(\$0.28109)	(\$0.11615)	\$30,421	(\$0.01690)	(\$0.02745)	\$949,576	(\$0.00845)	\$474,788				2,399,875	\$14.03	\$33,670,246	
4	2025	(\$0.28109)	(\$0.11615)	\$30,530	(\$0.28109)	(\$0.11615)	\$30,530	(\$0.01690)	(\$0.02745)	\$952,995	(\$0.00845)	\$476,497				2,399,875	\$14.03	\$33,670,246	
5	2026	(\$0.28109)	(\$0.11615)	\$30,640	(\$0.28109)	(\$0.11615)	\$30,640	(\$0.01690)	(\$0.02745)	\$956,426	(\$0.00845)	\$478,213				2,399,875	\$14.03	\$33,670,246	
6	2027	(\$0.28109)	(\$0.11615)	\$30,750	(\$0.28109)	(\$0.11615)	\$30,750	(\$0.01690)	(\$0.02745)	\$959,869	(\$0.00845)	\$479,934				2,399,875	\$14.03	\$33,670,246	
7	2028	(\$0.28109)	(\$0.11615)	\$30,861	(\$0.28109)	(\$0.11615)	\$30,861	(\$0.01690)	(\$0.02745)	\$963,324	(\$0.00845)	\$481,662				2,399,875	\$14.03	\$33,670,246	
8	2029	(\$0.28109)	(\$0.11615)	\$30,972	(\$0.28109)	(\$0.11615)	\$30,972	(\$0.01690)	(\$0.02745)	\$966,792	(\$0.00845)	\$483,396				2,399,875	\$14.03	\$33,670,246	
9	2030	(\$0.28109)	(\$0.11615)	\$31,084	(\$0.28109)	(\$0.11615)	\$31,084	(\$0.01690)	(\$0.02745)	\$970,273	(\$0.00845)	\$485,136				2,399,875	\$14.03	\$33,670,246	
10	2031	(\$0.28109)	(\$0.11615)	\$31,196	(\$0.28109)	(\$0.11615)	\$31,196	(\$0.01690)	(\$0.02745)	\$973,766	(\$0.00845)	\$486,883				2,399,875	\$14.03	\$33,670,246	
11	2032	(\$0.28109)	(\$0.11615)	\$31,308	(\$0.28109)	(\$0.11615)	\$31,308	(\$0.01690)	(\$0.02745)	\$977,271	(\$0.00845)	\$488,636				2,399,875	\$14.03	\$33,670,246	
12	2033	(\$0.28109)	(\$0.11615)	\$31,421	(\$0.28109)	(\$0.11615)	\$31,421	(\$0.01690)	(\$0.02745)	\$980,789	(\$0.00845)	\$490,395				2,399,875	\$14.03	\$33,670,246	
13	2034	(\$0.28109)	(\$0.11615)	\$31,534	(\$0.28109)	(\$0.11615)	\$31,534	(\$0.01690)	(\$0.02745)	\$984,320	(\$0.00845)	\$492,160				2,399,875	\$14.03	\$33,670,246	
14	2035	(\$0.28109)	(\$0.11615)	\$31,647	(\$0.28109)	(\$0.11615)	\$31,647	(\$0.01690)	(\$0.02745)	\$987,864	(\$0.00845)	\$493,932				2,399,875	\$14.03	\$33,670,246	
15	2036	(\$0.28109)	(\$0.11615)	\$31,761	(\$0.28109)	(\$0.11615)	\$31,761	(\$0.01690)	(\$0.02745)	\$991,420	(\$0.00845)	\$495,710				2,399,875	\$14.03	\$33,670,246	
16	2037	(\$0.28109)	(\$0.11615)	\$32,221	(\$0.28109)	(\$0.11615)	\$32,221	(\$0.01690)	(\$0.02745)	\$994,989	(\$0.00845)	\$497,495				2,399,875	\$14.03	\$33,670,246	
17	2038	(\$0.28109)	(\$0.11615)	\$32,337	(\$0.28109)	(\$0.11615)	\$32,337	(\$0.01690)	(\$0.02745)	\$998,571	(\$0.00845)	\$499,286				2,399,875	\$14.03	\$33,670,246	
18	2039	(\$0.28109)	(\$0.11615)	\$32,453	(\$0.28109)	(\$0.11615)	\$32,453	(\$0.01690)	(\$0.02745)	\$1,002,166	(\$0.00845)	\$501,083				2,399,875	\$14.03	\$33,670,246	
19	2040	(\$0.28109)	(\$0.11615)	\$32,570	(\$0.28109)	(\$0.11615)	\$32,570	(\$0.01690)	(\$0.02745)	\$1,005,774	(\$0.00845)	\$502,887				2,399,875	\$14.03	\$33,670,246	
20	2041	(\$0.28109)	(\$0.11615)	\$32,687	(\$0.28109)	(\$0.11615)	\$32,687	(\$0.01690)	(\$0.02745)	\$1,009,395	(\$0.00845)	\$504,697				2,399,875	\$14.03	\$33,670,246	
21	2042	(\$0.28109)	(\$0.11615)	\$32,805	(\$0.28109)	(\$0.11615)	\$32,805	(\$0.01690)	(\$0.02745)	\$1,013,029	(\$0.00845)	\$506,514				2,399,875	\$14.03	\$33,670,246	
22	2043	(\$0.28109)	(\$0.11615)	\$32,923	(\$0.28109)	(\$0.11615)	\$32,923	(\$0.01690)	(\$0.02745)	\$1,016,675	(\$0.00845)	\$508,338				2,399,875	\$14.03	\$33,670,246	
23	2044	(\$0.28109)	(\$0.11615)	\$33,042	(\$0.28109)	(\$0.11615)	\$33,042	(\$0.01690)	(\$0.02745)	\$1,020,335	(\$0.00845)	\$510,168				2,399,875	\$14.03	\$33,670,246	
24	2045	(\$0.28109)	(\$0.11615)	\$33,161	(\$0.28109)	(\$0.11615)	\$33,161	(\$0.01690)	(\$0.02745)	\$1,024,009	(\$0.00845)	\$512,004				2,399,875	\$14.03	\$33,670,246	
25	2046	(\$0.28109)	(\$0.11615)	\$33,280	(\$0.28109)	(\$0.11615)	\$33,280	(\$0.01690)	(\$0.02745)	\$1,027,695	(\$0.00845)	\$513,848				2,399,875	\$14.03	\$33,670,246	
26	2047	(\$0.28109)	(\$0.11615)	\$33,400	(\$0.28109)	(\$0.11615)	\$33,400	(\$0.01690)	(\$0.02745)	\$1,031,395	(\$0.00845)	\$515,697				2,399,875	\$14.03	\$33,670,246	
27	2048	(\$0.28109)	(\$0.11615)	\$33,520	(\$0.28109)	(\$0.11615)	\$33,520	(\$0.01690)	(\$0.02745)	\$1,035,108	(\$0.00845)	\$517,554				2,399,875	\$14.03	\$33,670,246	
28	2049	(\$0.28109)	(\$0.11615)	\$33,641	(\$0.28109)	(\$0.11615)	\$33,641	(\$0.01690)	(\$0.02745)	\$1,038,834	(\$0.00845)	\$519,417				2,399,875	\$14.03	\$33,670,246	
29	2050	(\$0.28109)	(\$0.11615)	\$33,762	(\$0.28109)	(\$0.11615)	\$33,762	(\$0.01690)	(\$0.02745)	\$1,042,574	(\$0.00845)	\$521,287				2,399,875	\$14.03	\$33,670,246	
30	2051	(\$0.28109)	(\$0.11615)	\$33,883	(\$0.28109)	(\$0.11615)	\$33,883	(\$0.01690)	(\$0.02745)	\$1,046,327	(\$0.00845)	\$523,164				2,399,875	\$14.03	\$33,670,246	
TOTALS				\$960,325			\$960,325			\$29,810,510		\$14,905,255		0	\$0			\$1,010,107,388	
3% Discount				\$569,009			\$569,009			\$17,684,135		\$8,842,067			\$0			\$603,949,941	
5% Discount				\$418,897			\$418,897			\$13,028,267		\$6,514,133			\$0			\$447,110,567	
7% Discount				\$317,912			\$317,912			\$9,893,904		\$4,946,952			\$0			\$341,049,291	

NICTD
WEST LAKE CORRIDOR
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Year	Calendar Year	Road Accidents Reduced	NICTD Train Accidents Increased	Total Change in Accidents	Value of Statistical Life	Road Death/ Crash Ratio	Auto Deaths Reduced	Train Death/100M VRM Ratio	Train Deaths Increased	Decreased Death Benefits	No Injury AIS 0 0.43676 * \$0	Minor AIS 1 0.41739 * \$27,700	Moderate AIS 2 0.08872 * \$433,965	Serious AIS 3 0.04817 * \$969,496	Severe AIS 4 0.00617 * \$2,456,056	Critical AIS 5 0.00279 * \$5,475,343	Injuries Prevented Benefits Accidents*Σ[Pr(AIS _i)*Val ue (AIS _i)]	Property Damage Only \$3,425 per Accident ¹⁸	Total Accident Death/ Injury/PDO Benefits ¹⁸	Residual Value ¹⁹
0	2017																			
0	2018				\$9,750,000															
0	2019				\$9,865,050															
0	2020				\$9,981,458															
0	2021	0.00			\$10,099,239															
1	2022	-152.60	1.66	-150.95	\$10,218,410	0.003205	-0.4890	0.00000019	0.2332	\$2,614,284	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$19,199,348	\$516,989	\$22,330,621	
2	2023	-153.15	1.66	-151.49	\$10,338,987	0.003205	-0.4908	0.00000019	0.2340	\$2,654,655	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$19,268,466	\$518,850	\$22,441,971	
3	2024	-153.70	1.67	-152.03	\$10,460,987	0.003205	-0.4926	0.00000019	0.2349	\$2,695,649	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$19,337,832	\$520,718	\$22,554,200	
4	2025	-154.26	1.67	-152.58	\$10,584,427	0.003205	-0.4943	0.00000019	0.2357	\$2,737,277	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$19,407,449	\$522,592	\$22,667,318	
5	2026	-154.81	1.68	-153.13	\$10,709,323	0.003205	-0.4961	0.00000019	0.2366	\$2,779,547	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$19,477,315	\$524,474	\$22,781,336	
6	2027	-155.37	1.69	-153.68	\$10,835,693	0.003205	-0.4979	0.00000019	0.2374	\$2,822,470	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$19,547,434	\$526,362	\$22,896,266	
7	2028	-155.93	1.69	-154.24	\$10,963,554	0.003205	-0.4997	0.00000019	0.2383	\$2,866,056	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$19,617,805	\$528,257	\$23,012,118	
8	2029	-156.49	1.70	-154.79	\$11,092,924	0.003205	-0.5015	0.00000019	0.2391	\$2,910,315	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$19,688,429	\$530,159	\$23,128,902	
9	2030	-157.05	1.71	-155.35	\$11,223,821	0.003205	-0.5033	0.00000019	0.2400	\$2,955,258	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$19,759,307	\$532,067	\$23,246,632	
10	2031	-157.62	1.71	-155.91	\$11,356,262	0.003205	-0.5051	0.00000019	0.2409	\$3,000,894	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$19,830,440	\$533,983	\$23,365,317	
11	2032	-158.19	1.72	-156.47	\$11,490,266	0.003205	-0.5069	0.00000019	0.2417	\$3,047,235	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$19,901,830	\$535,905	\$23,484,970	
12	2033	-158.76	1.72	-157.03	\$11,625,851	0.003205	-0.5088	0.00000019	0.2426	\$3,094,292	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$19,973,477	\$537,834	\$23,605,603	
13	2034	-159.33	1.73	-157.60	\$11,763,036	0.003205	-0.5106	0.00000019	0.2435	\$3,142,076	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$20,045,381	\$539,770	\$23,727,227	
14	2035	-159.90	1.74	-158.16	\$11,901,840	0.003205	-0.5124	0.00000019	0.2444	\$3,190,597	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$20,117,545	\$541,714	\$23,849,855	
15	2036	-160.48	1.74	-158.73	\$12,042,281	0.003205	-0.5143	0.00000019	0.2452	\$3,239,868	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$20,189,968	\$543,664	\$23,973,499	
16	2037	-161.05	1.77	-159.29	\$12,184,380	0.003205	-0.5161	0.00000019	0.2488	\$3,257,394	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$20,260,241	\$545,556	\$24,063,191	
17	2038	-161.63	1.77	-159.86	\$12,328,156	0.003205	-0.5180	0.00000019	0.2497	\$3,307,697	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$20,333,177	\$547,520	\$24,188,394	
18	2039	-162.22	1.78	-160.44	\$12,473,628	0.003205	-0.5199	0.00000019	0.2506	\$3,358,776	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$20,406,377	\$549,491	\$24,314,643	
19	2040	-162.80	1.79	-161.01	\$12,620,817	0.003205	-0.5217	0.00000019	0.2515	\$3,410,643	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$20,479,840	\$551,469	\$24,441,952	
20	2041	-163.39	1.79	-161.59	\$12,769,743	0.003205	-0.5236	0.00000019	0.2524	\$3,463,312	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$20,553,567	\$553,455	\$24,570,334	
21	2042	-163.97	1.80	-162.17	\$12,920,426	0.003205	-0.5255	0.00000019	0.2533	\$3,516,794	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$20,627,560	\$555,447	\$24,699,801	
22	2043	-164.56	1.81	-162.76	\$13,072,887	0.003205	-0.5274	0.00000019	0.2542	\$3,571,102	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$20,701,819	\$557,447	\$24,830,368	
23	2044	-165.16	1.81	-163.34	\$13,227,147	0.003205	-0.5293	0.00000019	0.2551	\$3,626,249	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$20,776,346	\$559,453	\$24,962,048	
24	2045	-165.75	1.82	-163.93	\$13,383,227	0.003205	-0.5312	0.00000019	0.2560	\$3,682,247	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$20,851,141	\$561,467	\$25,094,855	
25	2046	-166.35	1.83	-164.52	\$13,541,149	0.003205	-0.5331	0.00000019	0.2570	\$3,739,110	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$20,926,205	\$563,489	\$25,228,804	
26	2047	-166.95	1.83	-165.11	\$13,700,935	0.003205	-0.5350	0.00000019	0.2579	\$3,796,851	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$21,001,539	\$565,517	\$25,363,908	
27	2048	-167.55	1.84	-165.71	\$13,862,606	0.003205	-0.5369	0.00000019	0.2588	\$3,855,484	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$21,077,145	\$567,553	\$25,500,182	
28	2049	-168.15	1.85	-166.31	\$14,026,184	0.003205	-0.5389	0.00000019	0.2598	\$3,915,022	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$21,153,022	\$569,596	\$25,637,641	
29	2050	-168.76	1.85	-166.90	\$14,191,693	0.003205	-0.5408	0.00000019	0.2607	\$3,975,480	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$21,229,173	\$571,647	\$25,776,300	
30	2051	-169.36	1.86	-167.51	\$14,359,155	0.003205	-0.5428	0.00000019	0.2616	\$4,036,871	\$0	\$11,562	\$38,501	\$46,701	\$15,154	\$15,276	\$21,305,598	\$573,705	\$25,916,174	\$214,790,000
TOTALS		-4,825	53	-4,773			-15.4636			\$98,263,509							\$607,044,775	\$16,346,149	\$721,654,433	\$214,790,000
3% Discount										\$56,866,581							\$360,114,664	\$9,696,958		\$80,975,830
5% Discount										\$41,249,213							\$265,306,022	\$7,144,006		\$42,936,521
7% Discount										\$30,880,704							\$201,479,675	\$5,425,328		\$23,025,488

NICTD
WEST LAKE CORRIDOR
BENEFIT-COST ANALYSIS (2018 \$)

Year	Calendar Year	Capital Costs ¹ (Design/Const)	O&M Costs ²	Farm Crops Production Loss Costs ³	Ecological Acreage Loss (Project)	Ecological Value Per Acre	Ecological Land Loss Costs ⁴	Ecological Acreage Loss Induced Development	Ecological Value Per Acre	Ecological Land Loss Induced Development Costs ⁴	Chicago UZA Estimated Population	Chicago UZA Estimated AVMT-No Build	Per Capita VMT-No Build	AVMT Change ⁵	Proportion Auto Traffic	Auto AVMT Change	VMT Value	Auto VMT Benefits ⁵	
		<p>Benefit-cost analysis (BCA) of the proposed Northern Indiana Commuter Transportation District (NICTD) West Lake Project from Munster/Dyer, Indiana to Millennium Station in Chicago (proposed Project). The analysis assumes construction from 2017-2022, passenger operations beginning in 2022 and covers operations of 30 years through 2051. Sources of information are primarily the following documents: Final Environmental Impact Statement (FEIS) for the proposed Project (http://www.nictdwestlake.com/resources/); U.S. Department of Transportation, TIGER Benefit-Cost Analysis Resource Guide (TIGER Guide), dated March 2015 (https://www.transportation.gov/policy-initiatives/tiger/tiger-benefit-cost-analysis-bca-resource-guide); Victoria Transport Policy Institute (VTPI) Transportation Cost Analysis Spreadsheets and Transportation Cost Benefit Analysis Techniques, Estimates and Implications (http://www.vtpi.org/tca/). Other sources are identified in these notations. All figures are in 2018 dollars. The final calculations include totals based upon the vehicle miles traveled (VMT) and vehicle hours traveled (VHT) reductions from data in the FEIS and a second scenario which assumes only one-half of these two benefits due to induced travel demand brought on by the project. Of note is research which shows that a 10 percent increase in transit capacity reduces auto travel demand by 0.7 percent in the short run and 0.0 percent in the medium run while increasing auto travel demand 0.4 percent in the long run (Beaudoin, J and Lawell, CY. (2018). The Effects of Public Transit Supply on the Demand for Automobile Travel. Available via http://clinlawell.dyson.cornell.edu/transit_auto_travel_demand_empirical_paper.pdf).</p> <p>1. Capital Costs: According to the FEIS (Table 11.1-1), the total estimated capital construction cost is \$661,000,000 (YOE) or \$638,590,000 (2018\$) from 2017-2022. Breakdowns by year are replicated from the FEIS.</p> <p>2. Operating and Maintenance (O&M) Costs: The FEIS (Table 11.2-1) estimates annual O&M costs at \$9.61M (2017\$) or \$9.80M (2018\$).</p> <p>3. Farm Crops Production Costs: Not applicable.</p> <p>4. Ecological Acreage Loss Costs: Losses are calculated for vegetated land (80.1 acres) and woodland (15.97 acres) developed for the proposed Project per page S-40 of the FEIS. Annual cost values used per acre are based on the Monetization of Environmental Impacts of Roads by Peter Bein, B.C. Ministry of Transportation and Highways (1997)(http://www.geocities.ws/davefergus/Transportation/4CHAP4.htm). Per Table 4.13 of the citation, the 1994 Canadian dollars value of pavement converted to urban greenspace is \$24,000 per hectare. Per Oanda Historical Exchange Rates (http://www.oanda.com/currency/historical-rates/), the July 1994 Canadian/U.S. currency ratio was \$0.7233 which translates to \$17,359 (1994 \$) or \$29,430 (2018 \$). One hectare is 2.47105 acres, therefore the value per acre is \$11,969 (2018 US \$). This is multiplied by 96 acres annually. While the proposed Project may induce further development, additional ecological costs are not calculated due to a lack of credible information.</p> <p>5. Vehicle Miles Traveled: Chicago UZA population is estimated for 2020 based upon the 2010 Census population of 8,608,208 and the 3.6% increase from 2000-2010. A 0.36% annual increase is assumed. Annual vehicle miles traveled data (AVMT) is derived from the IDOT Eisenhower Expressway Reconstruction Expansion DEIS 2040 estimates. This is included for informational purposes only as the data has no practical application for the proposed NICTD West Lake Corridor Project. According to page PS-37 of the FEIS, the estimated reduction in regional daily vehicle miles traveled (DVMT) for the build alternative is 163,050 in 2037. Incremental increases over time are assumed accordingly in the BCA. The per mile operating costs of average sedans, SUVs, and minivans assumed is \$0.68 based on AAA's Your Driving Costs (2017). The variable rate (non-fixed) of this cost assumed is \$0.2754 (2018\$). It is assumed there will not be any reductions in bus or truck travel.</p> <p>5a. Ridership, Seat Miles, Vehicle Revenue Miles: Increased train estimated annual miles due to the proposed Project is 211,120 based on 24 trains added per weekday and 20 on weekends for 140 per week per the FEIS (S.9.5) at 29 miles per trip. The FEIS states that estimated daily weekday ridership is 3,750 by 2037 (FEIS, Table 3.2-1). It is estimated that the average daily ridership for the proposed Project accounting for weekends will be 2,963 (based on NTD 2017 NICTD data of 3,455,842 total linked trips/365 = 9,468 which is about 79% of existing weekday ridership of 12,050 per the FEIS, Table 3.2-1. 3,750 X 0.79 = 2,963 unlinked trips; 2,963 X 365 = 1,081,495 estimated new annual trips by 2037 due to the proposed Project). Estimated ridership is adjusted for each year based on the population growth assumption. Seat miles is calculated by multiplying ridership by annual train miles. Annual vehicle revenue miles (AVRM) due to the proposed Project is estimated using National Transit Database 2017 information for NICTD's existing service (3,355,842 unlinked trips/4,184,136 AVRM =0.8259 trips per AVRM) and using this ratio divided into the 1,081,495 new trips to estimate 1,309,412 AVRM by 2037.</p> <p>Productivity Increase: Train passengers that otherwise would have driven a car have the potential to increase productivity. An assumption is made that 80% of train riders are converted from driving and 20% of them opt to work 1/2 hour on each train trip. According to the TIGER Guide the value of time for business purposes is \$25.23 (2013 \$) or \$27.22 (FY2018 \$).</p> <p>6. Noise: The TRB Transportation Benefit-Cost Analysis web site provides noise impact values per VMT for vehicles from several studies [bca.transportationeconomics.org, referencing: Todd Litman (2010), "Noise," Transportation Cost and Benefit Analysis, Victoria Transport Policy Institute (www.vtpi.org), available at www.vtpi.org/tca/tca0511.pdf]. Dollar values for noise impacts in these cited studies show the following ranges per VMT (converted to 2018 \$): heavy trucks (\$0.035-\$0.26); and auto (\$0.001 and \$0.028). Mid-levels of \$0.1558 for trucks (and buses) and \$0.0153 for autos are used. Additionally, in the VTPI document, the following study is cited which includes values for passenger train noise: M. Maibach, et al. (2008), Handbook on Estimation of External Cost in the Transport Sector, CE Delft (www.ce.nl) Table 22 p 69. The average proportion noise values for cars (day, night, urban, suburban, rural) in this study are compared to the same for passenger trains. The latter monetized value is about 65 times that of automobiles. Consequently, \$0.0153 (value used for autos) X 65 is used to determine an estimated value of \$0.9945 for passenger train noise per mile.</p> <p>The following reference is used for NOx, PM10, PM2.5, and VOC emission rates per VMT: Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks, U.S. EPA, Office of Transportation and Air Quality, April 2008 (AAE) (http://www.epa.gov/otaq/consumer/420f08024.pdf);</p> <p>7. CO2: U.S. Environmental Protection Agency. EPA Emission Facts Sheet, Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks. October 2008 (http://www.epa.gov/otaq/consumer/420f08024.pdf), 368.4 g of CO2 is released per VMT. This is converted to MT by dividing by 1,000,000 and then multiplied by the reductions in VMT due to the project. For increases in train CO2 due to the project, FTA National Transit Database information shows that NICTD trains used 20,912,500 KWH in traveling 4,372,436 miles in 2016 for an average of 4.78 KWH/mile. Per the U.S. EPA, 2018 SmartWay Rail Carrier Partner Tool: Technical Documentation, the U.S. power plant mix releases 627 grams (0.000627 MT) of CO2 per 1 KWH used. 4.78 is multiplied by 0.000627 and by the increase in train miles due to the project to calculate the amount of CO2 increased from new train operations. Social cost of carbon (SCC) values are obtained from the TIGER BCA Guide. The data is then multiplied for each year by the social cost of carbon (SCC) values converted from 2013 \$ to 2018\$. Per the guidance, the CO2 values are only discounted at the 3 percent rate but are also used in the 5 and 7 percent benefit columns as disbenefits.</p> <p>8. NOx: The AAE value of 0.693 grams per VMT is used and multiplied by auto/light truck AVMT reduced and then divided by 1,000,000 (grams to MT factor) to calculate the reduction for automobiles/light trucks annually. Per the U.S. EPA, 2018 SmartWay Rail Carrier Partner Tool: Technical Documentation, the U.S. power plant mix releases 0.054 grams (0.00000054 MT) of PM10 and 0.030 grams (0.00000030) pf PM2.5 per 1 KWH used. 4.78 is multiplied separately by each of these figures and by the increase in train miles due to the project to calculate the respective amounts of PM10 and PM2.5 increased from new train operations.</p> <p>9. PM10 and PM2.5: The AAE respective values of 0.0044 and 0.0041 grams per VMT are used and multiplied by auto/light truck AVMT reduced and then divided by 1,000,000 (grams to MT factor) to calculate the reduction for automobiles/light trucks annually. Per the U.S. EPA, 2018 SmartWay Rail Carrier Partner Tool: Technical Documentation, the U.S. power plant mix releases 0.054 grams (0.00000054 MT) of PM10 and 0.030 grams (0.00000030) pf PM2.5 per 1 KWH used. 4.78 is multiplied separately by each of these figures and by the increase in train miles due to the project to calculate the respective amounts of PM10 and PM2.5 increased from new train operations.</p> <p>10. VOC: The AAE value of 1.034 grams per VMT is used and multiplied by auto/light truck AVMT reduced and then divided by 1,000,000 (grams to MT factor) to calculate the reduction for automobiles/light trucks annually. VOC changes for train operations is not calculated due to the unavailability of a value.</p> <p>11. Resource Consumption Costs: These are external costs of transport resource production (primarily petroleum) or the social benefits of resource conservation. These include military security costs for foreign oil, trade deficits from its import, environmental damages from oil extraction, oil company tax subsidies, and human health risks from injuries and pollution during extraction. Depletion of non-renewable resources for future generations is an externality as well although it is not included. See the VTPI Transportation Cost and Benefit Analysis II - Resource Consumption External Costs (http://www.vtpi.org/tca/tca0512.pdf). The VTPI, Transportation Cost Analysis Spreadsheet has default cost values per VMT as follows in 2007 \$ for average travel: average car \$0.039 (\$0.047 in 2018 \$); light truck/van \$0.050 (\$0.059 in 2018 \$). \$0.05 is used in the analysis.</p> <p>12. Parking Costs: The VTPI, Transportation Cost Analysis Spreadsheet has default parking cost values per VMT as follows in 2007 \$ for average travel: car/pickup/van \$0.064 (\$0.072 2015 \$) (internal); \$0.060 (\$0.068 2015 \$)(external) for a total of \$0.124 (\$0.1478 in 2018 \$). Internal costs are paid directly by users for residential parking while external costs are off-street parking paid by non-users through increased bundled goods costs and services that includes free/reduced cost parking. The Project does not affect residential parking. There could be some potential benefit in external parking due to passengers arriving at their destination and not needing parking. However, this could be completely offset by station parking lots where passengers board trains. Therefore, no benefit or cost is assigned.</p>																	

NICTD
WEST LAKE CORRIDOR
BENEFIT-COST ANALYSIS (2018 \$)

Year	Calendar Year	Proportion Heavy Tk	Diesel Bus VMT Decrease	VMT Value	Diesel Bus VMT Benefits ⁵	Train Miles Traveled	Annual Ridership	Seat Miles	Vehicle Revenue Miles	Auto Drivers Convert to Riding Train	Assumed 20% Drivers Working 1/2 hr on train	Productivity Rate Per Hour	Increased Worker Productivity Benefits ^{5a}	Auto Noise Value (per VMT)	Auto Noise Benefits ⁶	Bus Noise Value (per VMT)	Bus Noise Benefits ⁶	Train Noise Value (per VMT)	Train Noise Costs ⁶	CO ₂ Change (MT)	CO ₂ Change Train (MT)	CO ₂ Value (per MT)
		<p>13. Health Costs: The VTPI Spreadsheet has default health cost values per VMT as follows in 2007 \$ for average reductions as follows: walking: \$0.24 (internal)(\$0.28109 2018 \$); \$0.24 (external)(\$0.28109 2018 \$); bicycling \$0.095 (internal)(\$0.11615 2018 \$); \$0.095 (external)(\$0.11615 2018 \$). Internal cost reduction is reflected through extended lives and reduced mortality rates. External cost reduction is shown through reduced hospital and health care costs. For this BCA assumptions are as follows: 5% of riders will walk an average of 1/4 mile to their boarding station; 5% will bicycle an average of one mile to their boarding station; and 50% will walk an additional 1/4 mile at their destination station to their final destination. These distances are then multiplied by the aforementioned monetary value both for health and mortality benefits.</p> <p>14. Barrier Effects: These are delay costs to non-motorized travel caused by motorized travel. See the VTPI Transportation Cost and Benefit Analysis II - Barrier Effect publication (http://www.vtpi.org/tca/tca0513.pdf). The VTPI, Transportation Cost Analysis Spreadsheet has default barrier effect cost values per VMT as follows in 2007 \$ for average travel: car/pickup/van \$0.014 (\$0.0169 in 2018 \$) and diesel bus \$0.023 (\$0.02745 in 2018 \$). It is assumed that diesel buses and heavy trucks have the same values. The VMT reduction is multiplied by these values accordingly.</p> <p>15. Transport Diversity: According to the VTPI Transportation Cost Analysis Spreadsheet, the value per VMT for transportation diversity is \$0.007 in 2007 \$ (\$0.00845 in 2018 \$). This represents the benefits of improving transportation options brought about by the Project that reduces overall transportation costs for the public. Additionally, the value measures the extent disadvantaged populations (elderly, low income, minority) are unable to travel due to increased accessibility brought about by improved mode choice.</p> <p>16. Uncompensated Moving Costs: Not applicable.</p> <p>17. Travel Time Savings: The TIGER Guide hourly value of time for all purposes is \$14.02 (2018\$)(personal and business). The FEIS states that the Project is expected to generate 6,575 vehicle hours traveled (VHT) savings per year (Table 3.5-3 and pp 3-36 & 3.37). A NICTD project manager confirmed that this figure is daily. Increased Land Value: The TIGER Guide states the following: "1) The benefit of any property value increase can only be considered as a one-time stock benefit and cannot be treated as a stream of benefits accruing annually; 2) It cannot include any investment by developers; 3) Other benefits to land value already counted, such as travel time savings, must also be netted out." According to Capturing the Value of Transit by Reconnecting America's Center for TOD (2008), studies have shown ranges of residential property increases as follows: residential land, 2-45%; and office/retail, 1-167% within a 1/4-mile radius of TOD. Property value data and estimates of changes were not made to determine if any potential total land value increases exceed the value of travel time savings.</p> <p>18. Accident Reduction Benefits: According to the 2010 Illinois Crash Statistics publication (http://www.idot.illinois.gov/Assets/uploads/files/Transportation-System/Resources/Safety/Crash-Reports/crash-facts/2010%20Crash%20Facts.pdf), page 10, totals for the state are as follows: 105.74B VMT; 289,260 crashes; and 927 fatalities. The crash rate is 1 accident per 365,561 VMT. This rate is multiplied by the annual VMT savings due to the Project to estimate annual accident reduction. The fatality/crash ratio is 0.0032047 based on the 2010 data.</p> <p>The Project adds 12 trains per weekday and 20 trains on weekends for a total of 80 trains per week traveling 29 miles per trip totaling 2,320 miles weekly or 120,640 miles annually. National Transportation Statistics from the US DOT, Office of the Assistant Secretary for Research and Technology, Bureau of Transportation Statistics (http://www.rita.dot.gov/bts/sites/rita.dot.gov/bts/files/publications/national_transportation_statistics/index.html), Table 2-42: Railroad Passenger Safety Data provides passenger fatalities, injuries, and train miles. For purposes of this BCA, this data was analyzed for the most recent 10 years available: 2003 to 2012. Averages for this period are as follows: 97,700,000 passenger train miles; 7 fatalities; and 1,172 injuries. The NICTD increased service will result in 120,640 train miles annually which is 0.0012 that of the national level. Consequently, predicted annual fatalities for the new route is 0.0086 [(120,640 x 7)/97,700,000]. Predicted annual injuries for the new route is 1.45 [(120,640 x 1,172)/97,700,000]. For compatibility purposes with auto-related accidents, the 1.45 is divided by the AIS injury proportion of 0.56324 (1- 0.43676 no injury) which equates to 2.57 annual train-related accidents. This estimate is then used to offset the decreases in roadway fatalities and injuries due to the Project.</p> <p>The TIGER BCA Guide identifies the value of a statistical life as about \$9.2M in 2013 \$ or \$9.75M in 2018 \$. The guide also states that the growth rate in this metric is about 1.18 percent above inflation. This amount is increased annually by 1.18 percent.</p> <p>The estimates of injury severity is based in part on the TIGER Guide, Section 3. Accordingly, the data on number of road accidents reduced is converted to the Abbreviated Injury Scale (AIS) to determine estimated level of injury by severity rates (none, minor, moderate, serious, severe, critical). The AIS format is also used for bus and train accidents.</p> <p>19. The expected life of the Project elements were obtained from <i>Transport infrastructure evaluation using cost-benefit analysis: improvements at evaluating the asset through residual value a case study</i>, Massachusetts Institute of Technology, Engineering Systems Division, ESC-WP-2013-21, updated August 2014 (http://esd.mit.edu/WPS/2013/esd-wp-2013-21.pdf). Project element costs are based upon the FEIS Financial Considerations chapter. (converted to 2018 \$):</p> <ul style="list-style-type: none"> a. Stations, 50% after 30 years (60 years life): 4 new stations (\$3.9M + \$15.24M = \$19.14M) X 50% useful life = \$9.57M, b. Permanent Way (tracks, ballast), 20% after 30 years (38 years life): guideway/track (\$5.2M + \$53.52 + \$70.93M + \$14.51 = \$144.16M) X 20% = \$28.83M, c. Systems/Signaling/Safety, 50% after 30 years (60 years useful life): Systems (\$4.0M + \$15.81M + \$32.93M + \$4.84M = \$57.58) X 50% = \$28.79M. d. Land (150 years useful life): ROW/land (\$40.7M + \$10M + \$10.19M = \$60.89) X 80% useful life = \$48.71M. e. Sitework/Earthwork (60 years life): Sitework (\$74M + \$26.39M + \$3.54M = \$103.93M) X 50% = \$51.97M. f. Yards, Shops, Admin. Bldgs., (50 years life): 1 maintenance/storage facility (\$0.3 + \$3.24 + \$33.92 + \$4.84M = \$42.3M) X 40% = \$16.92M. g. Vehicles, 0% after 30 years (30 years useful life): 36 rehabilitated SSL vehicles (\$24.13M + \$7.6M = \$31.73M) X 0% useful life = \$0. h. The above totals \$459.73M before depreciation and \$184.79M afterwards. Professional Services is (\$638,590 (2018)) X 16.6% = \$106,006M. Unallocated contingency (\$638,590 X 8.0% = \$51,087M). (\$30M is arbitrarily added to to the total residual value to account for this.) Thus, the total undiscounted residual value after 30 years is \$214.79M. 																				

