

Benefit-Cost Analysis Memorandum

Rest area Expansion for Safe Transportation (REST)

Prepared for North Carolina Department of Transportation

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Table of Contents

EXECUTIVE SUMMARY	1
1. PROJECT DESCRIPTION	4
2. ANALYSIS FRAMEWORK	6
3. ANALYSIS ASSUMPTIONS	7
ASSUMPTIONS	8
4. BENEFIT ANALYSIS	9
4.1 ECONOMIC COMPETITIVENESS AND OPPORTUNITY	9
4.1.1 <i>Truck Parking Search Time Avoided</i>	9
4.1.2 <i>Unused Hours of Service Savings</i>	9
4.1.3 <i>Shipper Delay Cost Avoided</i>	10
4.2 SAFETY	10
4.2.1 <i>Safety Benefits from Additional Truck Parking</i>	11
4.2.2 <i>Safety Benefits from Adverse Weather Warning System</i>	11
4.2.3 <i>Safety Benefits from Avoided VMT</i>	12
4.3 ENVIRONMENTAL SUSTAINABILITY	12
4.3.1 <i>Emissions Savings</i>	12
4.4 QUALITY OF LIFE	13
4.4.1 <i>Avoided Vehicle Operating Cost</i>	13
4.4.1 <i>Avoided External Highway Use Cost</i>	13
4.5 STATE OF GOOD REPAIR	13
4.5.1 <i>Avoided Major Rehabilitation Costs</i>	13
4.5.2 <i>Residual Value</i>	13
4.6 MOBILITY AND COMMUNITY CONNECTIVITY	14
4.6.1 <i>Reduction in Delays due to Improved Traffic Incidence Management</i>	14
5. COST ANALYSIS	15
6. BCA RESULTS	16

Exhibits

Exhibit 1: Impact Matrix	2
Exhibit 2: Costs and Benefits, over 20-year period of analysis	3
Exhibit 3: Project Area	5
Exhibit 4: Benefit-Cost Analysis Inputs	7
Exhibit 5: Crash Modification Factor, Travel Information Centers	11
Exhibit 6: Crash Modification Factor, Install Icy Curve Warning System	12
Exhibit 7: Capital Cost (2024\$)	15
Exhibit 8: Benefit-Cost Analysis Results	16

Executive Summary

A benefit-cost analysis (BCA) for the Rest area Expansion for Safe Transportation (REST) Project (the “Project” hereafter) was prepared for North Carolina Department of Transportation (NCDOT) to support an application to the Better Utilizing Investments to Leverage Development (BUILD) discretionary grant program for 2026. The BCA was conducted in accordance with the U.S. Department of Transportation’s (USDOT’s) Benefit-Cost Analysis Guidance for Discretionary Grant Programs (December 2025). This BCA compares expected benefits and costs of undertaking the Project (the “Build” scenario) to the “No Build” baseline scenario, to estimate the Project’s net benefits. Exhibit 1: Impact Matrix presents the Impact Matrix, which describes the baseline, the Project, and all estimated benefits.

For the BCA, all values are in 2024 dollars, discounted to 2024 at 7%. The undiscounted 2024-dollar cost of the Project is \$35.8 million, and the 2024-dollar cost, discounted to 2024 at 7%, is \$25.4 million. The analysis covers a 20-year operating period following the opening of the Project in 2032.

As shown in Exhibit 2, the Project provides \$61.0 million in total benefits over the analysis period, using a 7% discount rate. The benefits consist mainly of travel time savings benefits from reductions in parking search time and unused hours of service, safety benefits from reduced crashes, avoided major rehabilitation cost, and avoided delays due to improved traffic incidence management.

The BCA estimates the Project’s Net Present Value (NPV) to be \$35.6 million and the benefit-cost ratio (BCR) to be 2.4.

Exhibit 1: Impact Matrix

Current Status/Baseline & Problem to be Addressed	Change to Baseline or Alternatives	Types of Impacts	Affected Population	Economic Benefit (Net Present Values, \$2024 M)
				Discounted at 7%
<p>Freight truck parking along the I-77 corridor is particularly scarce, with only 313 freight truck parking spaces within 10 miles of the Welcome Center, serving over 12,000 truck trips daily. NCDOT traffic counts (see Supplemental Materials) show that in 2025, an average of 350 trucks entered the Welcome Center daily. The truck parking shortage along I-77 in Surry County affects:</p> <p>(i) Freight mobility due to additional time spent by truckers search for parking or due to unused hours of service for early shutdown</p> <p>(ii) Travel Time Reliability reflected in shipper delay costs</p> <p>(iii) Safety Risk owing to fatigued truck drivers and for all vehicles facing adverse weather conditions along steep grades</p> <p>In addition, the existing facilities at the Welcome Center are in a state of disrepair, while traffic incidence management has been constrained by a lack of investment.</p>	<p>The Project will:</p> <ul style="list-style-type: none"> • Add 30 freight truck parking spaces to increase capacity • Consolidate old, outdated buildings that have exceeded their useful life in a new, modern building • Implement a Truck Parking Information Management System (TPIMS) that detects available truck parking spaces using radar or lidar technology and transmits this data in real-time • Complete a traffic management evaluation on REST's TPIMS performance as a pilot case study for future implementation • Install 11 Closed Circuit Television (CCTV) traffic cameras and 8 miles of single-mode fiber to alert freight truck drivers and other travelers of dangerous road and weather conditions ahead. 	Economic Competitiveness and Opportunity		
		Avoided Truck Parking Search Time	Truck Drivers	\$1.8
		Unused Hours of Service Savings	Truck Drivers	\$3.7
		Shipper Delay Cost Avoided	Shipping Companies	\$13.7
		Safety		
		Safety benefits due to Additional Truck Parking	Road Users	\$9.8
		Safety benefits due to Advanced Warning System	Road Users	\$15.6
		Safety benefits due to Avoided VMT	Road Users	\$0.1
		Environmental Sustainability		
		Emissions Savings	Local Population	\$0.03
		Quality of Life		
		Avoided Vehicle Operating Costs	Shipping Companies	\$1.5
		Avoided External Highway Use Costs	Local Population	\$0.1
State of Good Repair				
Net O&M Cost Savings	NCDOT	\$5.9		
Residual Value	NCDOT	\$3.5		
Mobility and Community Connectivity				
Reduction in Delays due to Improved Traffic Incidence Management	Road Users	\$5.4		

Source: AECOM

Exhibit 2: Costs and Benefits, over 20-year period of analysis

Rest area Expansion for Safe Transportation (REST)	
Costs (2024\$M)	
Capital Costs	\$25.4
Benefits (2024\$M)	
Economic Competitiveness and Opportunity	\$19.2
Avoided Truck Parking Search Time	\$1.8
Unused Hours of Service Savings	\$3.7
Shipper Delay Cost Avoided	\$13.7
Safety	\$25.5
Safety benefits due to Additional Truck Parking	\$9.8
Safety benefits due to Advanced Warning System	\$15.6
Safety benefits due to Avoided VMT	\$0.1
Environmental Sustainability	\$0.03
Emissions Savings	\$0.03
Quality of Life	\$1.6
Avoided Vehicle Operating Costs	\$1.5
Avoided External Use Highway Costs	\$0.1
State of Good Repair	\$9.3
Net O&M Cost Savings	\$5.9
Residual Value	\$3.5
Mobility and Community Connectivity	\$5.4
Reduction in Delays due to Improved Traffic Incidence Management	\$5.4
Total Benefits	\$61.0
Outcome	
Benefit-Cost Ratio	2.40
Net Present Value	\$35.6

Source: AECOM

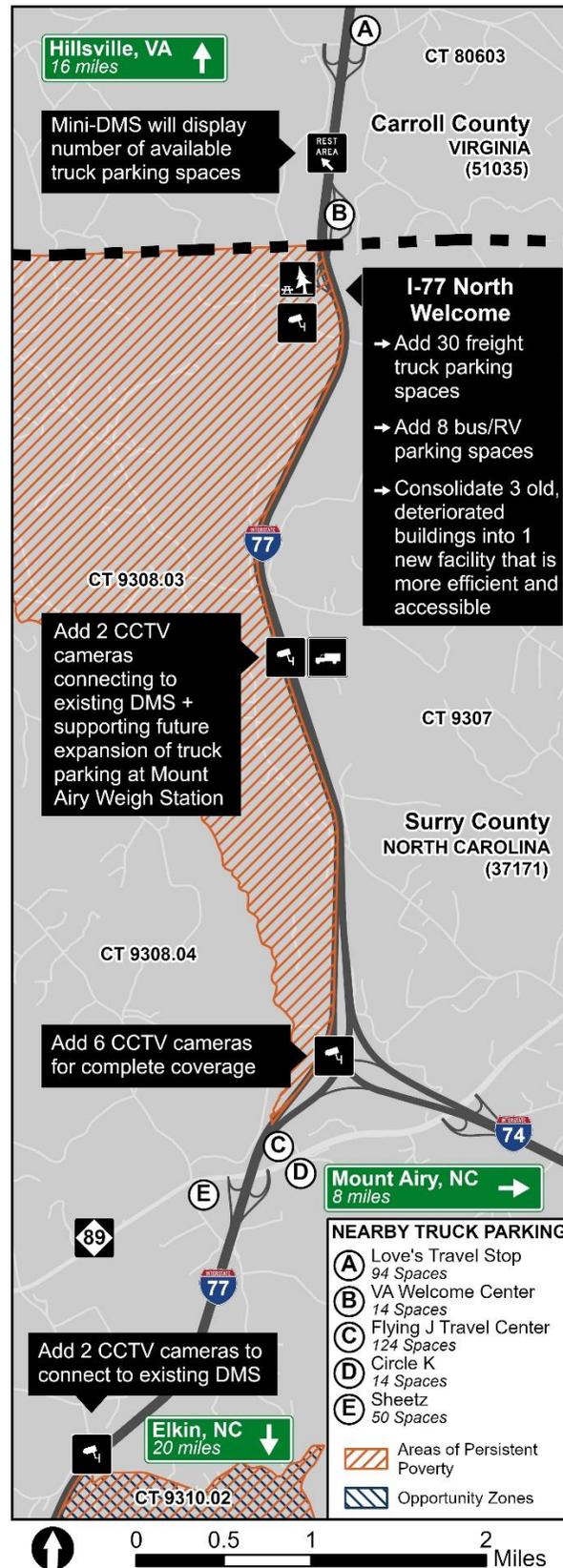
Note: M = millions

1. Project Description

The **Rest area Expansion for Safe Transportation (REST** or “the Project”) will reconstruct and modernize the I-77 North Welcome Center (Welcome Center) in Surry County, North Carolina (NC) to expand truck, bus, and recreational vehicle (RV) parking and implement technology solutions to monitor and communicate both weather and traffic hazards. These improvements will improve regional mobility, resiliency, and economic competitiveness; enhance the user experience of both freight truck drivers and traveling families; and significantly improve safety outcomes along one of NC’s most heavily traveled interstate corridors. The Project will:

- Add 30 freight truck parking spaces to increase capacity by 300% and alleviate severe truck parking shortages in the region.
- Consolidate old, outdated buildings that have exceeded their useful life into a new, modern building to create lifecycle cost savings and improve access to amenities for both freight truck drivers and families with children.
- Implement a Truck Parking Information Management System (TPIMS) that detects available truck parking spaces using radar or lidar technology and transmits this data in real-time to a mini-Dynamic Message Sign (DMS) embedded on a static sign prior to the Welcome Center exit, a first for North Carolina.
- Complete a truck parking study to evaluate REST’s TPIMS performance as a pilot case study for future implementation of similar systems at rest areas and welcome centers around NC.
- Install 11 Closed Circuit Television (CCTV) traffic cameras and 8 miles of single-mode fiber to connect the region to the State’s Traffic Information Management System (TIMS), identify and respond to traffic incidents faster, and quickly alert freight truck drivers and other travelers of dangerous road and weather conditions ahead.

Exhibit 3: Project Area



2. Analysis Framework

The benefit-cost analysis (BCA) of the Project was conducted using the USDOT’s Benefit-Cost Analysis Guidance for Discretionary Grant Programs¹ (USDOT BCA Guidance) as a guide for preferred methods and monetized values. The parameters of the benefits analysis follow the protocols set by the Office of Management and Budget (OMB) “Circular A-94,” as well as recommended benefit quantification methods from the USDOT. Generally, standard factors and values accepted by Federal agencies were used, except in cases where Project-specific values or prices were available. In such cases, modifications are noted and references are provided for data sources.

This analysis follows a conservative estimation of the quantifiable benefits of the Project; the actual total benefits of the Project may be greater than depicted in the results. The “No Build” or Baseline scenario assumes that the Project will not be built and the purpose of, and need for, the Project would not be met. The Project (“Build” scenario) was compared to the Baseline scenario to identify net benefits in the following categories: economic competitiveness and opportunity, safety, environmental sustainability, quality of life, state of good repair, and mobility and community connectivity.²

Benefits and costs were estimated over a 20-year period, beginning when construction is scheduled to be completed (2032) and concluding after 20 full years of operations (2051). All dollar values are in 2024 dollars and were discounted to 2024 at 7%.

¹ USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs, December 2025.

<https://www.transportation.gov/mission/office-secretary/office-policy/transportation-policy/benefit-cost-analysis-guidance>

² Benefits categories are consistent with the merit criteria found in the FY 2026 BUILD NOFO.

https://www.transportation.gov/sites/dot.gov/files/2025-12/FY_2026_BUILD_NOFO_Final.pdf

3. Analysis Assumptions

A list of assumptions and sources used in the analysis is provided in Exhibit 4.

Exhibit 4: Benefit-Cost Analysis Inputs

Input	Value	Source
General		
Discount Rate	7.0%	USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs, December 2025
Discount Year	2024	
Dollar Year	2024	
Analysis Period (years)	20	
Year Analysis Period Begin	2032	
Year Analysis Period End	2051	
Travel Time & Operating Cost Savings		
Existing Number of Parking Spots	10	NCDOT
Additional Number of Parking Spots	30	NCDOT
Annualization Days per Year, Build	365	The Welcome Center will be open every day, with no closures; NCDOT
Number of Trucks per Space per Day	2	Based on HOS requirement for 10 hours of rest, after driving a maximum 11 hours, FMCSA, Summary of Hours of Service Regulations
Reduction in Truck Parking Search Time, Build (Hours)	0.25	Texas Freight Network Technology and Operations Plan, Truck Parking Availability System, TXDOT
Trucker Average Unused Hours of Service Loss, No Build (Hours)	0.93	Managing Critical Truck Parking Case Study - Real World Insights from Truck Parking Diaries, American Transportation Research Institute
Trucker Average Unused Hours of Service Loss, Build (Hours)	0.25	<i>Estimate</i>
Shipper Delay Cost per Hour (updated from 2016\$ to 2024\$)	\$71	Examining the Value of Travel Time Reliability for Freight Transportation to Support Freight Planning and Decision-Making, National Center for Transportation Systems Productivity and Management
Average Truck Speed during Parking Search (parking lot + highway), mph	25	Conservative compared to literature which estimates 17 mph; Insights from Commercial Driver Parking Decision in a Truck Sim, USDOT University Transportation Center for Fed Region 10
Value of Time - truck driver per hour (2024\$)	\$37.20	USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs, December 2025
Value of time - all purposes (2024\$)	\$21.80	
Average Vehicle Occupancy	1.52	
Vehicle Operating Cost - Commercial Trucks, per mile (2024\$)	\$1.23	
Reduction in Congestion Time due to Improved Response Time (minutes)	4.5	Framework for Estimating the Impact of Camera-Based Intelligent Transportation Systems (ITS) Technology on Incident Duration, Journal of the Transportation Research Board

Input	Value	Source
Safety		
Value of PDO Crash (2024\$)	\$9,700	USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs, December 2025
Value of Reduced Fatalities and Injuries		
K - Killed (2024\$)	\$13,700,000	
A - Incapacitating (2024\$)	\$1,302,300	
B - Non -Incapacitating (2024\$)	\$256,300	
C - Injury (2024\$)	\$122,400	
O - No Injury (2024\$)	\$5,500	
Avoided Major Rehabilitation Cost		
Welcome Center Construction Cost (2023\$)	\$7,500,000	NCDOT
External Highway Use Cost		
Pavement costs per mile - 4-axle Truck/Rural Interstate (updated from 2000\$ to 2024\$)	\$0.0017	<i>Federal Highway Cost Allocation Study, FHWA</i>
Congestion costs - Bus/Truck Vehicles - Rural (2024\$)	\$0.0800	USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs, December 2025
Noise Costs - Bus/Truck Vehicles - Rural (2024\$)	\$0.0039	
Safety Costs - Bus/Truck Vehicles - Rural (2024\$)	\$0.0300	
Emissions Costs - Bus/Truck Vehicles - Rural (2024\$)	\$0.0000	

Assumptions

Under the baseline scenario, the shortage of truck parking along the Interstate 77 (I-77) causes significant delays as truck drivers spend time searching for parking or resort to illegal parking, disrupting traffic flow and increasing congestion on local roads. These inefficiencies not only delay truckers but also result in cascading impacts on shippers, who incur additional costs from delayed freight deliveries. Under this scenario, truck parking capacity is assumed to be fully utilized since it is documented that trucks have been found to park on highways and exit ramp shoulders along the I-77.

The proposed REST project adds 30 truck parking spaces (for a total of 40 spaces) and a Truck Parking Information Management System. This is expected to reduce the average parking search time and reduce the unused hours of service for truckers. This improvement will not only save truck drivers valuable time but also mitigate delay costs for shippers, enhancing the efficiency of freight operations. These benefits, combined with improved traffic flow and safety, highlight the critical need for this Project.

4. Benefit Analysis

This Project will produce benefits from the following categories: economic competitiveness and opportunity, safety, environmental sustainability, quality of life, state of good repair, and mobility and community connectivity. The methodologies used to estimate the benefits of the Project along with the associated results are described in the following sections.

4.1 Economic Competitiveness and Opportunity

The REST project will boost economic competitiveness and create opportunities by lowering transportation costs and increasing freight efficiency. It will save truck drivers time by reducing parking search delays and reclaiming unused hours of service. Additionally, the project will generate cost savings for shippers, further enhancing the efficiency and reliability of freight operations.

4.1.1 Truck Parking Search Time Avoided

The Project will benefit from reduced parking search time for trucks with the implementation of a Truck Parking Information Management System (TPIMS). TPIMS is an Intelligent Transportation System (ITS) application designed to assist truck drivers in locating available parking spaces in real-time so they can make informed decisions about their parking needs. TPIMS will detect available truck parking spaces using radar or lidar technology and transmit this data in real-time to a mini-Dynamic Message Sign (DMS) embedded on a static sign prior to the Welcome Center exit, a first for North Carolina. Based on research from TXDOT, the TPAS component of the Project will reduce truck search time by 15 minutes per truck per space.³

With the Project, a total of 40 truck parking spaces is assumed to turn over twice daily, conservatively reflecting the full 10-hour rest requirement. This will result in 80 trucks benefitting per day. The benefit calculation utilizes the USDOT BCA Guidance value of \$37.20 per hour for truck driver time. Given the well-documented imbalance between truck parking supply and demand, the new spaces are expected to operate at 100% utilization. These time savings will enhance productivity for truck drivers, reduce operational inefficiencies, and contribute to the economic competitiveness of freight movement along this essential corridor.

Total truck parking search time avoided amounts to \$1.8 million in 2024 dollars over the 20-year period, discounted at 7%.

4.1.2 Unused Hours of Service Savings

The Project is expected to deliver significant benefits by reducing unused hours of service (HOS) for truck drivers. HOS loss refers to the unused hours of a truck driver's legally permitted driving time that are wasted due to early stops to avoid being unable to find a safe and available rest space. Under the baseline scenario, truckers lose an average of 0.93 hours of their available service time due to parking shortages and inefficiencies, as reported by the American Transportation Research Institute.⁴ With the addition of 30 new truck parking spaces, the Project is estimated to reduce unused HOS to 0.25 hours for each driver that benefits from the expanded parking capacity.

³ TXDOT, Texas Freight Network Technology and Operations Plan, Truck Parking Availability System, <https://ftp.txdot.gov/pub/txdot/tpp/freight-planning/fntop/strategies/truck-parking-availability-system.pdf>

⁴ Managing Critical Truck Parking Case Study – Real World Insights from Truck Parking Diaries, <https://truckingresearch.org/2016/12/5342/>

The analysis applied the USDOT BCA Guidance value of \$37.20 per hour for truck driver time and assumed truck parking spaces turn over twice daily, as stated above. Given the persistent imbalance between truck parking supply and demand, the utilization of the new spaces is expected to reach 100%. By reclaiming otherwise wasted HOS, the project not only enhances truck driver productivity but also improves freight efficiency, ensuring more reliable and timely delivery schedules.

Total unused HOS savings amount to \$3.7 million in 2024 dollars over the 20-year period, discounted at 3.1%.

4.1.3 Shipper Delay Cost Avoided

The Project will deliver substantial cost savings for shippers by addressing delays caused by insufficient truck parking along I-77. Under the baseline scenario, truck drivers spend additional time searching for parking, which delays deliveries and disrupts supply chains. These delays translate into higher costs for shippers, who value on-time deliveries to maintain operational efficiency and meet customer expectations.

A 2016 study by the National Center for Transportation Systems Productivity and Management recommends the incorporation of value of reliability (VOR) measure into the BCA process to account for improvements in freight mobility.⁵ The study explicitly states that travel time savings based on driver's wages may underestimate the true value of a project placed by carriers and recommends adding the benefits of reliability improvements on freight and updating the value of time based on the types of goods being shipped.

To estimate the shipper delay cost avoided with the Project, a VOR of \$71 per hour for non-perishable goods (\$56 in 2016 dollars, updated to 2024 dollars) was applied to the 29,200 annual hours of time saved searching for parking. This reduction in search time will directly benefit shippers by enabling truck drivers to stay on schedule, reducing the risk of missed delivery windows, and improving supply chain reliability. By ensuring drivers spend more time moving goods rather than searching for parking, the project enhances overall freight efficiency, decreases late delivery penalties, and minimizes the costs associated with disrupted logistics operations.

Total shipper delay cost avoided amounts to \$13.7 million in 2024 dollars over the 20-year period, discounted at 7%.

Sensitivity Test: A 2019 report by RITIS⁶ quotes the value of commercial vehicle time in congestion at \$100.49 per hour (assumed to be in 2019 dollars). Applying this higher value for shippers' time of \$120.97 per hour in 2024 dollars (adjusted with the GDP deflator from 2019), the shipper delay cost avoided increases to \$23.3 million in 2024 dollars over the 20-year period, discounted at 7%. The BCR under this higher shipper cost rises to 2.78.

4.2 Safety

The REST project will enhance safety by ensuring truck drivers have adequate opportunities to rest when needed, addressing a critical issue in freight transportation. Insufficient parking forces drivers to continue driving while fatigued or park illegally, both of which increase the risk of

⁵ National Center for Transportation Systems Productivity and Management, Examining the Value of Travel Time Reliability for Freight Transportation to Support Freight Planning and Decision-Making, https://utc.gatech.edu/sites/default/files/u63/ExaminingtheValueofTravelTimeReliabilityforFreightTransportationtoSupportFreightPlanningandDecisionMaking_XiaJin.pdf

⁶ RITIS, Congestion Causes Help Page, 2019, <https://congestion-causes.ritis.org/help>

accidents. By adding 30 parking spaces, the project will provide truck drivers with safe, designated locations to rest, reducing the likelihood of crashes caused by fatigue.

4.2.1 Safety Benefits from Additional Truck Parking

The Project includes safety benefits for trucks with the expansion of truck parking from 10 to 40 spots. A review of fatigue-related incidents involving trucks along the I-77 and I-74 within Surry County, NC over the past eight years identifies five fatal crashes, one possible injury, and 16 property damage only (PDO) crashes. These crashes represent significant safety risk that the Project directly addresses by mitigating fatigue-related accidents and improving safety.

Safety benefits for the expansion of truck parking availability with the expanded parking area are estimated using a Crash Modification Factor (CMF) of 0.77 for all crash types (see Exhibit 5). Note that although the CMF ID 7874 applies to all vehicle crashes related to fatigue, this analysis only applies it to fatigue-related truck crashes.

Exhibit 5: Crash Modification Factor, Travel Information Centers

CMF ID	Description	CMF	CRF	Crash Type	Crash Severity	Link
7874	Build and Operate Travel Information Centers	0.77	23%	All	All	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=7874

Source: Crash Modification Factor Clearinghouse

The CMF was applied to average annual crashes, by crash type per year, to estimate the reduction in crashes with the Project. Benefits are factored down by 25% to account for the existing 10 (out of total 40) parking spaces. Over the 20-year benefit period, implementation of the Project is expected to lead to a decline in three fatalities, one possible injury, and nine PDOs.

Safety benefits due to additional truck parking with the Project are valued at \$9.8 million in 2024 dollars, discounted at 7%.

4.2.2 Safety Benefits from Adverse Weather Warning System

The Project will implement an adverse weather warning system with the installation of 11 Closed Circuit Television (CCTV) traffic cameras and eight miles of single-mode fiber to connect the region to the State's Traffic Information Management System (TIMS). Over the eight-year period from 2018 to 2025, a total of 2,287 adverse weather-related crashes were identified. Of these, two were fatalities and 10 were serious injuries. The advanced warning system will benefit all road users, since they will be provided with advance warning before approaching the welcome center, giving them the opportunity to stop at the welcome center and wait safely while conditions clear.

Benefits of the advance warning system are estimated using a CMF of 0.82 for all crash types (see Exhibit 6). The CMF was applied to average annual crashes by crash type per year to estimate the reduction in crashes with the Project. Over the 20-year benefit period, implementation of the Project will lead to a reduction of 1,030 weather-related crashes.

Exhibit 6: Crash Modification Factor, Install Icy Curve Warning System

CMF ID	Description	CMF	CRF	Crash Type	Crash Severity	Link
4114	Install icy curve (adverse weather) warning system	0.82	18%	All	All	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=4114

Source: Crash Modification Factor Clearinghouse

With the Project, safety benefits due to implementation of the advanced warning system are valued at \$15.6 million in 2024 dollars, discounted at 7%.

4.2.3 Safety Benefits from Avoided VMT

With the implementation of the Project, the reduction in truckers' search time will also reduce their associated VMT. VMT avoided was estimated at 6.25 miles per truck, calculated by taking the reduction in search time of 0.25 hours and multiplying the average truck speed of 25 mph when searching for a park. The average VMT avoided per year was estimated by multiplying 6.25 miles by 80 trucks per day and annualizing by 365 days per year. On average, VMT avoided due to a reduction in truck parking search time is estimated at 182,500 miles per year.

To estimate the annual number of crashes avoided, crash rates for fatalities, injuries, and PDO (as found in Bureau of Transportation Statistics and National Highway Traffic Safety Administration data)⁷ were applied to the annual VMT avoided for large trucks. Crashes were then valued using the USDOT BCA guidance for fatalities, injuries, and PDO crashes.

Safety benefits due to avoided VMT with the reduction in truck parking search time is valued at \$0.08 million in 2024 dollars, discounted at 7%.

4.3 Environmental Sustainability

Emissions reductions related to changes in VMT are negligible since the project does not significantly alter the total mileage on the system.

4.3.1 Emissions Savings

The Project will generate emissions savings by minimizing the time truck drivers spend searching for parking. To estimate the net emission costs under the Build condition, emissions savings were estimated based on the annual VMT avoided per year of 182,500 miles. The analysis accounts for nitrogen oxide (NO_x), sulfur dioxide (SO₂), and particulate matter less than 2.5 microns (PM_{2.5}) air emissions. Emission rates (g/mile) for trucks were obtained from the California Air Resources Board On Road Emission Rates model.⁸ These were valued based on dollar values prescribed in the USDOT BCA Guidance.

Emissions savings under the Build scenario is \$0.03 million in 2024 dollars, discounted at 7%.

⁷ Truck Occupant Safety Data, Table 2-23, <https://www.bts.gov/content/truck-occupant-safety-data>

⁸ California Air Resource Board, <https://arb.ca.gov/emfac/emissions-inventory/747eda1236e185f07668f8c5fabd093d532c0f50>

4.4 Quality of Life

The Project enhances quality of life by reducing externalities such as noise, congestion, and roadway wear, leading to smoother traffic flow and less strain on infrastructure.

4.4.1 Avoided Vehicle Operating Cost

Under the Build scenario, VMT avoided will result in a reduction in vehicle operating costs for trucks. VMT avoided was estimated at 182,500 miles per year. To value the operating cost savings from the Project, vehicle operating cost of \$1.23 per mile from the USDOT BCA Guidance was applied for trucks.

Vehicle operating cost savings for trucks were valued at \$1.5 million in 2024 dollars, discounted at 7%.

4.4.1 Avoided External Highway Use Cost

The avoided VMT will result in fewer externalities imposed on other roadway users and nearby residents. Monetized externalities include lower congestion impacts, decreased pavement wear, increased safety, and environmental benefits. For trucks in rural areas, the USDOT BCA Guidance values congestion costs at \$0.08 per mile, noise costs at \$0.0039 per mile, and safety costs at \$0.0023 per mile, while pavement wear savings are negligible.

The present value of avoided external highway use cost was estimated at \$0.1 million in 2024 dollars, over the 20-year period when discounted at 7%.

4.5 State of Good Repair

The project will reduce major rehabilitation costs while also retaining a residual value beyond the analysis period.

4.5.1 Avoided Major Rehabilitation Costs

The existing facilities have exceeded their service life, necessitating replacement of the Welcome Center at a minimum, without provision for additional or enhanced amenities. In the absence of the Project, re-construction/major rehabilitation of the Welcome Center without additional truck parking or the other Project amenities was estimated at \$7.5 million (in 2023 dollars) and would be incurred over a 3-year period.

Avoided major rehabilitation costs under the Build scenario is \$5.9 million in 2024 dollars, discounted at 7%.

4.5.2 Residual Value

The project will generate benefits beyond the 20-year analysis period, as its useful life extends well beyond this timeframe. The useful life of the project is estimated at 50 years for state buildings by the Bureau of Economic Analysis⁹ (BEA), and these values are used to depreciate the asset to the end of the analysis period using straight-line depreciation. The remaining value of these assets at the end of the 20-year analysis period, which concludes in 2051, is discounted to 2024.

⁹ https://apps.bea.gov/national/pdf/BEA_depreciation_rates.pdf

The value of the remaining useful life for the Project is \$3.5 million in 2024 dollars, discounted at 7%.

4.6 Mobility and Community Connectivity

4.6.1 Reduction in Delays due to Improved Traffic Incidence Management

The Project will improve Traffic Incidence Management with the implementation of CCTV through the early detection of incidents. The CCTV is expected to allow for faster response and reduce the time to clear an incident by 4.5 minutes per traffic incident, based on a 2018 study presented at Transportation Research Board.¹⁰ To estimate the volume of traffic affected per year, hourly traffic flow was multiplied by the average annual number of crashes. Hourly traffic flow was calculated by taking AADT and dividing by 24 hours per day. Average crashes were based on total crash data for I-77 and I-74 within Surry County from 2018 to 2025.

Annual vehicle hours saved per crash is estimated by multiplying 4.5 minutes to the volume of traffic affected by the crash per year. Annual vehicle hours saved per crash is estimated at 91 hours in 2032 and increases to approximately 140 hours by 2051 based on traffic growth projections. The value of delay reductions for all vehicles is estimated by multiplying vehicle hours saved per crash by the average number of crashes per year. For passenger vehicles, this value is adjusted to remove truck share of 11% and account for average vehicle occupancy of 1.52. A truck share of 11% is applied to estimate the value of delay reductions for trucks. The reduction in delays is then monetized for passenger vehicles and trucks based on the USDOT BCA Guidance for value of time.

With the Project, reduction in delays due to improved traffic incidence management is estimated at \$5.4 million over the 20-year period when discounted at 7%.

¹⁰ Framework for Estimating the Impact of Camera-Based Intelligent Transportation Systems (ITS) Technology on Incident Duration, https://www.researchgate.net/publication/325306455_Framework_for_Estimating_the_Impact_of_Camera-Based_Intelligent_Transportation_Systems_ITS_Technology_on_Incident_Duration

5. Cost Analysis

Capital costs for the project are expected to be incurred between 2027 and 2031 and include public engagement, design, engineering, construction activities, and a Truck Parking Information Management System (TPIMS) Implementation Study. The project costs were adjusted to 2024 dollars using the Gross Domestic Product (GDP) deflator. Exhibit 7 shows the breakdown of costs by year, showing total capital expenditures of \$25.4 million in 2024 dollars, using a discount rate of 7%.

Exhibit 7: Capital Cost (2024\$)

Year	Public Engagement	NEPA + Permitting	Design	Construction Cost	TPIMS Implementation Study	Total Cost (2024\$)	Discounted Cost 7%
2027			\$369,334			\$369,334	\$301,487
2028	\$19,571	\$14,678	\$1,477,336	\$4,729,782		\$6,241,366	\$4,761,508
2029			\$738,668	\$18,919,127		\$19,657,795	\$14,015,736
2030				\$9,459,564	\$55,042	\$9,514,606	\$6,339,984
2031					\$18,347	\$18,347	\$11,426
Total	\$19,571	\$14,678	\$2,585,338	\$33,108,472	\$73,390	\$35,801,400	\$25,430,100

Source: McAdams

The total capital costs for the Project are \$25.4 million in 2024 dollars, discounted at 7%.

6. BCA Results

The analysis results in a total project BCR of 2.4 when all costs and benefits are discounted to 2024 at a rate of 7%.

Exhibit 8 provides a summary of the BCA results for the Project.

Exhibit 8: Benefit-Cost Analysis Results

Rest area Expansion for Safe Transportation (REST)	
Costs (2024 \$M)	
Capital Costs	\$25.4
Benefits (2024\$M)	
Economic Competitiveness and Opportunity	\$19.2
Avoided Truck Parking Search Time	\$1.8
Unused Hours of Service Savings	\$3.7
Shipper Delay Cost Avoided	\$13.7
Safety	\$25.5
Safety benefits due to Additional Truck Parking	\$9.8
Safety benefits due to Advanced Warning System	\$15.6
Safety benefits due to Avoided VMT	\$0.1
Environmental Sustainability	\$0.03
Emissions Savings	\$0.03
Quality of Life	\$1.6
Avoided Vehicle Operating Costs	\$1.5
Avoided External Highway Costs	\$0.1
State of Good Repair	\$9.3
Net O&M Cost Savings	\$5.9
Residual Value	\$3.5
Mobility and Community Connectivity	\$5.4
Reduction in Delays - Improved Traffic Incidence Management	\$5.4
Total Benefits	\$61.0
Outcome	
Benefit-Cost Ratio	2.40
Net Present Value	\$35.6

Source: AECOM, BCA Workbook