

# WALK NC RAISE Grant – BCA Narrative

## Benefit Cost Analysis (BCA) Executive Summary

The Benefit-Cost Analysis (BCA) describes the benefits of the WALK NC project if it was awarded and constructed. NCDOT used USDOT’s Benefit-Cost Analysis Guidance (2023) to complete the BCA analysis and used the recommended parameter values where applicable. The BCA used an analysis period of 20 years (2028-2047) and assumed construction completed by 2027. All costs and benefits are presented in 2021 base year dollars, and future benefits and costs are computed with 2021 as the base year.

The BCA considered five different benefits:

- **Safety:** The reduction in crashes and crash costs.
- **Sustainability:** The reduction in vehicle miles traveled that improves air quality by reducing carbon dioxide emissions.
- **Health:**
  - **Reduce Nitrous Oxide Omissions:** The reduction in nitrous oxide emissions that improves air quality for personal health.
  - **Reduce Mortality Rate by Increasing Walking:** The increase in longevity from providing new opportunities to improve personal health.
- **Economic Activity:** The reduction in operating costs for residents resulting from mode shift from driving to walking.

## Summary of the BCA Results

Table 1 displays the BCA and total benefits. The capital costs included in the BCA are \$12.3 million. The BCA estimated a 20-year evaluation (2028-2047), a real discount rate of 7 percent, a CO<sub>2</sub> discount rate of 3%, and has a **net present value** of **\$9,293,530.41** and a **benefit-cost ratio** of **2.05**. Table 2 describes the benefits for each category over the years of operation.

Table 1. BCA Summary

Category	Discounted Value <sup>1</sup> (in 2021 Dollars)
Net Discounted Benefits	<b>\$ 18,186,287</b>
Net Discounted Capital Costs	<b>\$ 8,892,756</b>
Net Present Value	<b>\$ 9,293,530.41</b>
Benefit-Cost Ratio	2.05

Table 2. Undiscounted Benefits over 25 years of Operation

Category	Monetary Value (in 2021 Dollars)
Safety Benefits	\$50,667,088
Sustainability	\$3,527
Health - Emissions	\$2,071
Health – Reduce Mortality Rate	\$1,086,525
Economic Activity	\$56,346

<sup>1</sup> NCDOT used a 3% discount for CO<sub>2</sub> emissions and a 7% discount rate for all other benefits and costs.

Note: Innovation, Partnerships, Resiliency, Quality of Life, 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 safety, walkability and connectivity in the 15 municipalities.

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

- Sustainability - water quality: Impact on water quality is expected to be negligible with the majority of WALK NC improvements being related to signals and pavement markings.
- Resiliency: Resiliency impact from WALK NC improvements is expected to be negligible.
- State of good repair: Values are not easily quantified. However, NCDOT anticipates some cost savings from upgrades to signal plans, pavement markings, ADA curb ramps, sidewalk connections and resurfacings.
- Travel time savings: Not used for cost or benefit due to WALK NC's focus on systemic safety for pedestrians. This project will not meaningfully improve capacity, congestion, or travel time for vehicular traffic.
- Useful Life: Not used for benefit analysis as the pedestrian countdown signals will not retain a residual value in 30 years, and other improvements (signal designs, sidewalk gaps, curb ramps, etc.) are not easily quantified.

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

## Calculating Benefits for WALK NC

The WALK NC project will benefit all residents and visitors in the 15 municipalities, however, those that will benefit the most are pedestrians that use the new signals and safety improvements. The benefits were calculated by using population estimates from the 2020 Census and pedestrian estimates at the proposed signals using NCDOT's Statewide Pedestrian Crash Risk – Exposure Model. The population of each municipality has an assumed annual growth rate of 0.72%.

NCDOT calculated the benefits by comparing pedestrian activity at the proposed signals in the No Build scenario with how activity would change 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 pedestrian activity from that identified in the Exposure Model. To determine annual pedestrian activity, NCDOT assumed that 13 hours accounted for 80% of daily pedestrian activity; by increasing this estimate by 20%, annualizing it, and increasing it by combined annual growth rate of 0.72%, NCDOT established baseline pedestrian activity at each signal for 25 years.

Build conditions assume induced pedestrian activity from improved walking conditions towards the walk goal of 3 percent walking mode share by the year 2047. Pedestrian activity is categorized by trip purpose (work, non-work) based on the 2020 National Household Transportation Survey. The trip multipliers for the new trips are found in the "Trip Multipliers" tab of the [WALK NC RAISE BCA workbook](#).

Total Reduced VMT is calculated as the product of the new pedestrian activity by trip purpose and the typical replacement distance for each trip type.

Table 3. Summary of the Benefit Assumptions

Baseline	Build Scenario	Impacts
Pedestrian activity at each signal.	WALK NC will induce pedestrian activity by providing safer opportunities for pedestrian trips at the proposed intersections.	Reduced pedestrian and vehicular crashes, reduced pollution, reduced healthcare costs, and reduced operating costs.

## Costs

The capital costs for WALK NC are shown in Table 4. The main application provides more detailed information on the project costs.

Table 4. Project Construction Costs by Municipality

Municipality	Anticipated Cost
Kinston	\$1,725,210
Washington	\$572,217
Roanoke Rapids	\$745,473
Selma	\$377,109
Smithfield	\$452,670
Weldon	\$163,188
Wilson	\$1,503,651
Henderson	\$850,632
Oxford	\$834,405
Lumberton	\$942,819
Hamlet	\$363,162
Rockingham	\$581,697
Siler City	\$537,351
Lexington	\$1,253,235
Salisbury	\$1,397,181
<b>Total Capital Costs</b>	<b>\$12,300,000</b>

Note: NCDOT used a 20% contingency, which is added to the signal costs in each municipality, due to final design, right-of-way, and environmental documentation.

Estimated maintenance costs were based on NCDOT values for anticipated annual and emergency maintenance for proposed improvements. This cost assumed, conservatively, 8 pedestrian signals installed at each intersection, though some intersections with fewer than 4 approaches will not require 8 new signals. NCDOT added 0.1% of capital costs for other operations and maintenance costs annually over the 20-year period for a total of 2% additional costs. Total estimated maintenance costs equate to \$1,974,000 over 20 years.

## Useful Life

NCDOT expected the use life of WALK NC improvements to align with the 20-year analysis period and projects no residual value at the end of 2047.

## Benefits

### WALK NC Pedestrian Activity

As mentioned previously, NCDOT used data from Statewide Pedestrian Crash Risk – Exposure Model to determine pedestrian activity at proposed signals for the WALK NC project. NCDOT established activity estimates in 2022 at NCDOT signalized intersections across the state. The data-informed estimate uses variables such as pedestrian counts, pedestrian generators, land uses, and street characteristics to estimate 13-hour pedestrian activity at intersections. The NCDOT Traffic Safety Unit (TSU) created this estimate to inform safety planning projects. For WALK NC, NCDOT assumed this 13-hour window represented 80% of daily activity. Table 5 summarizes the process for establishing annual pedestrian activity estimates at a sample signal.

*Table 1. Annualized Pedestrian Activity*

Signal ID	Location	City	Activity Estimate (13H)	Daily Pedestrian Activity	Annual Pedestrian Activity
08-0167	NC 177 @ Hylan Ave.	Hamlet	25.62	30.74	11,221

*Table 6. Mode Share, 2021 ACS 5-Year Estimates (Workers, 16+)*

Population	Drove Alone	Carpool (Any)	Transit total	Walked	Other means
44,840,986166	77.2%	8.7%	0.9%	1.6%	11.7%

*Table 7. Demand/Activity Multipliers (NHTS, 2017)*

Demand/Activity Multipliers	Factor
Utilitarian/Non-work Walk Trip	3.27
<b>Vehicle Miles Reduced</b>	
Commuter – Walk	0.72
Utilitarian/Non-Work – Walk	0.83

*Table 8. Annual Trips by purpose (NHTS, 2020)*

Trip Purpose	
Work	16.63%
Utilitarian/Non-Work	83.37%

### Increase in Walking

Mode share and multipliers were calculated for adults due the limited availability of aggregated information for youth travel mode share across the 15 municipalities (Table 6). Vehicle Miles Traveled (VMT) reductions were calculated by an average trip distance factor from the 2017 National Household Transportation Survey (NHTS) (Table 7). Trip purpose was calculated based on the 2020 NHTS results for Annual Passenger Trips by Purpose in North Carolina (Table 8). Table 16 summarizes VMT reductions by purpose and trip distance.

The 2047 mode share goal of 3 percent was identified based on the state’s existing walking rates (1.6%) and the perceived growth from the significant levels of safety and crossing enhancements in WALK NC municipalities.

## Safety Benefits

NCDOT calculated the historical crash costs for the WALK NC’s fifteen municipalities and estimated the reduction from the implementation of safety improvements such as pedestrian signal heads, crosswalks, and signal timing improvements. Table 7 is separated into pedestrian crashes (2012-2021) and vehicular crashes (2016-2021) with reported crash severities on the KABCO scale. Pedestrian and vehicular crashes were provided by NCDOT, with a 250-foot buffer at the proposed signal locations (250 feet was selected as a buffer due to best practices recommended by the Highway Safety Manual).

Table 9. No Build Crashes (Historical Conditions)

<b>Pedestrian Crashes by Division and City</b>	<b>Total Crashes (10-Year)</b>	<b>K</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>O</b>	<b>Unknown Injury</b>	<b>Search Distance</b>	<b>Annual Crash Cost</b>
Division 2 – KINSTON	20	2	1	5	9	3		250'	\$2,565,130
Division 2 – WASHINGTON	3		2		1			250'	\$120,710
Division 4 – ROANOKE RAPIDS	8	1		1	3	2	1	250'	\$1,241,110
Division 4 – SELMA	1			1				250'	\$15,370
Division 4 – SMITHFIELD	4		1	2	1			250'	\$95,020
Division 4 – WELDON	1				1			250'	\$7,850
Division 4 – WILSON	16	2		2	7	3	2	250'	\$2,489,670
Division 5 – HENDERSON	15	2	1	4	5	2	1	250'	\$2,539,350
Division 5 – OXFORD	9	1		2	3	3		250'	\$1,235,490
Division 6 – LUMBERTON	4	1		1	2			250'	\$1,211,070
Division 8 – HAMLET	3				2	1		250'	\$16,100
Division 8 – ROCKINGHAM	6		1	1	3		1	250'	\$116,740
Division 8 - SILER CITY	4			1	2	1		250'	\$31,470
Division 9 - LEXINGTON	3	1		2				250'	\$1,210,740
Division 9 - SALISBURY	10			5	4	1		250'	\$108,650
<b>Vehicle Crashes by Division and City</b>	<b>Total Crashes (5-Year)</b>	<b>K</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>O</b>	<b>Unknown Injury</b>	<b>Search Distance</b>	<b>Annual Crash Cost</b>
Division 2 - KINSTON	332	4	4	22	141	161		250'	\$12,910,220

Division 2 - WASHINGTON	238	2	2	15	39	179	1	250'	\$6,205,100
Division 4 - ROANOKE RAPIDS	279	1		22	42	200	14	250'	\$4,454,600
Division 4 - SELMA	124		1	7	25	90	1	250'	\$835,320
Division 4 - SMITHFIELD	321	1	1	19	57	239	4	250'	\$4,314,140
Division 4 - WELDON	26			2	9	12	3	250'	\$340,720
Division 4 - WILSON	535	4	1	22	114	381	13	250'	\$12,879,880
Division 5 - HENDERSON	332	3	3	14	73	232	7	250'	\$9,480,100
Division 5 - OXFORD	220	1	2	9	46	158	4	250'	\$3,882,100
Division 6 - LUMBERTON	515	1	4	34	112	356	8	250'	\$6,242,040
Division 8 - HAMLET	137		1	7	29	93	7	250'	\$1,157,200
Division 8 - ROCKINGHAM	168		1	12	43	109	3	250'	\$1,372,380
Division 8 - SILER CITY	165	1		6	30	125	3	250'	\$3,243,780
Division 9 - LEXINGTON	233	1	3	4	39	180	6	250'	\$3,834,520
Division 9 - SALISBURY	779		2	36	123	601	17	250'	\$4,471,520

NCDOT also calculated the Build anticipated crashes. Table 10 adds the primary countermeasures for the intersections, notes the applicable crashes for the countermeasure, the Crash Modification Factor (CMF), and the anticipated reduced crashes. See Table 12 for source information for CMFs.

Table 10. Build Anticipated Crashes

Ped Crashes by Division and City	Countermeasures	Applicable crashes	CM F	K	A	B	C	O	Unknown Injury
Division 2 - KINSTON	Crosswalk, Pedestrian Signals, LPI	Ped crashes	0.5	1	0.5	2.5	4.5	1.5	0
Division 2 - WASHINGTON	Crosswalk, Pedestrian Signals, LPI	Ped crashes	0.5	0	1	0	0.5	0	0
Division 4 - ROANOKE RAPIDS	Crosswalk, Pedestrian Signals, LPI	Ped crashes	0.5	0.5	0	0.5	1.5	1	0.5
Division 4 - SELMA	Crosswalk, Pedestrian Signals, LPI	Ped crashes	0.5	0	0	0.5	0	0	0
Division 4 - SMITHFIELD	Crosswalk, Pedestrian Signals, LPI	Ped crashes	0.5	0	0.5	1	0.5	0	0
Division 4 - WELDON	Crosswalk, Pedestrian Signals, LPI	Ped crashes	0.5	0	0	0	0.5	0	0
Division 4 - WILSON	Crosswalk, Pedestrian Signals, LPI	Ped crashes	0.5	1	0	1	3.5	1.5	1

Division 5 - HENDERSON	Crosswalk, Pedestrian Signals, LPI	Ped crashes	0.5	1	0.5	2	2.5	1	0.5
Division 5 - OXFORD	Crosswalk, Pedestrian Signals, LPI	Ped crashes	0.5	0.5	0	1	1.5	1.5	0
Division 6 - LUMBERTON	Crosswalk, Pedestrian Signals, LPI	Ped crashes	0.5	0.5	0	0.5	1	0	0
Division 8 - HAMLET	Crosswalk, Pedestrian Signals, LPI	Ped crashes	0.5	0	0	0	1	0.5	0
Division 8 - ROCKINGHAM	Crosswalk, Pedestrian Signals, LPI	Ped crashes	0.5	0	0.5	0.5	1.5	0	0.5
Division 8 - SILER CITY	Crosswalk, Pedestrian Signals, LPI	Ped crashes	0.5	0	0	0.5	1	0.5	0
Division 9 - LEXINGTON	Crosswalk, Pedestrian Signals, LPI	Ped crashes	0.5	0.5	0	1	0	0	0
Division 9 - SALISBURY	Crosswalk, Pedestrian Signals, LPI	Ped crashes	0.5	0	0	2.5	2	0.5	0
<b>Vehicle Crashes by Division and City</b>	<b>Countermeasures</b>	<b>Applicable crashes</b>	<b>CM F</b>	<b>K</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>O</b>	<b>Unknown Injury</b>
Division 2 - KINSTON	Signal timing improvements	All crashes and severities	0.85	3.4	3.4	18.7	120	137	0
Division 2 - WASHINGTON	Signal timing improvements	All crashes and severities	0.85	1.7	1.7	12.8	33	152	0.5
Division 4 - ROANOKE RAPIDS	Signal timing improvements	All crashes and severities	0.85	0.9	0	18.7	36	170	7
Division 4 - SELMA	Signal timing improvements	All crashes and severities	0.85	0	0.9	5.95	21	77	0.5
Division 4 - SMITHFIELD	Signal timing improvements	All crashes and severities	0.85	0.9	0.9	16.2	48	203	2
Division 4 - WELDON	Signal timing improvements	All crashes and severities	0.85	0	0	1.7	7.7	10	1.5
Division 4 - WILSON	Signal timing improvements	All crashes and severities	0.85	3.4	0.9	18.7	97	324	6.5
Division 5 - HENDERSON	Signal timing improvements	All crashes and severities	0.85	2.6	2.6	11.9	62	197	3.5
Division 5 - OXFORD	Signal timing improvements	All crashes and severities	0.85	0.9	1.7	7.65	39	134	2
Division 6 - LUMBERTON	Signal timing improvements	All crashes and severities	0.85	0.9	3.4	28.9	95	303	4
Division 8 - HAMLET	Signal timing improvements	All crashes and severities	0.85	0	0.9	5.95	25	79	3.5
Division 8 - ROCKINGHAM	Signal timing improvements	All crashes and severities	0.85	0	0.9	10.2	37	93	1.5
Division 8 - SILER CITY	Signal timing improvements	All crashes and severities	0.85	0.9	0	5.1	26	106	1.5
Division 9 - LEXINGTON	Signal timing improvements	All crashes and severities	0.85	0.9	2.6	3.4	33	153	3

Division 9 - SALISBURY	Signal timing improvements	All crashes and severities	0.85	0	1.7	30.6	105	511	8.5
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To calculate Safety Benefit, NCDOT multiplied the historical crashes by the USDOT’s 2023 BCA Guidance KABCO levels and annualized crash costs (5 or 10 years). Table 11 shows the difference from the historical crash costs and the Anticipated Annual Crash Cost, which is the Safety Benefit calculated in the “BCA” tab of the [WALK NC RAISE BCA workbook](#).

Table 11. Build Anticipated Crashes

<b>Ped Crashes by Division and City</b>	<b>Anticipated Annual Crash Cost</b>	<b>Safety Benefit</b>
Division 2 - KINSTON	\$1,282,565	\$1,282,565
Division 2 - WASHINGTON	\$60,355	\$60,355
Division 4 - ROANOKE RAPIDS	\$620,555	\$620,555
Division 4 - SELMA	\$7,685	\$7,685
Division 4 - SMITHFIELD	\$47,510	\$47,510
Division 4 - WELDON	\$3,925	\$3,925
Division 4 - WILSON	\$1,244,835	\$1,244,835
Division 5 - HENDERSON	\$1,269,675	\$1,269,675
Division 5 - OXFORD	\$617,745	\$617,745
Division 6 - LUMBERTON	\$605,535	\$605,535
Division 8 - HAMLET	\$8,050	\$8,050
Division 8 - ROCKINGHAM	\$58,370	\$58,370
Division 8 - SILER CITY	\$15,735	\$15,735
Division 9 - LEXINGTON	\$605,370	\$605,370
Division 9 - SALISBURY	\$54,325	\$54,325
<b>Vehicle Crashes by Division and City</b>	<b>Anticipated Annual Crash Cost</b>	<b>Safety Benefit</b>
Division 2 - KINSTON	\$5,486,844	\$7,423,377
Division 2 - WASHINGTON	\$2,629,681	\$3,575,419
Division 4 - ROANOKE RAPIDS	\$1,788,394	\$2,666,206
Division 4 - SELMA	\$347,525	\$487,796
Division 4 - SMITHFIELD	\$1,803,564	\$2,510,577
Division 4 - WELDON	\$122,347	\$218,374
Division 4 - WILSON	\$5,376,625	\$7,503,256
Division 5 - HENDERSON	\$3,976,637	\$5,503,463
Division 5 - OXFORD	\$1,619,947	\$2,262,154
Division 6 - LUMBERTON	\$2,592,975	\$3,649,065
Division 8 - HAMLET	\$439,405	\$717,796
Division 8 - ROCKINGHAM	\$560,802	\$811,578
Division 8 - SILER CITY	\$1,356,147	\$1,887,633
Division 9 - LEXINGTON	\$1,584,752	\$2,249,768
Division 9 - SALISBURY	\$1,773,125.50	\$2,698,394.50
<b>TOTAL</b>	<b>\$37,961,002.00</b>	<b>\$50,667,088.00</b>

## Safety CMFs

NCDOT documented the applicable CMFs and crash reduction factors (CRFs) for the WALK NC improvements. NCDOT uses CMFs/CRFs approved by the CRF Committee to evaluate and compare the cost-effectiveness of alternatives for safety improvements. These CMFs are published in the [North Carolina Project Development Crash Reduction Factor \(CRF\) Information Sheet](#), last updated April 2022.

Table 22. Summary of CMFs Used for WALK NC Improvements

Improvement	CMF	CRF	Type	Source
Crosswalk, Pedestrian Signal, LPI*	0.5	0.5	Pedestrian crashes	NCDOT
Traffic Signal Timing Upgrades	0.85	0.15	All Crashes and severities	NCDOT (CMF 1.8.1)

\* The Crosswalk, Pedestrian Signal, LPI CMF is a composite of CMFs for Crosswalk Improvements (CMF: 0.68), Pedestrian Signals (CMF: 0.83) and LPI (CMF: 0.87).

## Health Benefits

Table 13 uses pedestrian activity assumptions in one of the 15 municipalities based on pedestrian activity, population growth, mode share, and new induced trips for adults, and calculates the monetized health value (reduced mortality rates) given the USDOT's 2023 BCA Guidance value of \$7.20 per walking trip for adults aged 20-74. See "Health Mortality" tab of the [WALK NC RAISE BCA workbook](#) for full detail information.

Table 13. Health Value – Kinston, NC

Year	Baseline Pedestrian Activity, Annualized	Induced Pedestrian Activity, Annualized	New Induced Pedestrian Activity, Annualized	Mortality Reduction Estimate, Annualized (2021 USD)
2023	4384			
2024	4415			
2025	4447			
2026	4479			
2027	4511			
2028	4544	4689	145	\$ 1,043.63
2029	4577	4723	146	\$ 1,051.14
2030	4609	4908	299	\$ 2,151.19
2031	4643	5101	459	\$ 3,302.12
2032	4676	5302	626	\$ 4,506.00
2033	4710	5510	801	\$ 5,764.96
2034	4744	5727	984	\$ 7,081.23
2035	4778	5952	1175	\$ 8,457.10
2036	4812	6187	1374	\$ 9,894.99
2037	4847	6430	1583	\$ 11,397.39
2038	4882	6683	1801	\$ 12,966.89
2039	4917	6946	2029	\$ 14,606.20

2040	4952	7219	2266	\$ 16,318.11
2041	4988	7503	2515	\$ 18,105.54
2042	5024	7798	2774	\$ 19,971.51
2043	5060	8104	3044	\$ 21,919.18
2044	5097	8423	3327	\$ 23,951.82
2045	5133	8754	3621	\$ 26,072.84
2046	5170	9099	3929	\$ 28,285.75
2047	5207	9457	4249	\$ 30,594.26

Table 14 shows the annual emissions cost benefit from the Build condition in one of the 15 municipalities. NCDOT computed the metric tons of NO<sub>x</sub>, SO<sub>x</sub>, PM 2.5, and CO<sub>2</sub> from the reduced VMT based on pedestrian activity estimates, population and mode share projections and the EPA-estimated grams per mile emissions for standard passenger vehicles. NCDOT used Annual Emissions Reductions Multipliers to calculate the cost benefit. 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 [WALK NC RAISE BCA workbook](#) for full detail information.

Table 34. Annual Emissions Savings from Build (2021 USD)

KINSTON	Annual Emissions Savings from Build (2021 USD)						
	Year	NO <sub>x</sub>	SO <sub>x</sub>	PM2.5	CO <sub>2</sub>	Total (Excluding CO <sub>2</sub> )	Total for All Pollutants
	2023						
	2024						
	2025						
	2026						
	2027						
	2028	\$1.48	\$0.01	\$0.42	\$2.69	\$1.92	\$4.61
	2029	\$1.53	\$0.01	\$0.43	\$2.75	\$1.97	\$4.72
	2030	\$3.18	\$0.02	\$0.90	\$5.81	\$4.10	\$9.91
	2031	\$4.88	\$0.03	\$1.39	\$9.05	\$6.30	\$15.35
	2032	\$6.65	\$0.05	\$1.89	\$12.54	\$8.59	\$21.13
	2033	\$8.51	\$0.06	\$2.42	\$16.28	\$10.99	\$27.27
	2034	\$10.46	\$0.07	\$2.97	\$20.29	\$13.50	\$33.79
	2035	\$12.49	\$0.09	\$3.55	\$24.59	\$16.12	\$40.71
	2036	\$14.61	\$0.10	\$4.15	\$29.59	\$18.87	\$48.46
	2037	\$16.83	\$0.12	\$4.78	\$34.56	\$21.73	\$56.29
	2038	\$19.15	\$0.14	\$5.44	\$39.85	\$24.72	\$64.58
	2039	\$21.57	\$0.15	\$6.13	\$45.50	\$27.85	\$73.35
	2040	\$24.10	\$0.17	\$6.85	\$51.51	\$31.11	\$82.62

2041	\$26.73	\$0.19	\$7.60	\$58.65	\$34.52	\$93.17
2042	\$29.49	\$0.21	\$8.38	\$65.53	\$38.08	\$103.61
2043	\$32.37	\$0.23	\$9.20	\$72.83	\$41.79	\$114.62
2044	\$35.37	\$0.25	\$10.05	\$80.58	\$45.67	\$126.24
2045	\$38.50	\$0.28	\$10.94	\$88.79	\$49.71	\$138.51
2046	\$41.77	\$0.30	\$11.87	\$98.68	\$53.93	\$152.61
2047	\$45.18	\$0.32	\$12.83	\$108.01	\$58.33	\$166.34
<b>TOTAL</b>	<b>\$394.82</b>	<b>\$2.83</b>	<b>\$112.17</b>	<b>\$868.06</b>	<b>\$509.82</b>	<b>\$1,377.88</b>

## Economic Activity

Table 15 summarizes the base value per mile for light duty vehicles. Table 16 computes VMT reductions in Kinston by multiplying new pedestrian activity by trip purpose percentages and trip distance multipliers from NHTS (See Tables 7 and 8). NCDOT estimates the amount of money residents save from increased walking and decreased driving by multiplying VMT reductions by the values in Table 15. See the "Economic Activity" and "BCA" tabs of the [WALK NC RAISE BCA workbook](#) for full detail information.

Table 45. Base Value per Mile (Based on USDOT 2023 BCA Guidance Table A-5)

Vehicle Type	Value per mile (2021 USD)
Light Duty Vehicle	\$ 0.46
Commercial Trucks	\$ 1.01

Table 16. Future Estimated Pedestrian Activity and Reduced VMT – Kinston, NC

Year	New Induced Pedestrian Activity, Annualized	Work Trips	Non-Work Trips	Reduced VMT	Economic Activity
2023					
2024					
2025					
2026					
2027					
2028	145	24.11	120.84	117.65	\$54
2029	146	24.28	121.71	118.50	\$55
2030	299	49.69	249.08	242.52	\$112
2031	459	76.28	382.35	372.27	\$171
2032	626	104.09	521.75	507.99	\$234
2033	801	133.17	667.52	649.92	\$299
2034	984	163.57	819.93	798.31	\$367
2035	1175	195.36	979.24	953.43	\$439
2036	1374	228.57	1,145.73	1,115.53	\$513
2037	1583	263.27	1,319.70	1,284.91	\$591

2038	1801	299.53	1,501.43	1,461.85	\$672
2039	2029	337.40	1,691.24	1,646.66	\$757
2040	2266	376.94	1,889.46	1,839.65	\$846
2041	2515	418.23	2,096.43	2,041.16	\$939
2042	2774	461.33	2,312.49	2,251.52	\$1,036
2043	3044	506.32	2,538.01	2,471.10	\$1,137
2044	3327	553.28	2,773.36	2,700.25	\$1,242
2045	3621	602.27	3,018.96	2,939.37	\$1,352
2046	3929	653.39	3,275.19	3,188.85	\$1,467
2047	4249	706.71	3,542.49	3,449.10	\$1,587
<b>Total</b>	<b>37,145</b>	<b>6,178</b>	<b>30,967</b>	<b>30,151</b>	<b>\$13,869</b>

## Results

The following tables summarize the benefit-cost analysis for each year of the analysis period in Kinston, NC. NCDOT assumed a no-build scenario over 20 years (2027-2047), a 3 percent real discount rate on CO2 emissions, and a 7 percent real discount rate on remaining benefits and all costs. See the "BCA" tab of the [WALK NC RAISE BCA workbook](#) for more information. WALK NC has a **net present value** of **\$9,293,530.41** and a **benefit-cost ratio** of **2.05**.

Table 17. Estimated Annual Benefits (Undiscounted and Discounted) – Kinston, NC

Benefits							
Merit Criteria	Safety	Environmental Sustainability		Quality of Life			
Year	Safety (Crash Reduction)	Sustainability - Emissions (CO <sub>2</sub> )	Health - Emissions (SO <sub>x</sub> , NO <sub>x</sub> , PM2.5)	Health - Mortality Reduction Benefits from Walking	Economic Activity - Reduced operating costs from mode shift	Benefits Total (Undiscounted)	Benefits (Discounted)
2023							
2024							
2025							
2026							
2027							
2028	\$435,297	\$2.69	\$2	\$1,044	\$54	\$436,399	\$271,770
2029	\$435,297	\$2.75	\$2	\$1,051	\$55	\$436,407	\$253,995
2030	\$435,297	\$5.81	\$4	\$2,151	\$112	\$437,570	\$238,010
2031	\$435,297	\$9.05	\$6	\$3,302	\$171	\$438,786	\$223,059
2032	\$435,297	\$12.54	\$9	\$4,506	\$234	\$440,058	\$209,071
2033	\$435,297	\$16.28	\$11	\$5,765	\$299	\$441,388	\$195,986
2034	\$435,297	\$20.29	\$14	\$7,081	\$367	\$442,779	\$183,743
2035	\$435,297	\$24.59	\$16	\$8,457	\$439	\$444,233	\$172,288
2036	\$435,297	\$29.59	\$19	\$9,895	\$513	\$445,754	\$161,570

2037	\$435,297	\$34.56	\$22	\$11,397	\$591	\$447,342	\$151,540
2038	\$435,297	\$39.85	\$25	\$12,967	\$672	\$449,001	\$142,154
2039	\$435,297	\$45.50	\$28	\$14,606	\$757	\$450,734	\$133,369
2040	\$435,297	\$51.51	\$31	\$16,318	\$846	\$452,544	\$125,147
2041	\$435,297	\$58.65	\$35	\$18,106	\$939	\$454,435	\$117,452
2042	\$435,297	\$65.53	\$38	\$19,972	\$1,036	\$456,408	\$110,248
2043	\$435,297	\$72.83	\$42	\$21,919	\$1,137	\$458,468	\$103,504
2044	\$435,297	\$80.58	\$46	\$23,952	\$1,242	\$460,617	\$97,190
2045	\$435,297	\$88.79	\$50	\$26,073	\$1,352	\$462,861	\$91,278
2046	\$435,297	\$98.68	\$54	\$28,286	\$1,467	\$465,202	\$85,742
2047	\$435,297	\$108.01	\$58	\$30,594	\$1,587	\$467,644	\$80,558
<b>Total</b>	<b>\$ 8,705,942</b>	<b>\$ 2,275</b>	<b>\$ 1,314</b>	<b>\$ 689,304</b>	<b>\$ 35,747</b>	<b>\$ 9,434,581</b>	<b>\$ 3,050,968</b>

Table 18. Estimated Annual Costs – Kinston, NC

Year	Costs			
	Capital Expenditures	Operations and maintenance	Costs Total (Undiscounted)	Costs Total (Discounted)
2023				
2024				
2025				
2026				
2027	\$1,725,210.00		\$1,725,210.00	\$1,149,580.27
2028	\$0.00	\$12,525.21	\$12,525.21	\$7,800.07
2029	\$0.00	\$12,525.21	\$12,525.21	\$7,289.79
2030	\$0.00	\$12,525.21	\$12,525.21	\$6,812.88
2031	\$0.00	\$12,525.21	\$12,525.21	\$6,367.18
2032	\$0.00	\$12,525.21	\$12,525.21	\$5,950.64
2033	\$0.00	\$12,525.21	\$12,525.21	\$5,561.34
2034	\$0.00	\$12,525.21	\$12,525.21	\$5,197.52
2035	\$0.00	\$12,525.21	\$12,525.21	\$4,857.49
2036	\$0.00	\$12,525.21	\$12,525.21	\$4,539.71
2037	\$0.00	\$12,525.21	\$12,525.21	\$4,242.72
2038	\$0.00	\$12,525.21	\$12,525.21	\$3,965.16
2039	\$0.00	\$12,525.21	\$12,525.21	\$3,705.76
2040	\$0.00	\$12,525.21	\$12,525.21	\$3,463.32
2041	\$0.00	\$12,525.21	\$12,525.21	\$3,236.75
2042	\$0.00	\$12,525.21	\$12,525.21	\$3,025.00
2043	\$0.00	\$12,525.21	\$12,525.21	\$2,827.10
2044	\$0.00	\$12,525.21	\$12,525.21	\$2,642.15
2045	\$0.00	\$12,525.21	\$12,525.21	\$2,469.30
2046	\$0.00	\$12,525.21	\$12,525.21	\$2,307.76
2047	\$0.00	\$12,525.21	\$12,525.21	\$2,156.78
<b>Total</b>	<b>\$1,725,210</b>	<b>\$250,504</b>	<b>\$1,975,714</b>	<b>\$1,237,999</b>

Table 19. Estimated Discounted Total Costs and Benefits and Benefit-Cost Ratio, All Municipalities

<b>BCR</b>		<b>Discounted Benefit</b>	<b>Discounted Cost</b>	<b>Net Present Value</b>
<b>TOTAL</b>	<b>2.05</b>	<b>\$18,186,287</b>	<b>\$8,892,756</b>	<b>\$9,293,530.41</b>
Division 2 - KINSTON	2.54	\$3,147,673	\$1,237,998.72	\$1,909,674.30
Division 2 - WASHINGTON	3.14	\$1,296,922	\$413,286.35	\$883,635.62
Division 4 - ROANOKE RAPIDS	2.11	\$1,170,461	\$555,640	\$614,821.11
Division 4 - SELMA	0.66	\$178,701	\$270,225	\$(91,523.65)
Division 4 - SMITHFIELD	2.74	\$906,153	\$330,242	\$575,911.21
Division 4 - WELDON	0.66	\$80,140	\$121,566	\$(41,426.91)
Division 4 - WILSON	2.90	\$3,161,696	\$1,091,072	\$2,070,623.91
Division 5 - HENDERSON	3.94	\$2,417,667	\$613,363	\$1,804,303.00
Division 5 - OXFORD	1.71	\$1,027,041	\$600,124	\$426,916.83
Division 6 - LUMBERTON	2.24	\$1,519,141	\$678,098	\$841,042.61
Division 8 - HAMLET	1.00	\$258,716	\$259,802	\$(1,086.15)
Division 8 - ROCKINGHAM	0.76	\$319,015	\$419,670	\$(100,655.23)
Division 8 - SILER CITY	1.72	\$678,940	\$394,890	\$284,050.07
Division 9 - LEXINGTON	1.13	\$1,029,524	\$907,463	\$122,060.62
Division 9 - SALISBURY	1.00	\$994,497	\$999,314	\$(4,816.93)