

**Opportunities Providing Easier Navigation in Brunswick (OPEN in Brunswick)  
Project  
Maine Department of Transportation**

U.S. Department of Transportation (USDOT)  
FY 2025 to Better Utilizing Investments to Leverage Development (BUILD) Program

# BCA NARRATIVE

**BENEFIT-COST ANALYSIS NARRATIVE**

3.1% NPV Summary			
	Costs	Benefits	Discounted
Capital Cost	(\$24,485,874)		(\$19,197,776)
Operations and Maintenance		\$8,918,134	\$6,106,937
Safety		\$67,157,911	\$37,530,633
Travel Time Savings		\$5,029,799	\$2,810,861
Vehicle Operating Cost Savings		\$683,741	\$382,103
Emission Reductions		\$180,703	\$121,180
Amenity Benefits		\$10,873,564	\$6,076,599
Health Benefits		\$1,307,542	\$730,709
<b>Total</b>	<b>(\$24,485,874)</b>	<b>\$94,151,394</b>	<b>\$34,561,247</b>

  

<b>Net Present Value</b>	<b>\$34,561,247</b>
<b>Benefit-Cost Ratio</b>	<b>2.80</b>

The Benefit-Cost Analysis estimates that there will be more than \$94 million in total benefits over the 20-year analysis period (undiscounted), resulting from the \$31,250,000 investment. When evaluated on a discounted NPV basis (3.1 percent for all costs and benefits except CO<sub>2</sub>, which is discounted at 2 percent), the Project yields a **benefit-cost ratio of 2.8:1**. Benefits arise from various sources, including safety, ongoing maintenance cost savings, travel time savings, and the value associated with amenity improvements.

The proposed improvements will enhance safety for users of all transportation modes through Brunswick, promote the use of affordable transportation, reduce road maintenance costs, and significantly improve the aesthetics and quality of life for both regional residents and tourists relying on the commercial district. These enhancements will lead to an appreciable increase in residential and commercial property values in Brunswick and the surrounding neighborhoods. This has not been incorporated into the BCA calculations to avoid double-counting benefits found in other categories.

All savings are presented in 2023 dollars, and the Project is expected to start accruing full benefits in 2033, with the end of the 20-year analysis period set for 2052.

**Net Operations and Maintenance Costs**

A modest overall benefit of the Project is the reduction in post-construction maintenance, achieved by resurfacing roadways and repairing sidewalks to address deficiencies. Most Project components are estimated to have a useful life of 45 years, with the BCA accounting for increased maintenance costs every five years (Build Scenario). Additionally, traffic signals are expected to be replaced after 10 years, and mill and fill pavement treatments after 15 years. The NPV of net savings in the build versus no-build scenario is **\$6,106,937**.

**Safety**

The calculated nominal annualized safety benefit is over \$3.3 million per year, resulting in an overall NPV of **\$37,530,633**. These savings are derived from the estimated reduction of crashes involving pedestrians and cyclists resulting from the new shared-use paths, updated sidewalks designed with Complete Streets principles and the addition of crosswalks, including new

## Opportunities Providing Easier Navigation in Brunswick (OPEN in Brunswick) Project

Rectangular Rapid Flashing Beacons (RRFB). A weighted average of 37 percent from different CMFs (9250, 4123, 11158, 9302) was used to estimate the accident reductions under the build scenario.

### **Travel Time Savings and Vehicle Operating Costs**

The transition of Pleasant Street to a two-way road will result in travel time savings for 547 daily vehicle users, as determined by the transportation study conducted by Project engineers. It will reduce travelers' commutes by 0.3 miles and eliminate an average congestion delay of approximately three minutes at a primary intersection, as observed in a MaineDOT traffic analysis modeling tool. This improvement will also eliminate the need to stop at a highly congested intersection, classified as Level F (grade worst for congestion). The net present value (NPV) of this benefit is **\$2,810,861**. Additionally, this improvement yields savings in vehicle operating costs, with an NPV of **\$382,103**.

#### *Assumptions*

While it is impossible to quantify the exact portion of pedestrian and cyclist trips that will experience travel time savings, it is conservatively estimated that this benefit impacts five percent of all trips.

### **Amenity Benefits**

The new pathways, connecting to both existing and new infrastructure, are expected to significantly enhance connectivity throughout the Project area. Benefits were calculated for both existing and new users. The NPV of these benefits is **\$6,076,599**.

### **Health Benefits**

The new pathways are expected to increase pedestrian and cyclist activity throughout the Project area. The NPV of the incremental induced affordable transportation in this benefit is **\$730,709**.

#### *Assumptions (Volumes)*

Because of the city's rural nature, pedestrian and bicyclist volumes are not regularly tracked. As a part of the Feasibility Study that guided this Project design, traffic engineers collected pedestrian and bicyclist volumes at critical crossing points. Volumes are conservative given that the data only includes crossing segments, and there was data available for only a few project areas, resulting in a daily pedestrian count of 404 and a cyclist count of 36 (both less than two percent of total population).

For purposes of the BCA, Project engineers prepared a conservative estimate of one-time, five percent pedestrian and bicyclist volume growth due to the Project at the time of Project completion. This includes induced non-motorized transportation from residents.

### **Emissions**

The construction of the two-way roadway will yield savings as 199,655 vehicle trips will experience a reduction of 0.3 miles on each trip and avoid a congested intersection, resulting in a reduction of CO<sub>2</sub> and non-CO<sub>2</sub> emissions. The NPV of these benefits is **\$121,180**.

### **Unquantified Benefits**

Because the Project improves many aspects over much of Brunswick, property values will be enhanced by the Project just as many studies conclude:

## Opportunities Providing Easier Navigation in Brunswick (OPEN in Brunswick) Project

Changes in property values are driven by, and hence reflect, the value associated with local changes in community impacts (**accessibility, safety...visual amenity, and community cohesion**), as well as economic development impacts (**business productivity**). In general, a transportation project would only lead to changes in property values (and subsequent land use) if it causes a direct change in one or more of these other local factors that affect the desirability of a location.<sup>32</sup>

The Project specifically targets the items in bold. The Project will benefit the property values of 859 parcels, worth \$353,629,700 million. A one-time, two percent improvement in values is estimated upon Project completion, which would result in \$7 million in additional benefits, but was not calculated in the BCA to avoid over accumulating benefits. This estimate takes a conservative approach since previous studies have concluded that infrastructure improvements yield increases to property values in excess of six percent while this analysis only presumes two.<sup>33</sup>

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<sup>32</sup> <https://sites.google.com/site/benefitcostanalysis/benefits/community-impacts>

<sup>33</sup> <https://publications.iadb.org/publications/english/document/The-Impact-of-Upgrading-Municipal-Infrastructure-on-Property-Prices-Evidence-from-Brazil.pdf> & <https://www.povertyactionlab.org/evaluation/increasing-access-infrastructure-and-property-values-through-urban-investment-mexico>