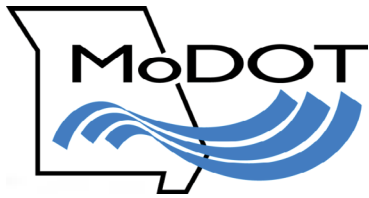


Missouri Department of Transportation

Missouri's Freight Corridors

Connecting Prosperity in America



Submitted to:

United States Department of Transportation

Office of the Secretary

Docket No. DOT-OST-2017-0090

**Application for Funding Opportunity under the
Department of Transportation's Nationally Significant
Freight and Highway Projects (INFRA Grants)
for Fiscal Years 2017 and 2018**

November 2, 2017

1.0 Introduction

Missouri's Freight Corridors: Connecting Prosperity in America is a nearly \$1 billion initiative being undertaken by the Missouri Department of Transportation (MoDOT). MoDOT is seeking \$194 million in INFRA Grant funding from the USDOT to supplement more than \$775 million of state funds for improvements to the I-270, I-70, and I-44 corridors, routes on the USDOT Primary Highway Freight Network of national and regional significance. The transportation crossroads for the entire nation, Missouri's strategic location puts it within 500 miles of 43 percent of the U.S. population, 44 percent of all U.S. manufacturing plants and seven of the top 25 international cargo hubs in the U.S. Missouri is also home to the country's 2nd and 3rd largest rail hubs in Kansas City and St. Louis, respectively. The planned highway upgrades, capacity expansion, safety enhancements, and bridge replacement will benefit not only Missouri and the Midwest region, but the entire nation by enhancing the safety, capacity, and reliability of these critical national freight highway corridors.

Significance of Missouri's Freight Corridors

- ✔ Carry over 500 million tons of freight worth over \$710 billion
- ✔ About 46% of tonnage and 61% of value is through-traffic: freight moving through Missouri to and from other states
- ✔ Over 1.3 million jobs nationwide depend on I-44 in Missouri, while over 1.1 million jobs nationwide depend on I-70 in Missouri
- ✔ \$260 billion of the nation's GDP depends on I-70 and I-44 in Missouri
- ✔ Over 20% of through-freight on I-70 originates as far away as Florida, Nevada, and Washington, while over 35% of through-freight on I-44 originates as far away as Arizona, California, and Texas
- ✔ Agricultural products from rural counties comprise about 25% of freight leaving the state via I-44

2.0 INFRA Grant Request

MoDOT is requesting an INFRA Grant of \$194 million to leverage more than \$775 million in state funds for improvements along these critical freight corridors. Table 1 below provides a breakout of the individual project components comprising Missouri's Freight Corridors as well as their costs and anticipated funding sources.

All costs shown in Table 1 are future costs and include no previously-incurred expenses.

Grant Recipient

The Missouri Department of Transportation (MoDOT) will be the recipient of the requested INFRA Grant.

TABLE 1: MISSOURI'S FREIGHT CORRIDORS: OVERVIEW OF ANTICIPATED FUNDING FLOW

Amount (\$, in thousands)				
Project	Total Cost	State Funds in STIP	INFRA	Additional State
I-270 North Modernization	500,000	155,099	100,000	244,901
I-70 Incident Management	36,608		7,322	29,286
I-44 Incident Management	4,093		819	3,274
I-70 High Hill Curve	19,000		3,800	15,200
I-70 6-Lane Expansion (20 miles)	150,000	3,406	30,000	116,594
I-44 at US 65 Interchange	25,000	3,948	5,000	16,052
I-70 Climbing Lanes at Mineola	5,000		1,000	4,000
I-70 Rocheport Bridge Replacement	230,000	15,595	46,000	168,405
Totals	\$969,701	\$178,048	\$193,941	\$597,712

3.0 Project Description and Location

Missouri’s Freight Corridors: Connecting Prosperity in America consists of a set of highway projects (components) on I-270, I-70, and I-44 that cumulatively leverage both current and past investments and serve the long-term needs of the vital national and regional freight transportation system. These projects represent the most critical needs identified throughout the state to support the safe and reliable movement of freight across Missouri and throughout the United States. In addition to transcontinental traffic, Missouri’s Freight Corridors also have important freight movement benefits for rural parts of Missouri, particularly in the non-metropolitan segments of I-70 and I-44, and will help the agriculture industry address the challenges of moving agricultural products from farm to market. Cumulatively, the I-270/70/44 system carries over 500 million tons of freight worth over \$710 billion each year. About **46 percent of this tonnage and 61 percent of this value is through-traffic** – freight moving through Missouri to and from other states. In addition, over 1.3 million jobs nationwide and \$260 billion of the nation’s GDP depend on the I-270/70/44 system.

Figure 1 and Table 2 below provide an overview of Missouri’s Freight Corridors and their component projects.

Given the national significance of the I-270/70/44 system in Missouri, its performance is a vital and urgent national economic concern. Traffic from throughout the United States is subject to increasing safety risk and incident delay each year due both to the current state of repair on this system as well as events ranging from crashes and routine road work to winter storms that jeopardize the performance of this system. As freight demand and traffic volumes grow, Missouri’s Freight Corridors are increasingly in need of modernization to both

Over 1.3 million jobs nationwide and \$260 billion of the nation’s GDP depend on the reliability and performance of the I-270/70/44 system

support ongoing safe and efficient traffic flow and reduce the impacts of incidents each year. Between 2011 and 2016, the number of crashes on these corridors cumulatively **grew by 11 percent**, including 167 fatalities, mainly in the rural segments of I-70 and I-44. In the last five years there have been over 5,500 instances of various delays (including crashes, weather, road work, and other events), each of which have reduced localized speeds on the corridor by more than 15 miles per hour. In 2015 alone, these incidents resulted in the **loss of nearly 140,000 hours of passenger car time and over 38,000 hours of commercial trucking time**. These statistics demonstrate the importance of MoDOT’s plans for major improvements throughout these corridors, including corridor-wide incident management in the rural segments of I-70 and I-44 as well as addressing safety and capacity deficiencies disrupting the flow of national traffic. As shown in the supporting analysis and documentation, the program of improvements described below and proposed in this application are expected to **save America’s traffic and freight carriers over 94 million hours of travel time, more than 189 million vehicle miles of diversion and prevent over 4,400 crashes**. Implementation of these improvements is the first step in making significant gains in safety and reliability on these corridors. By focusing on the most critical bottlenecks and causes of disruption, the most essential improvements can be made while minimizing the overall necessary capital outlays. Collectively, these improvements will provide system-wide benefits of national and regional significance.

FIGURE 1: MISSOURI’S FREIGHT CORRIDORS: CONNECTING PROSPERITY IN AMERICA – OVERVIEW OF CORRIDORS AND PROJECT LOCATIONS

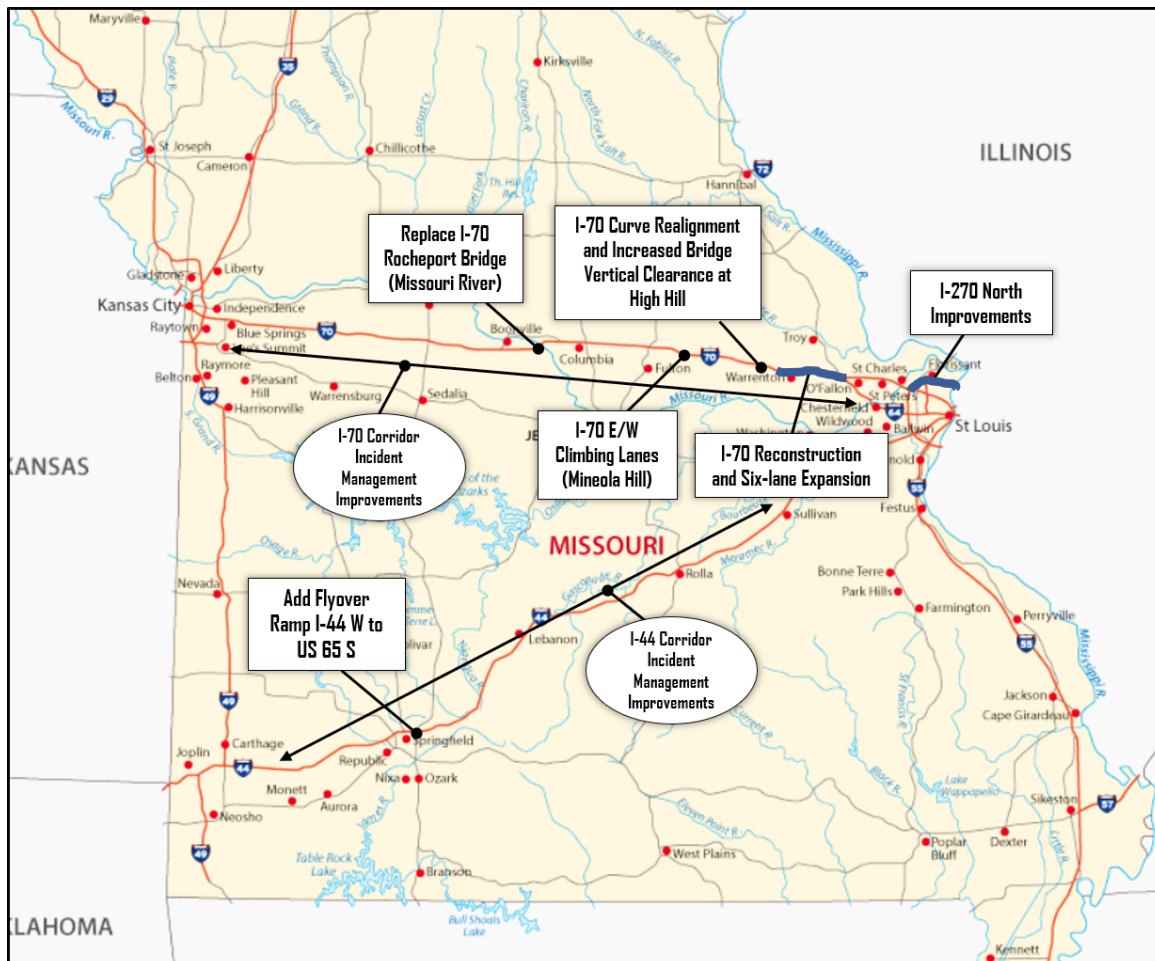


TABLE 2: MISSOURI'S FREIGHT CORRIDORS: CONNECTING PROSPERITY IN AMERICA - PROJECT COMPONENTS

Project Component	Description
Component 1: Interstate 270	<p>1.A Safety, reliability, and capacity improvements between I-70 and Mississippi River; includes new lanes and reconfiguration of multiple interchanges</p>
Component 2: Interstate 70	<p>2.A Incident management improvements (corridor-wide from Exit 21 to Exit 210)</p> <p>2.B Replacement of Rocheport Bridge over Missouri River</p> <p>2.C Climbing lanes for excessive grade at Mineola</p> <p>2.D Curve realignment and removal of low vertical clearance at High Hill</p> <p>2.E Reconstruction and expansion to 6 lanes from Wentzville to Warrenton (approximately 20 miles)</p>
Component 3: Interstate 44	<p>3.A Incident management improvements (corridor-wide from OK state line to Exit 251)</p> <p>3.B New Flyover Ramp from I-44 Westbound to US 65 Southbound</p>

MoDOT will use the **design-build delivery** method to speed implementation of these improvements, maximize the scope of work, and spur innovation. MoDOT has an excellent track record using the design-build approach, delivering over \$1.5 billion in projects, and saving taxpayers \$275 million. Collectively, MoDOT's design-build projects have been completed **86 months (7 years) ahead of schedule**. Nationally, design-build projects are completed 33 percent faster and 6 percent cheaper than conventional design-bid-build projects. This is largely the result of innovative solutions fostered by the design-build approach, and MoDOT expects similar results from the proposed INFRA projects (see Section 4, Criteria 3 and 4 for more information). MoDOT is also pursuing a design-build-finance approach that could accelerate project delivery further by seeking contractor financing through construction until MoDOT has additional bonding capacity or available cash flow.

MoDOT has delivered \$1.5 billion in design-build projects **86 months (7 years) ahead of schedule**

Development and Identification of Project Priorities

The projects included in this application are high-priority statewide freight improvements identified in the [Missouri State Freight Plan](#). These projects align with the objectives of the INFRA Grant program, and represent a practical approach to eliminating critical freight bottlenecks on the USDOT Primary Highway Freight Network.

From November 2013 to November 2014, MoDOT engaged freight stakeholders for input into the Missouri State Freight Plan. These stakeholders included Metropolitan Planning Organizations (MPO), Regional Planning Commissions (RPC), economic developers, modal operators, business organizations and freight operators and owners. Over 100 stakeholders at three regional forums developed project evaluation criteria and weightings that focused on the safe, efficient movement of goods supporting economic benefits for Missouri.

MoDOT narrowed the list of 3,800 suggested projects to 122 multimodal projects that were consistent with the freight plan goals, on the state network, and could be ready for construction within seven years. Using the scoring criteria defined and weighted through the stakeholder engagement process, MoDOT evaluated and approved the highway projects included in the Missouri State Freight Plan. These criteria focused on **freight** and **economic development**.

The I-270, I-70, and I-44 freight bottleneck improvements highlighted in this INFRA Grant application were rated as high statewide priorities. The scoring criteria used to develop this INFRA project list is consistent with the criteria used to score highway related projects in the Missouri State Freight Plan.



4.0 How Missouri’s Freight Corridors Initiative Satisfies INFRA Grant Criteria

CRITERION 1: Supporting Economic Vitality at the National and Regional Level

Missouri’s central location and diverse infrastructure has made the state a logistics hub for the nation. Each year, over \$700 billion of freight travels through, to, from, or within the state, facilitated by a diverse, interconnected transportation system that includes:

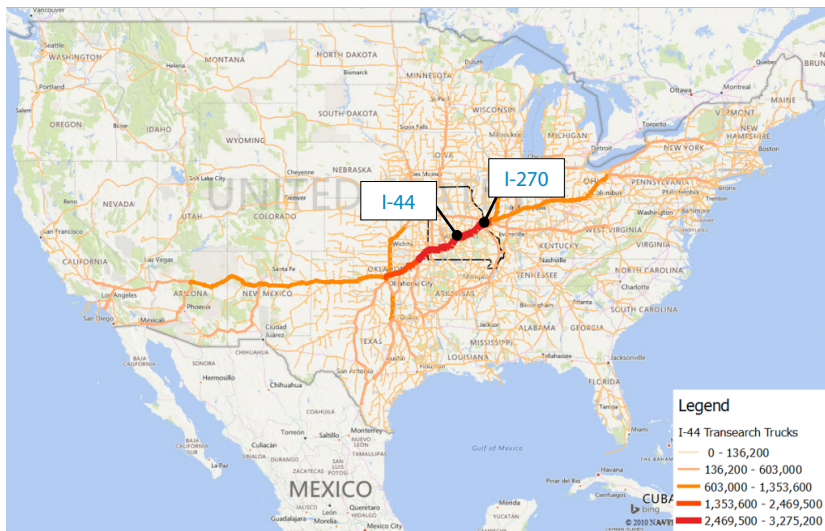
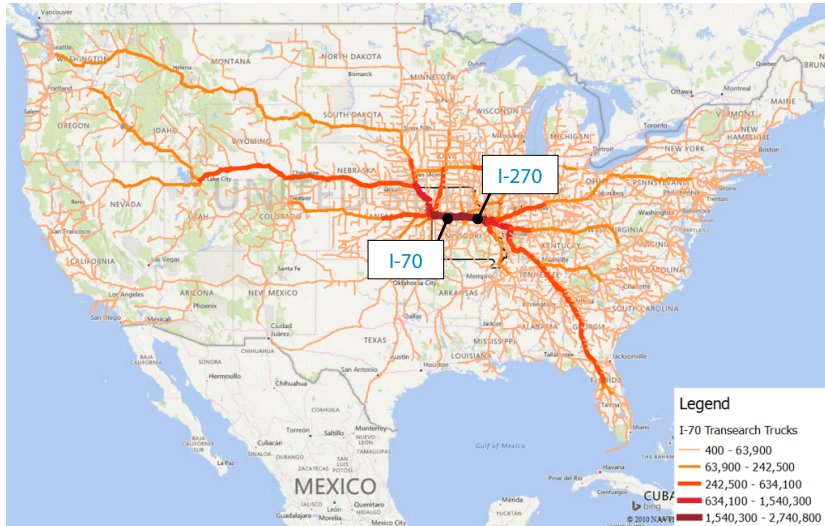
- Interstate highways traversing the state
- The nation’s second and third largest rail hubs -- Kansas City and St. Louis
- The cargo-carrying Missouri and Mississippi Rivers have the most northern year-round shipping in the U.S., with a direct connection to the Gulf of Mexico and freight opportunities from the newly expanded Panama Canal
- Three of the nation’s top cargo airports -- Kansas City (37), St. Louis (56), and Springfield-Branson (106)

The national east-of-the-Mississippi interstate network serving regional and national supply chains converges at the iconic gateway to the west at St. Louis. This is the **nation's second largest east-west interstate connection hub**.

The linkage of businesses in the East North Central, Northeast, Mid-Atlantic and Southeast regions of the U.S. via I-55 North, I-64 East, I-270 North/I-70 East and I-55 South at St. Louis is critical to regional and national supply chains that extend to the west on I-70 and to the Southwest via I-44. For example, **over 50 percent of freight moving on I-44 in Missouri is through-traffic. Over 36 percent of the freight moving on I-70 in Missouri is through-traffic.** Together, I-270, I-70, and I-44 are the arteries of commerce serving the heart of national and regional distribution and commodity flows, from

rural areas in the west on to New York and New England, and to Philadelphia, Baltimore, and Washington in the Mid-Atlantic. The multimodal crossroads of American commerce in St. Louis and the connections to the West North Central via I-29 and I-35 in Kansas City are critical to business and population in rural areas and Western state urban areas as well. American exports reach to the Gulf Coast ports through the highway connectivity to the Missouri and Mississippi River ports served by I-270, I-70, and I-44. In addition, the rail freight that flows to St. Louis from the East Coast and to Kansas City from the West Coast relies greatly on the I-270/70/44 corridors for inland distribution by truck throughout Missouri and the entire Midwest.

The improvements to I-270 North will also support the **continued redevelopment of a historically low-income and economically disadvantaged part of the state, the north St. Louis area**. This area has struggled economically for decades due to the outmigration of skilled workers and infrastructure and housing neglect. In recent years, public and private efforts to redevelop, grow jobs, and improve residents' quality of life have been initiated. Among the keys to



I-270, I-70, and I-44 together are the heart of national and regional distribution and commodity flows

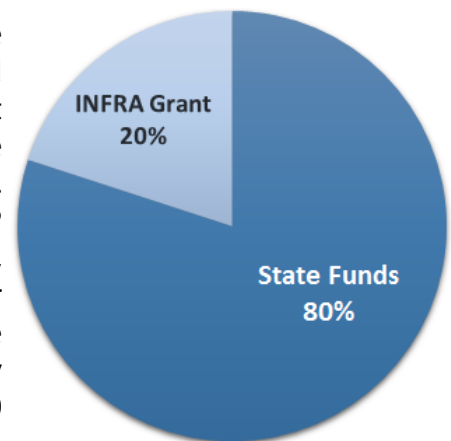
catalyzing job and economic growth in north St. Louis is improved transportation accessibility and logistics mobility for firms that wish to remain, relocate, or expand there. The I-270 North improvements to be funded through the INFRA grant will enable MoDOT to modernize the roadway and significantly improve the access and mobility options of people and businesses in North St. Louis for both regional and national transportation needs.

In sum, the projects that together comprise Missouri's Freight Corridors will provide **long-term reliability and resiliency** for these national and regional freight networks.

CRITERION 2: Leveraging Federal Funding to Attract Other, Non-Federal Sources of Infrastructure Investment, as well as Accounting for the Life-Cycle Costs of the Project

MoDOT's plan for funding implementation of Missouri's Freight Corridors seeks only 20 percent of total project costs from the INFRA Grant. All remaining funds will be comprised of state funds, making the total federal share of the proposal only 20 percent.

MoDOT has \$178 million programmed in the Statewide Transportation Improvement Program (STIP) for work related to a few of the proposed projects. However, the current amount of funds in the STIP is not sufficient to complete any of the proposed improvements in this application. Most of the projects that have some funding in the STIP are considered facility life-extension rehabilitation projects, rather than modernization and safety improvements. For example, the \$16 million currently programmed for the I-70 Rocheport Bridge is for a temporary fix that would only extend the useful life of the bridge by approximately 10 years before a replacement is ultimately required. With an INFRA Grant, however, MoDOT would instead devote this \$16 million to the cost of replacing the bridge. The scenarios are similar for the I-44/US 65 interchange and the I-70 six-lane expansion from Wentzville to Warrenton. For I-270 North, only phase 1 of the project can be built if INFRA funds are not obtained. To deliver the improvements as proposed, MoDOT will supplement the requested INFRA funds (\$194 million) with the existing state funds in the STIP and an additional \$598 million in state funds.



In addition to the safety and reliability benefits, it is expected these projects would also **reduce ongoing operations and maintenance (O&M) costs** via reconstructed pavement and bridges as well as less diversion of traffic, particularly large trucks, onto less substantial roads. The proposed INFRA projects would result in an estimated O&M savings of \$33 million (7 percent discount rate) to \$49 million (3 percent discount rate). Furthermore, the proposed projects will not create a situation in which MoDOT is dependent upon additional federal grant funding to operate and maintain the improvements. The design-build projects will specifically seek and evaluate solutions that provide the most durability and minimize ongoing operations and maintenance.

Local communities may also build upon these projects through the Missouri Highways and Transportation Commission’s cost-share program to expedite important local projects. Since 1998, \$462 million in state and federal funds have supported the construction of locally-important projects totaling \$1.1 billion by leveraging funds from local entities and utilizing the state’s infrastructure bank. A primary example of this is a new interchange on I-70 in Warrenton being fully-funded by the city. Utilization of the cost-share program near the projects included in this INFRA Grant application could swell the transportation improvements made to these facilities and bring additional locally-sourced funds to the table. Likewise, the state legislature has created the 21st Century Transportation Task Force to identify solutions for increasing the state’s transportation funding. Such an increase would allow MoDOT to expand on the proposed INFRA improvements and further improve these corridors of national and regional significance.

CRITERION 3: Using Innovative Approaches to Improve Safety and Expedite Project Delivery

As highlighted earlier, MoDOT has **great success with design-build** projects since 2005, with 9 projects completed and 3 others under construction. As recent experience has shown, design-build opens the door for innovation and promotes accelerated construction and added value on projects. Collectively, MoDOT’s design-build projects have been completed **\$275 million under budget and 86 months ahead of schedule**. Nationally, DB projects are completed 33 percent faster and 6 percent cheaper than conventional design-bid-build projects. MoDOT intends to use design-build to deliver several of the proposed projects, including the **incident management projects** on the I-70 and I-44 corridors. MoDOT has a long history with operating effective traffic incident management in Missouri’s most urbanized areas. However, crashes on the Interstates in the state’s rural areas present many more challenges related to response time, incident clearance times, traffic delays, and secondary crashes. In Missouri, rural I-70 and I-44 account for approximately 3,500 crashes per year. FHWA estimates approximately 25 percent of congestion is caused by traffic crashes. In addition, for every minute a freeway travel lane is blocked during peak travel times, four minutes of delay result. Further, these primary crashes periodically result in more severe secondary crashes.

To improve response times and incident clearance times on rural I-70 and I-44, MoDOT will use the design-build approach to spur innovation and explicitly consider performance outcomes. MoDOT anticipates this method will lead to improved safety in the rural I-70 and I-44 corridors by maximizing available resources and combining traditional and technological strategies. **Traditional Strategies** may include installing additional emergency crossovers, emergency exit ramps, and improvements to outer road connections to better facilitate diversion opportunities. **Technology Strategies** may include additional closed-circuit television (CCTV) cameras, additional dynamic message signs (DMS), truck parking availability hardware and software, and expanding MoDOT’s award-



winning real-time, automated congestion warning system along I-70 and I-44. The congestion warning system is a software-based tool that monitors live traffic speeds 24 hours a day and immediately pushes warning messages to rural DMS whenever backups occur on the interstate.

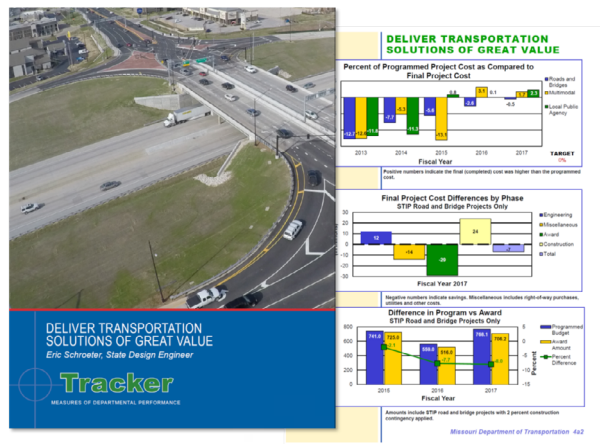


MoDOT is also seeking opportunities in the rural I-44 and I-70 corridors to enhance efficiency and reliability of freight movement by using technology to provide **more efficient truck parking**. By improving the ability for truck drivers to know when parking is available, these improvements help minimize driver fatigue and parking in risky locations such as shoulders, off ramps, or desolate private parking locations. MoDOT is reviewing multiple types of detection hardware and looks forward to innovations that could be spurred by an

incident management design-build project. Other proposed projects that are good candidates for design-build include I-270 North, the I-70 expansion from Wentzville to Warrenton, and the Rocheport Bridge. The I-270 North project will be pursued using a design-build-finance procurement, allowing contractor financing on the project and accelerating construction by deferring costs to MoDOT. For projects not chosen for the design build delivery method, other innovative approaches, such as Cost-Plus-Time Bidding, may be considered to accelerate completion and minimize traffic impacts.

In addition to pursuing innovation through design-build, MoDOT welcomes the opportunity to participate in the **new approach described in the federal Notice of Funding Opportunity (NOFO) for environmental review and permitting**. While significant environmental work has already been completed for many of the proposed projects, updates and reviews will be necessary. Several federal agencies will be stakeholders during these reviews, making the proposed projects an ideal opportunity to try the new approach. The Rocheport Bridge may present more complicated permitting issues since it crosses the Missouri River.

CRITERION 4: Holding Grant Recipients Accountable for Their Performance and Achieving Specific, Measurable Outcomes Identified by Grant Applicants



As noted previously, MoDOT's experience and leadership in the design-build delivery method is well documented. Several of the projects in this application are good candidates for using this delivery method. As recent experience has shown, this will not only open the door for innovation and speed but will also promote accountability by explicitly identifying project goals and desired performance outcomes. MoDOT uses a rigorous process to evaluate

design-build proposals and ensure improvements meet project goals and achieve desired results. This is done by stating clear goals but providing contractors flexibility in how results will be achieved. The process relies on data-driven analysis and innovation to determine the overall best value, a win not only for MoDOT, but most importantly tax payers.

In addition, MoDOT's long-standing commitment to Practical Design and performance management has resulted in delivering more than **\$12.6 billion in transportation improvements 7 percent under budget and 94 percent on-time the last 10 years**. MoDOT is the birthplace of [Practical Design](#), a concept aimed at focusing on core traveler needs and controlling costs during project development. [Tracker](#) is a public document that not only measures and drives organizational performance but also provides transparency and accountability to the citizens of Missouri. These processes have produced measurable [results](#) and will be used to ensure INFRA projects remain on-schedule, on-budget, and meet the intended purpose and need. For a summary of MoDOT's recent results with accountability, innovations, and efficiency, visit www.modot.org/Results.



5.0 Project Components of Missouri's Freight Corridors

Component 1: I-270 Improvements



Originally constructed in the 1960s, the I-270 North Corridor encompasses 15.5 miles of urban interstate from the I-70 interchange on the west to the Mississippi River at the Missouri-Illinois state line on the east. It functions as an extension of I-70 for transcontinental and local traffic that wishes to pass to or from Illinois without traveling through the downtown urban core of St. Louis.

I-270 is the primary artery of North St. Louis County, connecting individuals in low-income communities with economic opportunities throughout the region. Although St. Louis County as a whole is affluent, stark disparities exist within the county. North County has poverty rates more than twice as high as the other regions in the county, and much of the area has been designated as a Promise Zone by the U.S. Department of Housing and Urban Development.

An Environmental Assessment (EA) has been completed for the corridor and outlines the [preferred alternative](#) for improvements. Currently, less than one-third of the improvements are funded in MoDOT's 5-year Statewide Transportation Improvement Program (STIP). Going forward, the remaining improvements must compete with additional needs on the state's 20-year Long Range Transportation Plan, a list of projects estimated to have less than 20 percent of necessary funds during the next 20 years. The requested INFRA grant would allow MoDOT to move forward with the preferred alternative for I-270 North on an accelerated timeline. Furthermore, using design-build-finance to deliver all the improvements at once will allow MoDOT to complete construction in 3-4 years rather than building the improvements incrementally over more than a decade. By accelerating construction through innovative financing, the savings in construction inflation alone could approach \$100 million. MoDOT has shown this approach to be successful, completing a comparable section of I-64 using design-build two years faster than originally planned and \$144 million cheaper. In addition, one of the goals for the design-build project will be to provide a diverse workforce and achieve Disadvantaged Business Enterprise (DBE) goals reflective of the communities being served by the project, a strong boost to the economic vitality of the region

1.A: I-270 North Reconstruction. MoDOT will conduct a major modernization project on this critical transportation system link between I-70 and the Missouri-Illinois state line at the Mississippi River to relieve growing traffic congestion, enhance safety and resiliency, and improve mobility for freight and passengers. The project will also create an economic boost for nearby communities.

Goal: Improve safety, reliability, efficiency, and resiliency for trucks and passenger vehicles on a 15-mile critical interstate link.

Key Elements: Reconstruction of multiple interchanges and addition of new auxiliary lanes; improved connections with and relocation of selected segments of the outer road; addition of travel lanes in the most heavily-traveled segments; reconstruction and conversion of existing outer roads to one-way system.

Schedule: 2020-2023

Estimated Cost: \$500 million

Component 2: I-70 Improvements

MoDOT has been studying the needs of Missouri's "Main Street" – Interstate 70 – for nearly two decades, seeking remedies for condition, capacity and safety problems that plague one of the nation's oldest and most important interstate highways – constructed from 1956-65.

An Environmental Impact Statement (EIS) completed in 2006 concluded I-70 should be rebuilt from the ground up with a minimum of one additional lane in each direction, and with

reconstructed interchanges. In 2009, MoDOT completed a Supplemental EIS that compared the previous identified alternative with an eight-lane I-70 featuring two lanes in each direction dedicated to long-haul trucks, and two lanes in each direction for general purpose traffic.



However, with the onset of disruptive technologies, it's now possible the safety and reliability of I-70 could be greatly enhanced at a fraction of the previously estimated reconstruction costs of \$2-4 billion. Innovations in vehicle-to-vehicle and vehicle-to-infrastructure communication, autonomous vehicles, and the like, are creating new opportunities to maximize system efficiency and highway safety. Aware of this shift, MoDOT proactively launched its Road to Tomorrow program in 2015 seeking new ideas and

technologies for creating a 21st century I-70, an information and innovation corridor across the heart of the country. MoDOT is willing and actively pursuing new solutions to accommodate today's transportation and economic needs. With such innovation and technology looming, MoDOT is now focusing on implementing the most critical, yet practical improvements along I-70 to address deficiencies with the most significant national and regional implications.

2.A: Incident Management Improvements - Kansas City to St. Louis. MoDOT will implement a package of incident management improvements on the rural segment of I-70 between Exits 21 and 210, with a goal of reducing average incident clearance times as well as the frequency of secondary crashes resulting from traffic stopped due to the primary incident.

Goal: Improve overall safety and reliability for vehicles (passenger and freight) in the I-70 corridor by reducing response times, clearance times, and secondary crashes

Key Elements: Add new emergency crossovers, new emergency off-ramps, improved outer road connectivity, additional dynamic message signs (DMS) and closed-circuit television (CCTV), and potentially, truck parking availability systems; also expand MoDOT's automated congestion warning system.

Schedule: 2019-2020

Estimated Cost: \$36 million

2.B: I-70 Rocheport Missouri River Bridge Replacement. MoDOT will replace this aging bridge that carries I-70 across the Missouri River, as the bridge is approaching the end of its useful life. MoDOT needs to either replace the bridge now or undertake a major rehabilitation to keep it safe and functional for the next 10 years. After 10 years, any further rehabilitation would no longer be technically feasible, making full replacement necessary. MoDOT’s proposal is to replace the bridge now to save the costs of a rehabilitation as well as expensive annual maintenance for 10 more years. The undiscounted cost of delaying replacement 10 years is over \$276 million compared to \$230 million today. In addition to increased costs, any short or long-term closure of the existing bridge due to structural deficiencies would require vehicles to take a detour of nearly 100 miles, accumulating significant road user costs and national freight disruption.

Goal: A modern Missouri River bridge on I-70 that provides safe and reliable mobility for freight and passenger vehicles.

Key Elements: Construction of new I-70 Missouri River bridge and necessary approaches; removal of existing bridge.

Schedule: 2020-2022

Estimated Cost: \$230 million



2.C: I-70 East/West Climbing Lanes at Mineola Hill. MoDOT will add both eastbound and westbound climbing lanes to I-70 to make traffic (both truck and passenger) flow safer and more efficient. The grades of 4 percent to 6 percent in this approximately 1.5-mile segment of I-70 slow trucks and increase their travel time by 30-35 percent. Adding climbing lanes will allow vehicles to safely pass slow-moving trucks and mitigate the relatively high crash rates at this location.

Goal: Improve truck capacity and make overall traffic (truck and passenger) flows safer and more efficient.

Key Elements: New climbing lanes on I-70 between mile markers 168.4 and 170.2 (eastbound) and between mile markers 167.6 and 166.4 (westbound)

Schedule: 2019

Estimated Cost: \$5 million

2.D: I-70 Curve Realignment and Removal of Vertical Clearance Issue at High Hill. MoDOT will remove existing vertical and horizontal clearance issues of an existing railroad bridge over I-70 to better accommodate trucks with oversize loads. The current clearance constraint requires oversize load trucks to use a 50-mile detour through towns and lower classification roadways where such traffic is not desirable, creating a freight bottleneck of national and regional significance. MoDOT will also realign the roadway to flatten out two curves on either side of the railroad bridge. The current roadway configuration has a 50 percent higher crash rate than the full rural I-70 corridor. This project will thus improve freight efficiency and roadway safety.

Goal: Eliminate the need for oversize loads to re-route; improve safety for all motorists and provide more efficient truck movement

Key Elements: Realign I-70 roadway between mile markers 180.6 and 182.0 to improve safety and allow large trucks with oversize loads to more safely and efficiently traverse this segment; replace railroad bridge crossing I-70 to eliminate vertical clearance restrictions for trucks on I-70.

Schedule: 2019-2020

Estimated Cost: \$19 million

2.E: I-70 Reconstruction and Six-lane Expansion from Wentzville to Warrenton. MoDOT will enhance freight mobility between east and west by providing more capacity where it's needed most, reducing congestion and associated vehicle crashes. This project will include adding a third lane in each direction from Wentzville to Warrenton (approximately 20 miles), the section of I-70 between St. Louis and Kansas City most frequently experiencing recurring congestion. In 2016, the estimated user delay cost for this 20-mile section of I-70 was \$12.7 million. On a per-mile basis, this cost is over 3 times greater than the user delay cost for the rest of rural I-70 combined (\$32.4 million across 170 miles).

Goal: Improve the safety, reliability, and capacity of I-70 for freight and passenger vehicles

Key Elements: Add travel lanes and reconstruct roadway in both directions between Exit 210 in Wentzville and mile marker 191 in Warrenton

Schedule: 2020-2022

Estimated Cost: \$150 million

Component 3: I-44 Improvements

Interstate 44 was constructed in roughly the same timeframe as Interstate 70, and is also one of the nation's most important east-west corridors. It, too, has condition, capacity, and safety concerns and although it has lower overall AADT than I-70, it carries a higher percentage of trucks and the state's highest-value freight.

Also like I-70, however, reconstruction of the I-44 corridor is an unfunded priority. MoDOT believes there are reasonable and practical improvements that can be made today that would improve the safety and reliability of I-44. These improvements align with those goals.



3.A: Incident Management Improvements - Oklahoma State Line to St. Louis. MoDOT will implement a package of incident management improvements on the rural segment of I-44 between the OK State Line and Exit 251, with a goal of reducing average incident clearance times as well as the frequency of secondary crashes resulting from traffic stopped due to the primary incident.

Goal: Improve overall safety and reliability for vehicles (passenger and freight) in the I-44 corridor by reducing response times, clearance times, and secondary crashes

Key Elements: Add new emergency crossovers, additional dynamic message signs (DMS) and closed-circuit television (CCTV) feeds throughout corridor, and potentially, truck parking availability systems; also expand MoDOT's automated congestion warning system.

Schedule: 2019

Estimated Cost: \$4 million

3.B:I-44/US 65 Interchange Improvements. MoDOT will replace the westbound to southbound loop ramp of this partial cloverleaf with a direct flyover, thereby mitigating a conflict with other ramps that cause high crash rates and congestion due to growing traffic volumes. The existing loop ramp also requires speed reductions from 70 mph to 30 mph for trucks (and about 35 mph for passenger vehicles), while the flyover would allow all traffic to transition from I-44 to US 65 at 55-60 mph.

Goal: Enhance operational efficiency, capacity, and safety of I-44/US 65 interchange for trucks and passenger vehicles.

Key Elements: Construction of new flyover between I-44 west and US 65 south; removal of existing I-44 west to US 65 south loop ramp.

Schedule: 2020

Estimated Cost: \$25 million

6.0 Project Readiness

MoDOT has significant experience in the development and implementation of large and complex transportation capital projects. In addition, MoDOT plans, designs, constructs, and maintains 33,856 miles of highways and 10,403 bridges – the nation’s seventh largest state highway system, with more miles than Iowa, Nebraska and Kansas’ systems combined. Missouri also has 53 major river bridges, the most of any state. From 2007-2016, MoDOT delivered 4,661 projects 7 percent under budget and 94 percent on-time or early.

The readiness of each of the project components comprising Missouri’s Freight Corridors is reflected in the estimated implementation schedule shown in Figure 2 below. As the state of Missouri owns and operates all the affected facilities that comprise these project components, MoDOT can move ahead with implementation upon securing required funding. Table 3 provides an overview of each grant component’s current environmental review status.

MoDOT has an excellent track record of quickly delivering projects once authorized. In fact, MoDOT has regularly accelerated the delivery of projects when additional funding opportunities have been presented. For example, when Congress passed the FAST Act, MoDOT proactively responded by increasing the state’s construction program by \$500 million per year because of the stability in federal funding provided by the legislation. Likewise, when a TIGER grant was awarded for the US 54 Champ Clark Bridge over the Mississippi River in Louisiana, MO, MoDOT moved quickly to procure delivery of the project through the design-build process. Similarly, MoDOT stands ready to deliver the proposed INFRA projects upon award.

FIGURE 2: MISSOURI'S FREIGHT CORRIDORS – OVERVIEW OF PLANNED PROJECT COMPONENT IMPLEMENTATION TIMEFRAMES

	2019	2020	2021	2022	2023
Component 1: Interstate 270					
1.A Safety, Reliability, and Capacity Improvements between I-70 and Mississippi River Bridge					
Component 2: Interstate 70					
1.A Incident Management Improvements (corridor-wide)					
1.B Replacement of Rocheport Bridge					
1.C Add Climbing Lanes at Mineola					
1.D Curve Realignment & Elimination of Vertical Clearance Restriction at High Hill					
1.E Reconstruction and Expansion from Wentzville to Warrenton					
Component 3: Interstate 44					
2.A Incident Management Improvements (corridor-wide)					
2.B Add Flyover Ramp from I-44 West to US 65 South					

TABLE 3: MISSOURI'S FREIGHT CORRIDORS: CONNECTING PROSPERITY IN AMERICA - PROJECT COMPONENT ENVIRONMENTAL REVIEW STATUS

Component 1: I-270	MoDOT conducted an Environmental Assessment (EA) for the I-270 North Corridor starting in 2013. In 2017, FHWA issued a Finding of No Significant Impact (FONSI) for the project.
Component 2: I-70	In 2006, MoDOT completed a Tiered Environmental Impact Statement (EIS) to reconstruct I-70 in its present location from Independence to Lake St. Louis with a minimum of three lanes in each direction. Subsequently, as part of FHWA's "Corridors of the Future" program, MoDOT conducted a Supplemental EIS (SEIS) on the 200-mile corridor to evaluate the impacts and benefits of an eight-lane I-70 that included dedicated truck lanes against the previously selected alternative. FHWA issued a Record of Decision for the truck-only lane concept in 2009. To move forward with I-70 improvements, MoDOT would need to conduct a re-evaluation of the SEIS which is expected to take six months or less.
Component 3: I-44	In 2007, MoDOT conducted a Purpose & Need Study of the I-44 corridor to evaluate crashes, assess environmental characteristics and demographic history, conduct detailed traffic analyses, catalog bridge/pavement history, and evaluate roadway condition and characteristics compared to current design standards. In the intervening years, MoDOT has not had the resources to pursue I-44 improvements the study indicated are needed. MoDOT anticipates that the I-44 corridor projects included in this grant application would each receive a Categorical Exclusion or CE2 status and be able to advance quickly to construction upon awarding of an INFRA grant.

7.0 Cost Effectiveness Summary

A National Economic Priority

As described earlier in the application, the transportation performance challenges addressed by the entire package of improvements on I-70, I-270 and I-44 represent over \$907 million (7 percent discount rate) in avoidable transportation costs, including loss of life, loss of travel time and reliability, emissions, fuel consumption and vehicle operating costs. Looking at value-chain effects of economic activity making, using, and selling goods moved on the I-70 system and their role in America's economy highlights the national significance of this system. Using input-output data from the TREDIS fueled by TRANSEARCH system (including both Global Insight data and IMPLAN input-output accounts) – it is observable that goods moved on the I-70/I-270 system in Missouri are involved in commerce accounting for over \$113.8 billion of America's overall annual GDP and over 1.1 million jobs (82 percent of which are American jobs outside of Missouri). Furthermore, goods moved on the I-44 system in Missouri are used in activity supporting over \$145.4 billion of America's overall annual GDP and over 1.3 million jobs (90 percent of which are American jobs outside of Missouri). By providing additional capacity at key junctures for traffic throughout Missouri, removing a known bottleneck on I-270 where national traffic moves from the St. Louis trade center onto the I-70 transcontinental corridor, supporting more efficient traffic movement through incidents ranging from flooding to blizzards to crashes and other events – the proposed improvement program is essential to securing America's economic performance in the 21st century.

Table 4 provides the required Project Matrix summarizing the analysis of impacts from the changes from the proposed I-70, I-270 and I-44 improvement projects. In this table the first column provides a description of the current I-70, I-270 and I-44 infrastructure baseline (including the anticipated changes over the analysis period), and identifies the problems with these key national connector interstates that these projects will address. The second column describes how the improvements from the projects would change the current I-70, I-270 and I-44 infrastructure baseline. The third and fourth columns describe the impact of the improvements and the corresponding population it will affect. The fifth column identifies the economic nature of the benefits. The last column provides reference to the location in the report for this information.

The types of outcomes that have been identified for the projects and the assessment approach adopted within the benefit-cost assessments are summarized in Table 5. These outcomes are organized according to INFRA selection criteria. As detailed above, the quantification of benefits involves both spreadsheet evaluations and calculations performed by the TREDIS transportation economics tool (See Appendix B).

The time horizon of the benefit-cost analysis covers the construction period from 2019-2023, and an operational period from 2020-2057. All benefits are expressed in constant 2016 dollars, and discounted to 2016.

TABLE 4: PROJECT SUMMARY MATRIX

Current Status/ Baseline and Problem to be Addressed	Change to Baseline/ Alternatives	Type of Impacts	Population Affected by Impacts	Economic Benefit	Summary of Results	Grant Application Reference
Delays and unreliability of highway freight movement from congestion, and crashes on I-70, I-270 the I-44 interstate highways	Widening to 6-lanes, bridge and segment improvements and incident management system	Reduce travel time for trucks and increase reliability of shipment delivery times; lower vehicle congestion; reduce crashes	Number of vehicles with reduced delay time & number of crashes/fatalities & injuries per year	Monetized value of reduced travel time, reduced operating costs, improved reliability, reduced crash costs, reduced emissions	Estimated dollar value of time savings, operating cost savings, improved travel time reliability, safety improvement, reduced emissions	Pages 3-7 and Appendix A

TABLE 5: PROJECT OUTCOMES

State of Good Repair	Maintenance and repair savings	Quantitative assessment (TREDIS) – Appendix A Refer to Section 4
	Shifted VMT from lower capacity roads	Quantitative assessment (TREDIS) – Appendix A Refer to Section 4
Economic Competitiveness	Travel time savings from reduced congestion and less diversion	Quantitative assessment (TREDIS) – Appendix A Refer to Section 4
	Operating cost savings from avoided congestion & resulting diversion	Quantitative assessment (TREDIS) – Appendix A Refer to Section 4
Economic Impacts	Short-term job creation from construction & long-term job creation from transportation efficiency gains	Quantitative assessment (TREDIS) – Appendix A Refer to Summary of Economic Impacts
Safety	Prevented crashes from avoiding increased exposure from diversion, from improved road design, and from reduced exposure to back ups	Quantitative assessment (Spreadsheet) – Appendix A Refer to Section 3
Environmental Sustainability	Emission benefits from reduced congestion and avoided extra mileage on associated alternative routes	Quantitative assessment (Spreadsheet) – Appendix A Refer to Section 4
Quality of Life	Improved mobility for residents and businesses connected by this road segment	Qualitative Assessment Refer to Section 3

Summary of Benefits and Costs

Table 6 shows a summary of project benefits by performance area, undiscounted and discounted at 3 percent and 7 percent as further documented in Appendices A and B. As described both in Section 1 and the introduction of the current section – 61 percent of the value carried by the I-270/I-70/I-44 system in Missouri is pass-through traffic, and between 80 percent and 90 percent of the jobs supported by the production, use and sale of goods moving on this system in Missouri are located elsewhere in America. Consequently, the benefits shown below represent an important gain to the US economy overall.

TABLE 6: SUMMARY OF BENEFITS OF PROJECTS, COMBINED (3% AND 7% DISCOUNT RATES)

BENEFIT CATEGORY	3% Discount Rate (In \$M's)	7% Discount Rate (In \$M's)	Undiscounted (In \$M's)
Travel Time Savings	785.5	393.2	1,491.0
Vehicle Operating Cost Savings	291.3	147.3	548.8
Value of Travel Time Reliability	33.6	16.8	63.6
Safety Benefits	264.6	137.7	489.6
Environmental & Social Benefits	7.8	4.4	13.7
Wider Economic (Productivity) Benefits	420.1	207.5	805.8
Total Benefits	1,803.0	906.8	3,412.4
Capital Investment Costs	651.4	586.6	693.7
Operations & Maintenance Costs	-49.0	-32.7	-71.2
Total Costs	602.4	553.9	667.5
Benefit Cost Ratio	2.99	1.64	5.11

Compared in Figure 3 and Table 7, the benefits and costs show the economic feasibility of this package of projects whether the net present values of the benefits and costs are discounted at the 7 percent or the 3 percent alternative.

FIGURE 3: COMPARISON OF BENEFITS AND COSTS, BY COMPONENT, 3% & 7% DISCOUNT RATE

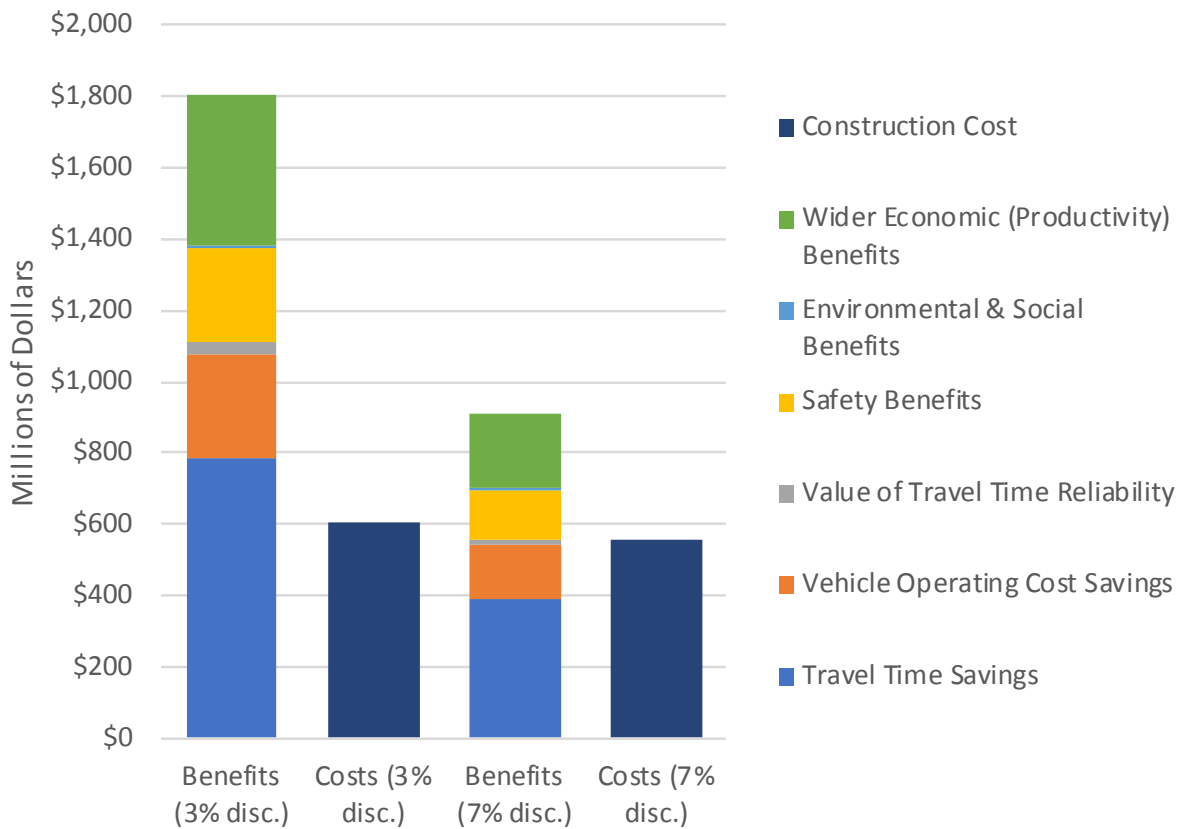


TABLE 7: SUMMARY OF BENEFITS AND COSTS OF PROJECTS, COMBINED

	Discounted at 3%	Discounted at 7%
Project Costs, Adjusted*	602.4	553.9
Total Benefits	1,803.0	906.8
Benefit-Cost Ratio	2.99	1.64

* Project costs are shown in millions and include capital outlays, along with adjustments for O&M costs, and a residual value calculated to account for the fact that the interstates' useful lives extend beyond the analysis period.

It is notable that not only is the cohesive program of improvements for the I-270/I-70/I-44 system vital to national economic importance, representing a highly favorable benefit-cost ratio for the nation – but each individual component carries more than sufficient benefit to justify its cost. Table 8 summarizes each of the individual components of the program as described in Section 5, demonstrating that at both the 3 percent and 7 percent discount rates, these improvements generate benefits exceeding their costs. Projects not meeting similar high economic returns were removed from this application.

TABLE 8: SUMMARY OF BENEFITS AND COSTS INDIVIDUAL PROJECTS (Millions)

Project	3% Discount Rate			7% Discount Rate		
	Total Benefits	Total Costs	BC Ratio*	Total Benefits	Total Costs	BC Ratio
I-270 Modernization	\$955.9	\$425.3	2.25	\$465.2	\$354.5	1.31
I-70 6-Lane Expansion	\$444.1	\$91.6	4.85	\$208.5	\$88.4	2.36
I-70 Rocheport Bridge	\$114.8	\$2.1	55.80	\$81.9	\$36.9	2.22
High Hill	\$34.8	\$12.6	2.76	\$18.5	\$12.8	1.45
I-70 Mineola	\$45.8	\$5.2	8.83	\$24.4	\$4.5	5.37
I-70 IMS	\$99.6	\$38.2	2.61	\$51.9	\$33.0	1.57
I-44 IMS	\$46.1	\$5.0	9.22	\$24.8	\$4.2	5.94
I-44 U.S. 65 Interchange	\$62.0	\$22.5	2.76	\$31.5	\$19.6	1.61
Grant Package Total	\$1,803.0	\$602.4	2.99	\$906.8	\$553.9	1.64

*Details regarding costs, benefits, and the discounted value of time are included in Appendix B

Summary of Economic Impacts

In addition to extraordinary safety benefits, the improvements in this proposal will have long-term impacts on the economy. The economic impacts of the proposed improvements to I-70, I-270 and I-44 are expected to support 2,915.3 jobs from construction at the height of the construction period and an average of 176 jobs annually in the 36-year operations period from 2020-2057. During construction, project expenditures are expected to support \$576 million in wage income, \$756.7 million in Gross Regional Product, and \$1.5 billion in business output cumulatively from 2019-2023. In addition, transportation efficiency gains are expected to generate an additional \$368 million in wage income, \$588.3 million in Gross Regional Product, and \$1.3 billion in business output cumulatively from 2021-2057. Detail on estimated economic impacts is included in Appendix D of this report.

TABLE 9: SUMMARY OF ECONOMIC IMPACTS

Source of Impact	Cumulative Impacts			Average Annual Jobs over the Period
	Business Output (\$ mil.)	GRP (\$ mil.)	Wage Income (\$ mil.)	
Construction (2019-2023)	1,452.2	756.7	575.9	2,915
Improved Transportation Efficiency (2021-2057)	1,251.0	588.3	367.8	166

Costs and Benefits Strongly Support INFRA Objectives

Project Costs

Design and construction of the I-70, I-270 and I-44 improvements are scheduled to occur in the five-year period from 2019-2023. During construction, the current highways will remain open. The I-70, I-270 and I-44 improvements are expected to cost \$694 million (net, undiscounted) in capital outlays. These highway system improvements will yield savings in operating and maintenance cost, relative to the base-case scenario in which the highways are not improved through 2057. In the build case, the improved Interstates will require fewer resources for annual maintenance, reducing total operations and maintenance costs by \$71 million (net, undiscounted) over the evaluation period. The total undiscounted net costs of the package of projects is \$668 million. Discounted at 7 percent, the present value of costs is \$554 million, and at 3 percent, the present value of costs is \$602 million. The tabs for each project in the Appendix A spreadsheet presents all cost assumptions in detail, by year of analysis.

State of Good Repair

Overall, the improvements to the system will reduce annual operation and maintenance (O&M) costs on many facilities, by replacing older pavements with newer ones, and obviating the need for other preservation improvements later. In the case of the Rocheport Bridge, the project prevents a costly stop-gap measure that would only extend the life of the bridge by approximately 10 years before an even more costly replacement would be needed. The differences between cost streams shown in the workbook of Appendix B and described in Appendix A demonstrate in dollar terms how these savings contribute to the overall project benefits (and net costs).

Travel Time Savings – Trucks and Passenger Cars

The proposed improvement program will save time for cars and trucks by (1) eliminating bottlenecks at key locations on I-270, I-44 and I-70, (2) facilitating the ongoing movement of people and goods across the entire I-270/I-44/I-70 system during sporadic incidents affecting traffic flow (through incident management) and (3) reducing the likelihood of secondary crashes during slow-downs caused by incidents. Because of the hours saved as described in the introduction to this application in the period from 2021-2057, across all the projects, improvements are expected to result in a total cumulative travel time savings of \$393.2 million (discounted 7 percent) or \$785.5 million (discounted 3 percent).

Vehicle Operating Cost Savings

By reducing crashes and providing critical infrastructure to manage all incidents affecting traffic flow on these critical transcontinental facilities – the proposed improvements will reduce idling, reduce the number of miles cars and trucks must drive to divert when incidents occur – greatly improving fuel efficiency and reducing long-term vehicle operating costs. Because of the mileage and speed savings described in the introduction, in the period from 2021-2057, the projects are expected to generate total cumulative vehicle operating cost savings of \$147.3 million (discounted 7 percent) or \$291.3 million (discounted 3 percent).

Safety Benefits – Trucks, Passengers, Residents

By enhancing capacity and design at key pinch-points and improving interchange design at key locations the proposed improvements will reduce crashes at some of the most significant safety hot-spots on Missouri's transcontinental highways. There have been 167 fatal crashes across the I-70, I-270 and I-44 system over the past six years. In that same time there have been 648 disabling injury crashes, 3,084 minor injury crashes, and 17,425 property damage only crashes across the system. With the safety benefits from the implementation of the proposed improvements, through 2057 there will be 4,438 fewer crashes and 32 lives saved. The reductions in numbers of crashes can be traced to two effects: (1) reduced accident rates on the improvements to I-70, I-270 and I-44, relative to the current highway conditions, and (2) reduced accident exposure from avoiding increases in vehicle-miles on detour routes. In the period from 2020-2057, the projects are expected to generate total cumulative safety savings of \$137.7 million (discounted 7 percent) or \$262.6 million (discounted at 3 percent). Most of these savings derive from the effect of avoiding crashes through use of the improved interstate facilities.

Emission Reduction Impacts

Avoidance of incident delays and diversion routes results in faster speeds, less idling and therefore fewer tons of emissions being released from travel on Missouri's transcontinental highways. The 279,354 tons of emissions saved by 2057 are estimated based on savings in vehicle-miles traveled and then monetized. In the period 2020-2057, the project is expected to generate total cumulative savings to society of \$4.4 million (discounted 7 percent) or \$7.8 million (discounted at 3 percent), deriving from reductions in volatile organic compounds, nitrogen oxides, sulfur dioxide, and particulate matter.

Quality of Life and Intangible Benefits

The benefits of the proposed improvements extend far beyond the readily quantifiable areas described above. The occurrence of incidents impeding traffic on the corridors affect not only business and commercial traffic, but also passenger car traffic carrying Americans on journeys ranging from family vacations to holiday gatherings and cultural, athletic, and social events of all kinds. While the value of personal travel time savings is quantified in Appendices A and B (and can be included as part of the travel time benefit), the importance of this system and its performance carries an intangible quality that cannot be captured entirely in dollars (such as resolving a traffic incident which may enable someone to attend a child's ball game or dance recital). Furthermore, the frequency and magnitude of slow-down incidents described in the introduction affects not only the mainline traffic, but besets cities and towns throughout Missouri with a backup of passenger car and truck traffic overwhelming local street networks when the interstate is disabled by incidents. For example, if I-70 traffic diverts through the main street of a small town, it can easily gridlock the entire system, rendering much of the town's population immobile for even the most basic activities until the incident is resolved. The proposed projects will greatly reduce and in some areas, eliminate this problem.

