Appendix A - Project Benefits
Interstate 69 (Monticello Bypass – Highway 65)

Travel Demand Impacts

Travel demand benefits for the proposed improvements along I-69 are summarized below (Table 1). Benefits reflect corridor-level impacts compared to a future 2040 No-Build scenario. The project's proposed opening to traffic is in year 2020. A future/horizon year for the No Build and Build project scenarios is set at 2040 to provide a 20-year benefit stream for the impact analysis. Impacts are isolated to the I-69 project only; they do not reflect any additional planned improvements in the region.

It is estimated that in 2040, the proposed project will reduce lead to a reduction of over 500,000 vehicle hours travel and over 46 million vehicle miles traveled.

Table 1. Project-Level Impacts in 2040

	Auto	Truck
VMT	(19,343,893)	(41,824,287)
VHT	(67,214)	(1,625,313)

Benefit-Cost Analysis

A detailed Benefit-Cost Analysis (BCA) was conducted as part of the impact analysis for the proposed I-69 project. In conducting the BCA, all federal guidance regarding evaluation criteria, discount and monetization rates, and evaluation methods prescribed in the Benefit-Cost Analysis Guidance for TIGER and INFRA Applications (2017) supporting documents were adhered to. The benefits and costs of the project are calculated in 2016 dollars over a time horizon of 20 years, Benefits were estimated across the following categories:

- State of Good Repair
- Economic Competitiveness
- Environmental Sustainability
- Safety

The estimation of benefits involved establishing a base year Build and No-Build scenarios in 2010 and 2040, and calculating the differences between the Build and No Build in the benchmark years, using straight line growth. The project is assumed to opens to traffic in 2020. A horizon year of 2040 was applied for the Build and No Build scenarios to provide a 20-year benefit stream.

It should be noted that the application refers to the total future corridor funding ($81.7 million) for construction of the first two lanes of an ultimate four-lane facility. For the Benefit Cost Analysis, the project was considered to be complete with a four-lane cross-section to determine savings. A total construction cost estimate of nearly $200 million was used to adequately account for the construction of the completed Bypass.

Model outputs for each of scenario included the following:

- Daily vehicle-miles traveled (VMT) by vehicle type (passenger cars and trucks), trip purpose (commute, business and leisure trips), and time period (a.m. peak period, mid-day, p.m. peak period, and night).
- Daily vehicle-hours traveled (VHT) by vehicle type (passenger cars and trucks), trip purpose (commute, business and leisure trips), and time period (a.m. peak period, mid-day, p.m. peak period, and night).
- Daily delays by vehicle type (passenger cars and trucks), trip purpose (commute, business and leisure trips), and time period (a.m. peak period, mid-day, p.m. peak period, and night)

A summary of the BCA methodology is provided in Table 2 for each benefits category.

Table 2. Summary Methodology and Data Sources for BCA

Economic Benefit Category	Metrics	Methodology	Data Source
A. State of Good Repair	Pavement Maintenance Costs	Estimate marginal external cost associated with pavement maintenance (the additional spending (or saving) of maintaining pavements) resulting from a unit increase/decrease in VMT resulting from project Marginal pavement cost is multiplied by changes in VMT over 20-year analysis period	
B. Economic Competitiveness	Travel Time Costs	Estimate vehicle-hours traveled (VHT) Calculate average vehicle occupancy (AVO) by trip purpose Changes in VHT over the 20-year analysis period are multiplied by the corresponding AVO and Value of Time (VOT) estimates for autos and trucks	VHT: Arkansas Travel Demand Model AVO: Arkansas Travel Demand Model VOT: Benefit-Cost Analysis Guidance for TIGER and INFRA Applications (2017)
	Vehicle Operating Costs (VOC)	Estimate average per-mile VOC for passenger vehicles and trucks Assume 15,000 miles traveled per year Multiply the average marginal VOC for passenger cars and trucks by their corresponding changes in VMT over the 20-year analysis period	

C. Environmental Sustainability	Social Cost (SCC) Emissions & Non-Carbon Emissions Costs	Calculate emission rates for Carbon Dioxide (CO_2), Volatile Organic Compound (VOCs), Nitrogen Oxides (NOx), Particular Matter (PM) and Sulfur Dioxide (SOx) for passenger cars and trucks on urban restricted access roads as a function of travel speed Multiply emission rates by the changes in VMT resulting from project implementation Multiply emissions increase/decrease by emissions cost	Emission rates: Calculated by CS using MOVES2014 Benefit-Cost Analysis Guidance for TIGER and INFRA Applications (2017); Corporate Average Fuel Economy for MY2017-MY2025 Passenger Cars and Light Trucks (August 2012), page 922, Table VIII-16, "Economic Values Used for Benefits Computations (2010 dollars)." Benefit-Cost Analysis Guidance for TIGER and INFRA Applications (2017); Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866 (May 2013; revised July 2015), page 17, Table A1 "Annual SCC Values: 2010-2050 (2007$/metric ton CO_2).
D. Safety	Motor Vehicle Crash Costs	Apply fatality, injury and property damage only (PDO) crash rates to changes in VMT resulting from project to estimate crash reduction/increase Multiply crash reduction/increase by the dollar value of crash	

The benefits of implementing the project include cost savings due to reduced pavement maintenance cost, travel time, delays and vehicle operating cost, motor vehicle crash costs. Table 3 summarizes the findings of the benefit-cost analysis which yield a robust BCR ranging between 2.4 and 4.0.

Table 3. Summary of Benefit-Cost Analysis

Benefits	2015$	7% discount	3% discount
Reduction in Value of Time Costs	$799,407,474	$363,440,414	$556,135,327
Reduction in Non-Fuel Vehicle	$3,317,586	$1,732,838	$2,468,619
Reduction in Fuel Vehicle Operating	$2,716,527	$1,418,893	$2,021,370
Reduction in Safety Costs	$1,619,817	$846,061	$1,205,307
Reduction in Emissions Costs	$2,076,006	$1,076,203	$1,539,372
Reduction in Repair Costs	$2,271,908	$1,186,660	$1,690,529
Total Benefits	$811,409,317	$369,701,068	$565,060,524
Costs			
Construction Costs	$194,360,000	$153,817,378	$175,353,215
Maintenance and Operations Costs	$7,254,071	$2,813,486	$4,717,374
Total Costs	$201,614,071	$156,630,865	$180,070,589
Benefits vs. Costs			
Net Benefits	$609,795,247	$213,070,203	$384,989,935
Benefit-Cost Ratio	4.0	2.4	3.1

Economic Impacts

The transportation cost savings arising from the Project will support additional economic growth and development in the region. It is estimated that the short-term impact of the increased construction spending will lead to an additional 2,527 jobs. In the long term, the Project will increase the overall competitiveness of the region, translating into an additional 125 jobs, $5.9 million in labor income, and $17.7 million in Gross State Product (GSP), annually.

Summary Benefits

The I-69 corridor project is estimated to provide significant benefit to the State of Arkansas as well as the nation as a whole. The new interstate will facilitate trade and lead over 435,000 fewer hours of travel for trucks in 2040. Improved mobility and reliability resulting from the project will support reduced air pollution and ensure the region and the state's economy grows bigger and faster. The Gross State Product (GSP), a measure of the size of the state's economy, is projected to grow by about $17 million more per year with the project than without it. The expansion in GSP translates into an additional 125 permanent jobs per year and nearly $6 million in additional personal income per year for residents throughout the state.