

SAFE Lumberton RAISE Grant – BCA Analysis Memo

Benefit Cost Analysis (BCA) Executive Summary

Lumberton’s Benefit-Cost Analysis (BCA) describes the benefits of the SAFE Lumberton project if it was awarded and constructed. The City used USDOT’s Benefit-Cost Analysis Guidance (2022) to complete the BCA analysis and used the recommended parameter values where applicable. The BCA used an analysis period of 20 years (2025-2045) and assumed a useful service life of 25 years. All costs and benefits are presented in 2020 base year dollars.

The BCA considered five different benefits:

- **Safety:** The reduction in crashes and crash costs.
- **Sustainability:** Reductions that impact the quality of the air (carbon dioxide).
- **Health:**
 - **Reduce Nitrous Oxide Omissions:** Improves air quality for your health by reducing the amount of nitrous oxide omissions.
 - **Reduce Mortality Rate by Increasing Walking:** Increasing longevity by providing new opportunities to better your health.
- **Economic Activity:** Reducing operating costs from the mode shift.
- **Useful Life:** Residual value.

Summary of the BCA Results

Table 1 displays the BCA and total benefits. The capital costs included in the BCA are \$10.3 million. The BCA estimated a 25-year evaluation (2020-2045) and a real discount rate of 7 percent and has a **net present value** of **\$28,197,534** and a **benefit-cost ratio** of **4.5**. Table 2 describes the benefits for each category over the years of operation.

Table 1. BCA Summary

Category	Discounted Value ¹ (in 2020 Dollars)
Net Discounted Benefits	\$36,317,713
Net Discounted Capital Costs	\$8,120,179
Net Present Value	\$28,197,534
Benefit-Cost Ratio	4.5

¹ The City used a 7% discount rate for the benefits and costs.

Table 2. Undiscounted Benefits over 25 years of Operation

Category	Monetary Value (in 2020 Dollars)
Safety Benefits	\$95,337,402
Sustainability	\$1,177
Health - Emissions	\$741
Health – Reduce Mortality Rate	\$443,029
Economic Activity	\$20,702
Residual Value	\$856,400

Note: Innovation, Partnerships, Economic Activity, and Mobility +Connectivity are not featured in the BCA due to lack of data. However, these can be qualitatively described in the vast improvements in walkability and connection to the downtown, especially for those 15% of households in the project area without access to a vehicle.

The City did not calculate the following items given RAISE NOFO guidance and low quantitative values relative to the inputs for:

- Sustainability - water quality: However, water quality will be improved as drainage conveyances are redesigned.
- State of good repair: Values are not easily quantified. However, cost savings from reduced roundabout maintenance compared with traffic signals maintenance, as would the road diet and reduced maintenance of unused travel lanes.
- Travel time savings: Not used for cost or benefit due to lack of current corridor congestion. This project will not meaningfully improve capacity, congestion, or travel time since the corridor currently performs at a high level of service for each of these traffic operations measures.

Detailed calculations and supporting data for this analysis can be found in the referenced [Lumberton RAISE BCA workbook](#).

Calculating Benefits for SAFE Lumberton

The SAFE Lumberton project will benefit all residents and visitors, however, those that will benefit the most are those living within a ½ mile of the project corridor, which is considered the walk-shed for community and utilitarian trips. The benefits were calculated by using population estimates from the 2020 Census and mode share estimates from the 2015-2019 American Community Survey (ACS) due to Block Group reporting. The Lumberton population and study area population have an assumed 1-percent annual population growth rate.

The City calculated the benefits by comparing walking in the Build Scenario with how it would be changed if the project was implemented. The Net Present Value and Benefit-Cost Ratio calculations identify the difference between the two scenarios.

Baseline conditions assume no change in mode share from that identified in the 2015-2019 ACS of approximately 1 percent. To determine Commuting Walk Trips Annually, the City assumed that the daily commuting population takes 2 walking trips (one to work and one back), 5 days a week for 52 weeks; this is the annualized walking trip commuting baseline. Utilitarian walking trips were calculated based on the local walk share but for all eligible adults (assumed 68 percent of the population based on USDOT’s 2022 BCA Guidance), multiplied by the utilitarian walk share, and 365 days per year.

Build conditions assume induced trips from improved walking conditions towards the walk goal of 3 percent walking mode share for both commuting and utilitarian trips by the year 2045. The trip multipliers for the new trips are found in the “Trip Multipliers” tab of the [Lumberton RAISE BCA workbook](#).

Total Reduced VMT is calculated from the product of the new commuting trips and new utilitarian trips multiplied by the respective trip replacement rates and typical replacement distance for each trip type.

Table 3. Summary of the Benefit Assumptions

Baseline	Build Scenario	Impacts
Walking within ½ mile of the project corridor.	SAFE Lumberton’s project corridor will provide more opportunities for community and utilitarian trips for those living within ½ mile of the walkshed.	Reduced pedestrian and bicyclist crashes, reduced pollution, reduced healthcare costs, and reduced operating costs.

Costs

The capital costs, shown in Table 4, describe the capital costs for SAFE Lumberton. The main application provides more detailed information on the project costs.

Table 4. Project Construction Costs by Segment of Corridor

Segment	Anticipated Cost
NC 41 Roundabout	\$3,034,000
Systemic Intersection Improvements	\$1,582,000
2 nd /5 th Street Roundabout	\$1,248,000
Road Diet	\$2,847,000
NC 211 Improvements	\$865,000
Water Street	\$722,000
Total Capital Costs	\$10,298,000

Note: The City used a 40% contingency, which is added to the segment costs, due to landscaping, lighting, final design, right-of-way, and environmental documentation.

Estimated maintenance costs range from 1-3 percent. The City of Lumberton estimated that the SAFE Lumberton multimodal improvements in the build scenario will cost yearly \$102,980 for a total operations and maintenance cost of \$2,059,600 over 20 years.

Useful Life

The expected use life of the SAFE Lumberton improvements is 25 years. The City used an analysis period of 20 years. The City claimed a residual value benefit of **\$856,400**.

Benefits

Walking Activity in Lumberton

As mentioned previously, the City used data from ACS to determine walking along the project area. Walking was selected since the project improvements are focused primarily on pedestrians, and the City does not have reported bicycling mode share for commuting, nor facilities aside from the riverfront shared-use path. Table 5 summarizes the baseline mode share.

Table 5. Baseline Mode Share

Trip Type	Population	Drove Alone	Carpool (Any)	Transit total	Motorcycle	Bicycle	Walked	Other means	WFH
Commute (Walk Area)	4,166	83.82%	12.12%	0.02%	0.74%	0.00%	1.01%	1.18%	1.10%
Adult Utilitarian (Walk Area, minus WFH)	4,120	84.76%	12.26%	0.02%	0.75%	0.00%	1.02%	1.19%	N/A

Table 6. Demand/Activity Multipliers (NHTS, 2017)

Demand/Activity Multipliers	Factor
Utilitarian Walk Trip Multiplier	3.27
Vehicle Miles Travelled Reduced	
<i>Commute - Walk</i>	0.72
<i>Utilitarian - Walk</i>	0.83

Increase in Walking in Lumberton

Mode share and multipliers were also only calculated for adults due the lack of schools in the area for both college and K-12 students. Given the absence of other information, the same percentage of utilitarian walk trips (1 percent) was used as for commuting.

The 2045 mode share goal of 3 percent was identified based on the City's existing walking rates and the perceived growth from the significant levels of network completion and crossing enhancements in the downtown area.

Safety Benefits

The City calculated the historical crash costs for the project's six segments and estimated the reduction from the implementation of safety improvements such as pedestrian refuge islands and roundabouts. Table 7 is separated into vehicular crashes (5-year data, December 2016- November 2021) and bike/ped crashes (10-year data, 2012-2021) with reported crash severities on the KABCO scale. Vehicular crashes on the corridor were provided by NCDOT, while the bicyclist/pedestrian crashes were selected as within 300-ft of the corridor. (300 ft was selected as a buffer due to potential of pedestrians and bicyclists diverting to side routes and parking lots to avoid travel on the corridor due to unsafe conditions and incomplete pedestrian network.) Bicyclists were included in the crash reporting due to the lack of formal bicycle facilities and bicyclists using pedestrian facilities.

Table 7. No Build Crashes (Historical Conditions)

Vehicle Crashes by Segment	Total Crashes (5-Year)*	K	A	B	C	O	PDO	Search Distance	Annual Crash Cost
Segment 1 - NC 211 and NC 72 (NCDOT Intersection 3)	90			2	15		73	On Corridor	\$359,200
Segment 2 - NC 72 Road Diet (NCDOT Section 2)	58		3	7	10		38	On Corridor	\$733,780
Segment 3 - 2nd and 5th St (NCDOT Intersection 2)	6	1					5	On Corridor	\$2,324,600
Segment 4 - NC 41 to 5th St (NCDOT Section 1)	213	1	1	12	61		138	On Corridor	\$3,862,400
Segment 5 - NC 41 and NC 72 (NCDOT Intersection 1)	36		1	2	6		27	On Corridor	\$288,880
Segment 6 - Water St and W 5th St (NCDOT Section 3 and NCDOT Section 3_SR 1600)	49		1	3	6		39	On Corridor	\$330,140
Non-Motorized Crashes by Segment	Total Crashes (10-Year)**	K	A	B	C	O	PDO	Search Distance	Annual Crash Cost
Segment 1 - NC 211 and NC 72	5	1		1	3			300' from corridor	\$1,198,270
Segment 2 - NC 72 Road Diet	2				2			300' from corridor	\$15,440
Segment 3 - 2nd and 5th St	0							300' from corridor	\$0
Segment 4 - NC 41 to 5th St	9	1	1	1	3	3		300' from corridor	\$1,254,920
Segment 5 - NC 41 and NC 72	4				4			300' from corridor	\$30,880
Segment 6 - Water St and W 5th St	2			2				300' from corridor	\$30,220

The City also calculated the Build anticipated crashes, shown in Table 8. See Table 10 for source information for Crash Modification Factors (CMFs).

Table 8. Build Anticipated Crashes

Primary Countermeasure	Applicable crashes	CMF	K	A	B	C	O	PDO
Road Diet (4-lane to 3-lane, urban)	All crashes	0.53	0	1.59	3.71	5.3	0	20.14
Roundabout (Two-Way Stop Controlled Orig.)	Injury and fatal crashes	0.18	0.18	0	0	0		
Install raised median with or without marked crossing	All crashes and severities	0.742	0.742	0.742	8.904	45.262	0	102.396
Roundabout (Signalized Orig.)	Injury and fatal crashes	0.22	0	0.22	0.44	1.32		
Leading Pedestrian Interval	Vehicle-Ped crashes	0.87	0.87	0	0.87	2.61	0	0
Road Diet (4-lane to 3-lane, urban)	All crashes	0.53	0	0	0	1.06	0	0
Roundabout (Two-Way Stop <i>Controlled Orig.</i>)	Injury and fatal crashes	0.18	0	0	0	0		
Pedestrian refuge island	Ped crashes	0.68	0.68	0.68	0.68	2.04	2.04	0
Roundabout (Signalized Orig.)	Injury and fatal crashes	0.22	0	0	0	0.88	0	0
Pedestrian refuge island	Ped crashes	<i>0.68</i>	<i>0</i>	<i>0</i>	<i>1.36</i>	<i>0</i>	<i>0</i>	<i>0</i>

The City multiplied the historical crashes are by the USDOT's 2022 BCA Guidance KABCO levels and annualized (5 or 10 years). Table 9 adds the primary countermeasure for the segment, notes the applicable crashes for the countermeasure, the CMF, and the anticipated reduced crashes. The City computed the annualized crash cost and the Safety Benefit, which is the difference from the historical crash costs is the Safety Benefit that is calculated in the "BCA" tab of the [Lumberton RAISE BCA workbook](#).

Table 9. Build Anticipated Crashes

Anticipated Annual Crash Cost	Safety Benefit
\$ -	\$ 359,200
\$ 388,903	\$ 344,877
\$ 417,600	\$ 1,907,000
\$ 2,865,901	\$ 996,499
\$ 58,089	\$ 230,791
\$ -	\$ 330,140
\$ 1,042,495	\$ 155,775
\$ 8,183	\$ 7,257
\$ -	\$ -
\$ 853,346	\$ 401,574
\$ 6,794	\$ 24,086
\$ 20,550	\$ 9,670
Total	\$ 4,766,870

Safety CMFs

The City documented the applicable crash modification factors (CMFs) for the segment improvements. The City used CMFs according to FHWA's Proven Safety Countermeasures or from the CMF Clearinghouse.

Table 10. Summary of CMFs Used for SAFE Lumberton Improvements

Improvement	CRF	CMF	Type	Source
Sidewalk	0.74	0.26	Ped crashes	Gan et al. Update of Florida Crash Reduction Factors and Countermeasures to Improve the Development of District Safety Improvement Projects. Florida DOT, (2005).
High visibility marked crossing	0.4	0.6	Ped injury crashes	Chen, L., C. Chen, and R. Ewing. The Relative Effectiveness of Pedestrian Safety Countermeasures at Urban Intersections - Lessons from a New York City Experience. (2012).
Pedestrian refuge island	0.32	0.68	Ped crashes	Zegeer, C., R. Srinivasan, B. Lan, D. Carter, S. Smith, C. Sundstrom, N.J. Thirsk, J. Lyon, E. Ferguson, and R. Van Houten. (2017). NCHRP Report 841: Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments. Transportation Research Board, Washington, D.C.
Intersection lighting	0.42	0.58	Ped crashes	Elvik, R. and Vaa, T. Handbook of Road Safety Measures. Oxford, United Kingdom, Elsevier, (2004).
Pedestrian Signal Head - Peds	0.25	0.75	Ped crashes	Estimated CMF based on performance of other traffic controls, such as Pedestrian Hybrid Beacon.
Leading Pedestrian Interval	0.13	0.87	Veh-Ped crashes	Goughnour, E., D. Carter, C. Lyon, B. Persaud, B. Lan, P. Chun, I. Hamilton, and K. Signor. "Safety Evaluation of Protected Left-Turn Phasing and Leading Pedestrian Intervals on Pedestrian Safety." Report No. FHWA-HRT-18-044. Federal Highway Administration.
Roundabout (Signalized Orig.)	0.78	0.22	Injury and fatal crashes	AASHTO. The Highway Safety Manual, American Association of State Highway Transportation Professionals, Washington, D.C., (2010).
Roundabout (Two-Way Stop Controlled Orig.)	0.82	0.18	Injury and fatal crashes	AASHTO. The Highway Safety Manual, American Association of State Highway Transportation Professionals, Washington, D.C., (2010).
Road Diet (4-lane to 3-lane, urban)	0.47	0.53	All crashes	<i>Persaud, B., Lana, B., Lyon, C., and Bhim, R. "Comparison of empirical Bayes and full Bayes approaches for before-after road safety evaluations." Accident Analysis & Prevention, Vol. 42, Issue 1, pp. 38-43 (2010)</i>
Install raised median with or without marked crossing	0.258	0.742	All crashes and severities	CMF ID 8800

Health Benefits

Table 11 uses the population assumptions based on the population and mode share and the new induced trips for adults, and calculates the monetized health value (reduced mortality rates) given the USDOT's 2022 BCA Guidance value of \$7.08 per walking trip for adults aged 20-74. See "Health Mortality" tab of the [Lumberton RAISE BCA workbook](#) for more information.

Table 11. Health Value

Year	Lumberton Population	Study Area Population (0.5 Mile)	New Induced Walking Trips (Annualized)*	Mortality Reduction Estimate (Annualized, 2020 USD)
2020	19,025	12,849		\$ -
2021	19,215	12,977		\$ -
2022	19,407	13,107		\$ -
2023	19,601	13,238		\$ -
2024	19,797	13,371		\$ -
2025	19,995	13,504		\$ -
2026	20,195	13,639	1,509	\$ 10,681
2027	20,397	13,776	1,661	\$ 11,757
2028	20,601	13,914	1,816	\$ 12,854
2029	20,807	14,053	1,973	\$ 13,972
2030	21,015	14,193	2,134	\$ 15,111
2031	21,226	14,335	2,298	\$ 16,272
2032	21,438	14,479	2,465	\$ 17,454
2033	21,652	14,623	2,635	\$ 18,658
2034	21,869	14,770	2,808	\$ 19,884
2035	22,087	14,917	2,985	\$ 21,133
2036	22,308	15,066	3,165	\$ 22,405
2037	22,531	15,217	3,348	\$ 23,700
2038	22,757	15,369	3,534	\$ 25,019
2039	22,984	15,523	3,724	\$ 26,362
2040	23,214	15,678	3,917	\$ 27,730
2041	23,446	15,835	4,113	\$ 29,122
2042	23,681	15,993	4,313	\$ 30,539
2043	23,918	16,153	4,517	\$ 31,982
2044	24,157	16,315	4,725	\$ 33,450
2045	24,398	16,478	4,936	\$ 34,945

Table 12 computes the metric tons of NO_x, SO_x, PM 2.5, and CO₂ for the Build condition. The City calculated the metric tons of reduced air pollutants from the reduced VMT based on the population and mode share projections and the EPA-estimated grams per mile emissions for standard passenger vehicles. For this analysis, it is assumed that most vehicle trips replaced with walking trips are short commuting trips and utilitarian trips that are accomplished by a passenger vehicle. Trucks, SUVs, and commercial vehicles were not included in the analysis; those emissions values are higher and would result in increased emissions benefits. See the "Health Emissions" tab of the [Lumberton RAISE BCA workbook](#) for more information.

Table 12. Metric Tons Reduced Per Year from VMT Reductions

Year	Metric Tons Reduced Per Year from Build VMT Reductions			
	NOX	SOX	PM2.5	CO2
2021				
2022				
2023				
2024				
2025				
2026	0.00077	0.000002	0.000005	0.408583
2027	0.00085	0.000002	0.000005	0.449770
2028	0.00093	0.000002	0.000005	0.491739
2029	0.00101	0.000003	0.000006	0.534503
2030	0.00109	0.000003	0.000006	0.578073
2031	0.00117	0.000003	0.000007	0.622461
2032	0.00126	0.000003	0.000007	0.667679
2033	0.00134	0.000004	0.000008	0.713739
2034	0.00143	0.000004	0.000008	0.760654
2035	0.00152	0.000004	0.000009	0.808435
2036	0.00161	0.000004	0.000010	0.857096
2037	0.00171	0.000004	0.000010	0.906649
2038	0.00180	0.000005	0.000011	0.957108
2039	0.00190	0.000005	0.000011	1.008485
2040	0.00200	0.000005	0.000012	1.060794
2041	0.00210	0.000006	0.000012	1.114048
2042	0.00220	0.000006	0.000013	1.168262
2043	0.00230	0.000006	0.000014	1.223448
2044	0.00241	0.000006	0.000014	1.279621
2045	0.00251	0.000007	0.000015	1.336795
Total	0.031880901	8.40589E-05	0.000188617	16.9479422

Table 13. Annual Emissions Savings from Build (2020 USD)

Annual Emissions Savings from Build (2020 USD)						
Year	NO _x	SO _x	PM2.5	CO ₂	Total (Excluding CO ₂)	Total for All Pollutants
\$2,021.00						
\$2,022.00						
\$2,023.00						
\$2,024.00						
\$2,025.00						
\$2,026.00	\$12.91	\$0.09	\$3.70	\$23.29	\$16.71	\$40.00
\$2,027.00	\$14.47	\$0.10	\$4.14	\$26.09	\$18.71	\$44.80
\$2,028.00	\$16.10	\$0.12	\$4.60	\$29.01	\$20.81	\$49.82
\$2,029.00	\$17.80	\$0.13	\$5.08	\$32.07	\$23.00	\$55.07
\$2,030.00	\$19.68	\$0.14	\$5.58	\$35.26	\$25.40	\$60.67
\$2,031.00	\$21.19	\$0.15	\$6.01	\$38.59	\$27.36	\$65.95
\$2,032.00	\$22.73	\$0.16	\$6.45	\$42.06	\$29.34	\$71.41
\$2,033.00	\$24.30	\$0.17	\$6.89	\$45.68	\$31.37	\$77.05
\$2,034.00	\$25.90	\$0.19	\$7.34	\$50.20	\$33.43	\$83.63
\$2,035.00	\$27.53	\$0.20	\$7.81	\$54.17	\$35.53	\$89.69
\$2,036.00	\$29.18	\$0.21	\$8.28	\$58.28	\$37.67	\$95.95
\$2,037.00	\$30.87	\$0.22	\$8.75	\$62.56	\$39.84	\$102.40
\$2,038.00	\$32.59	\$0.23	\$9.24	\$67.00	\$42.06	\$109.06
\$2,039.00	\$34.34	\$0.25	\$9.74	\$71.60	\$44.32	\$115.92
\$2,040.00	\$36.12	\$0.26	\$10.24	\$76.38	\$46.62	\$123.00
\$2,041.00	\$37.93	\$0.27	\$10.76	\$81.33	\$48.96	\$130.28
\$2,042.00	\$39.78	\$0.28	\$11.28	\$87.62	\$51.34	\$138.96
\$2,043.00	\$41.66	\$0.30	\$11.81	\$92.98	\$53.77	\$146.75
\$2,044.00	\$43.57	\$0.31	\$12.36	\$98.53	\$56.24	\$154.77
\$2,045.00	\$45.52	\$0.33	\$12.91	\$104.27	\$58.75	\$163.02
Total	\$574.15	\$4.11	\$162.97	\$1,176.97	\$741.23	\$1,918.20

Economic Activity

Table 14 summarizes the base value per mile for light duty vehicles. These values are multiplied by the VMT reduced on the population and mode share (see Tables 15 and 16) to estimate the amount money Lumberton is saving residents from increased walking and less driving. See the “Economic Activity” tab of the [Lumberton RAISE BCA workbook](#) for more information.

Table 14. Base Value per Mile (Based on USDOT 2022 BCA Guidance Table A-5)

Vehicle Type	Value per mile (2020 USD)
Light Duty Vehicle	\$ 0.45
Commercial Trucks	\$ 0.94

Table 15. Baseline and Estimated Walk Trips

Year	Baseline					
	Lumberton Population	Project Area Population (0.5 Mile)	Employed Population in Project Area	Commute Walk Population*	Commute Walk Trips (Annualized)	Utilitarian Adult Walk Trips (Annualized)
2020	19,025	12,849	4,166	42	21,840	106,450
2021	19,215	12,977	4,208	42	22,058	107,514
2022	19,407	13,107	4,250	43	22,279	108,589
2023	19,601	13,238	4,292	43	22,502	109,675
2024	19,797	13,371	4,335	44	22,727	110,772
2025	19,995	13,504	4,379	44	22,954	111,880
2026	20,195	13,639	4,422	45	23,184	112,998
2027	20,397	13,776	4,467	45	23,415	114,128
2028	20,601	13,914	4,511	45	23,650	115,270
2029	20,807	14,053	4,556	46	23,886	116,422
2030	21,015	14,193	4,602	46	24,125	117,587
2031	21,226	14,335	4,648	47	24,366	118,762
2032	21,438	14,479	4,694	47	24,610	119,950
2033	21,652	14,623	4,741	48	24,856	121,150
2034	21,869	14,770	4,789	48	25,105	122,361
2035	22,087	14,917	4,837	49	25,356	123,585
2036	22,308	15,066	4,885	49	25,609	124,821
2037	22,531	15,217	4,934	50	25,865	126,069
2038	22,757	15,369	4,983	50	26,124	127,329
2039	22,984	15,523	5,033	51	26,385	128,603
2040	23,214	15,678	5,083	51	26,649	129,889
2041	23,446	15,835	5,134	52	26,915	131,188
2042	23,681	15,993	5,185	52	27,185	132,499
2043	23,918	16,153	5,237	53	27,456	133,824
2044	24,157	16,315	5,290	53	27,731	135,163
2045	24,398	16,478	5,343	54	28,008	136,514

Table 16. Future Estimated Walk Trips and Reduced VMT

Year	Build (Compare with Table 15)					
	Commute Walk Trips (Annualized)	Utilitarian Adult Walk Trips (Annualized)	Combined New Total Walking Trips (Annualized)**	Reduced Vehicle Commute Trips (Annualized)	Reduced Vehicle Utilitarian Trips (Annualized)	Reduced VMT
2020	21,840	106,450	-	-	-	
2021	22,058	107,514	-	-	-	
2022	22,279	108,589	-	-	-	
2023	22,502	109,675	-	-	-	
2024	22,727	110,772	-	-	-	
2025	22,954	111,880	-	-	-	
2026	23,440	114,250	1,508.56	231	1,136	1,109.07
2027	23,698	115,506	1,660.63	254	1,251	1,220.87
2028	23,959	116,776	1,815.59	277	1,368	1,334.80
2029	24,222	118,060	1,973.48	302	1,486	1,450.88
2030	24,488	119,358	2,134.35	326	1,608	1,569.15
2031	24,757	120,669	2,298.23	351	1,731	1,689.63
2032	25,030	121,996	2,465.19	377	1,857	1,812.38
2033	25,305	123,336	2,635.25	403	1,985	1,937.40
2034	25,583	124,691	2,808.46	429	2,115	2,064.75
2035	25,864	126,061	2,984.88	456	2,248	2,194.45
2036	26,148	127,446	3,164.55	484	2,384	2,326.54
2037	26,435	128,846	3,347.51	512	2,521	2,461.05
2038	26,725	130,262	3,533.81	540	2,662	2,598.01
2039	27,019	131,692	3,723.50	569	2,805	2,737.47
2040	27,316	133,139	3,916.64	599	2,950	2,879.46
2041	27,616	134,601	4,113.26	629	3,098	3,024.02
2042	27,919	136,079	4,313.42	659	3,249	3,171.18
2043	28,225	137,573	4,517.18	690	3,402	3,320.98
2044	28,535	139,083	4,724.58	722	3,559	3,473.46
2045	28,849	140,610	4,935.68	754	3,718	3,628.65

Results

The following tables summarize the benefit-cost analysis for each year of the analysis period. The City assumed a no-build scenario over 20 years (2025-2045) and a 7 percent real discount rate. See the “BCA” tab of the [Lumberton RAISE BCA workbook](#) for more information. SAFE Lumberton has a **net present value** of **\$28,197,534** and a **benefit-cost ratio** of **4.5**.

Table 17. Estimated Annual Benefits (Undiscounted and Discounted)

Merit Criteria	Benefits							
	Safety	Environmental Sustainability		Quality of Life		Useful Life		
Year	Safety (Crash Reduction)	Sustainability - Emissions (CO ₂)	Health - Emissions (SO _x , NO _x , PM2.5)	Health - Mortality Reduction Benefits from Walking	Economic Activity - Reduced operating costs from mode shift	Useful Life (residual value)	Benefits Total (Undiscounted)	Benefits (Discounted)
2020								
2021								
2022								
2023								
2024							\$ -	
2025							\$ -	
2026	\$ 4,766,870	\$ 23.29	\$17	\$10,681	\$499		\$4,778,090	\$3,183,843
2027	\$ 4,766,870	\$ 26.09	\$19	\$11,757	\$549		\$4,779,222	\$2,976,259
2028	\$ 4,766,870	\$ 29.01	\$21	\$12,854	\$601		\$4,780,375	\$2,782,222
2029	\$ 4,766,870	\$ 32.07	\$23	\$13,972	\$653		\$4,781,550	\$2,600,847
2030	\$ 4,766,870	\$ 35.26	\$25	\$15,111	\$706		\$4,782,748	\$2,431,307
2031	\$ 4,766,870	\$ 38.59	\$27	\$16,272	\$760		\$4,783,968	\$2,272,829
2032	\$ 4,766,870	\$ 42.06	\$29	\$17,454	\$816		\$4,785,211	\$2,124,691
2033	\$ 4,766,870	\$ 45.68	\$31	\$18,658	\$872		\$4,786,477	\$1,986,218
2034	\$ 4,766,870	\$ 50.20	\$33	\$19,884	\$929		\$4,787,767	\$1,856,779
2035	\$ 4,766,870	\$ 54.17	\$36	\$21,133	\$988		\$4,789,080	\$1,735,783
2036	\$ 4,766,870	\$ 58.28	\$38	\$22,405	\$1,047		\$4,790,418	\$1,622,680
2037	\$ 4,766,870	\$ 62.56	\$40	\$23,700	\$1,107		\$4,791,780	\$1,516,955
2038	\$ 4,766,870	\$ 67.00	\$42	\$25,019	\$1,169		\$4,793,168	\$1,418,125
2039	\$ 4,766,870	\$ 71.60	\$44	\$26,362	\$1,232		\$4,794,580	\$1,325,741
2040	\$ 4,766,870	\$ 76.38	\$47	\$27,730	\$1,296		\$4,796,019	\$1,239,382
2041	\$ 4,766,870	\$ 81.33	\$49	\$29,122	\$1,361		\$4,797,483	\$1,158,655
2042	\$ 4,766,870	\$ 87.62	\$51	\$30,539	\$1,427		\$4,798,975	\$1,083,192
2043	\$ 4,766,870	\$ 92.98	\$54	\$31,982	\$1,494		\$4,800,493	\$1,012,649
2044	\$ 4,766,870	\$ 98.53	\$56	\$33,450	\$1,563		\$4,802,038	\$946,706
2045	\$ 4,766,870	\$ 104.27	\$59	\$34,945	\$1,633	\$ 856,400	\$5,660,011	\$1,042,852
Total	\$ 95,337,402	\$ 1,177	\$741	\$443,029	\$20,702	\$ 856,400	\$96,659,451	\$36,317,713

Table 18. Estimated Annual Costs

Year	Costs			
	Capital Expenditures	Operations and maintenance (1% of Construction Costs)	Costs Total (Undiscounted)	Costs Total (Discounted)
2020				
2021				
2022				
2023				
2024	\$0.00		\$0.00	\$0.00
2025	\$10,298,000.00		\$10,298,000.00	\$7,342,331.68
2026	\$0.00	\$102,980.00	\$102,980.00	\$68,619.92
2027	\$0.00	\$102,980.00	\$102,980.00	\$64,130.77
2028	\$0.00	\$102,980.00	\$102,980.00	\$59,935.30
2029	\$0.00	\$102,980.00	\$102,980.00	\$56,014.30
2030	\$0.00	\$102,980.00	\$102,980.00	\$52,349.81
2031	\$0.00	\$102,980.00	\$102,980.00	\$48,925.06
2032	\$0.00	\$102,980.00	\$102,980.00	\$45,724.35
2033	\$0.00	\$102,980.00	\$102,980.00	\$42,733.04
2034	\$0.00	\$102,980.00	\$102,980.00	\$39,937.42
2035	\$0.00	\$102,980.00	\$102,980.00	\$37,324.69
2036	\$0.00	\$102,980.00	\$102,980.00	\$34,882.89
2037	\$0.00	\$102,980.00	\$102,980.00	\$32,600.83
2038	\$0.00	\$102,980.00	\$102,980.00	\$30,468.07
2039	\$0.00	\$102,980.00	\$102,980.00	\$28,474.83
2040	\$0.00	\$102,980.00	\$102,980.00	\$26,611.99
2041	\$0.00	\$102,980.00	\$102,980.00	\$24,871.02
2042	\$0.00	\$102,980.00	\$102,980.00	\$23,243.94
2043	\$0.00	\$102,980.00	\$102,980.00	\$21,723.31
2044	\$0.00	\$102,980.00	\$102,980.00	\$20,302.16
2045	\$0.00	\$102,980.00	\$102,980.00	\$18,973.98
Total	\$10,298,000.00	\$2,059,600.00	\$12,357,600.00	\$8,120,179.34

Table 19. Estimated Discounted Total Costs and Benefits (Discounted at 7 percent per USDOT's 2022 BCA Guidance)

Year	Total Cost	Total Benefit
2020		
2021		
2022		
2023		
2024	\$0.00	
2025	\$7,342,331.68	
2026	\$68,619.92	\$3,183,843
2027	\$64,130.77	\$2,976,259
2028	\$59,935.30	\$2,782,222
2029	\$56,014.30	\$2,600,847
2030	\$52,349.81	\$2,431,307
2031	\$48,925.06	\$2,272,829
2032	\$45,724.35	\$2,124,691
2033	\$42,733.04	\$1,986,218
2034	\$39,937.42	\$1,856,779
2035	\$37,324.69	\$1,735,783
2036	\$34,882.89	\$1,622,680
2037	\$32,600.83	\$1,516,955
2038	\$30,468.07	\$1,418,125
2039	\$28,474.83	\$1,325,741
2040	\$26,611.99	\$1,239,382
2041	\$24,871.02	\$1,158,655
2042	\$23,243.94	\$1,083,192
2043	\$21,723.31	\$1,012,649
2044	\$20,302.16	\$946,706
2045	\$18,973.98	\$1,042,852
Total Discounted Costs: \$8,120,179		Total Discounted Benefits: \$36,317,713
Net Present Value: \$28,197,534		Benefit-Cost Ratio: 4.5