

APPENDIX

SUMMARY OF MoDOT RESULTS

Year(s)	Innovation/Efficiency	2021 MoDOT Savings	2021 Customer Savings	2021 Additional Funding	2021 Lives Saved	Cost-Benefit Details
2007-2021	Paving With Recycled Materials	\$ 25,808,691				As asphalt costs rose in other states, MoDOT's emphasis on asphalt pavement recycling and use of used roofing shingles in pavement mix helped contractors keep the average bid price per ton of asphalt steady in Missouri. The use of recycled asphalt can reduce material costs by \$5-10 per ton. This effort began in 2004 and savings are ongoing.
2007-2021	Alternating Passing Opportunities with Shared 4-Lane Design	\$ -	\$ 26,932,512		3	A shared 4-lane can be thought of as a 2-lane road featuring a passing lane that alternates every mile or so between opposing traffic. This provides safe opportunities for drivers in both directions to pass slower vehicles. Four Missouri highways use the 4-lane approach, totaling 117 centerline miles. Savings shown here reflect the difference in cost between building traditional 4-lane highways and the shared 4-lane approach. Traveler savings in time and fuel costs are not shown, but are thought to be significant.
2010-2021	Achieving the Improbable With Design-Build Approach	\$ 11,000,000			27	In the early 2000s, Missouri's legislators authorized MoDOT to use a design-build approach on three projects to demonstrate whether the public sector success of this innovative bid-build approach could be replicated in public works. Since then, MoDOT has delivered 15 Design-Build Projects that were completed 107.5 months ahead of schedule. MoDOT continues to partner with the public and private sectors to deliver projects that maximize available resources into collaborative solutions that achieve goals. This collaborative effort challenges the way projects are delivered. MoDOT pushes the boundaries to execute projects of different size and complexity using innovative data driven processes and a wide range of public and private partnerships. Concentrating on project goals, innovation, schedule and budget, construction is completed more efficiently, with less impact on travelers.
2007-2021	Engineering Reviews Enhance Value	\$ 7,228,208				Before design and construction projects can be called complete, consultants or sharp-eyed co-workers review methods and procedures. The ideas they offer often improve project practicality and the bottom line.

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2011-2021	Building Slim Shoulders Where None Existed	\$ 78,728,926	8	<p>MoDOT has installed thousands of miles of shoulders and rumble strips on rural highways where there were none. Using a 2-foot standard rather than the 4-foot shoulder required for major roads made this possible. The result - a 30 percent reduction in run-off-road severe crashes. Engineered shoulders helped drivers regain control. The paving cost of a 2-foot versus a 4-foot shoulder saves \$106,000 per mile and reduces the cost to obtain sufficient right-of-way.</p>	
2007-2021	At-Grade Crossing Conversion to J-Turn	\$ 29,400,000	\$ 54,202,831	5	<p>J-Turns, a cost-effective alternative to an overpass, reduce the number and severity of crashes at at-grade highway intersections. Traditional interchanges cost \$5-10 million to build. J-Turns average cost is \$800,000. At locations where J-Turns were installed, crashes are down 25 percent and those incidents result in 88 percent fewer fatalities. This design innovation allows us to address a minimum of six severe crash sites with the same money it would take to build a single traditional overpass. MoDOT's first J-Turn was built in 2007.</p>
2007-2020	Rethinking Over-Estimate Contractor Bids	\$ 492,679			<p>When contractor bids come in above initial estimates, MoDOT takes another look. Often we discuss cost-saving adjustments with industry, such as eliminating unnecessary contractor risk, then release the proposal for new, nearly always lower-cost bids.</p>
2009-2021	Converting Roadside Assets to Truck Parking	\$ 1,216,987			<p>Though other states have shuttered rest areas in an attempt to save money, Missouri converted obsolete and expensive-to-maintain rest areas and weigh stations to basic truck parking areas. The costs of decommissioning these sites is quickly recouped. When converted, there is no need for building cleaning services, site maintenance or water. Electricity costs are slashed. Motor carriers praise Missouri. The conversions increased the number of publicly provided truck parking spaces in the state, making it easier to find a safe place to sleep. Rested drivers are safer drivers.</p>
2011-2021	Mowing Smart	\$ 1,500,000			<p>Starting in 2011, MoDOT adjusted our mowing schedule on low-volume highways to shift more of the budget to Missouri's roads and bridges each year. On odd years, two passes are required to make sure no substantial growth occurs in the clear recovery zone and on even years, only one pass is required on the final mowout to assure there are no sight distance issues.</p>

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2021	Savings From Shared Work Program	\$ 14,000,000	To stabilize the road fund as a result of the COVID-19 pandemic, MoDOT took aggressive actions to reduce spending, including temporarily reducing employee work hours and/or salaries by twenty percent and participated in the Shared Work Program through the Department of Labor.
2007-2021	Fighting Snow with Beet Juice and Salt Brine	\$ 1,212,450	Salt brine, a liquid solution, soaks into pavement. It is used to pretreat roads for expected storms because rock salt is scattered by passing traffic. Beet juice is a waste product of sugar production. The sticky substance helps rock salt adhere to pavement, increasing the effectiveness of MoDOT's winter storm activity. Both innovations reduce MoDOT's salt usage.
2012-2021	Streamlining Survey Costs with Light Detection and Ranging (LiDAR) Technology	\$ 2,764,095	LiDAR instruments measure distance to a target by illuminating it with a laser light. Adopting this technology reduced the cost of survey design. An ACEC Engineering Excellence Grand Award winner two consecutive years.
2011-2021	Sign Design Modifications	\$ 500,000	MoDOT designs as many signs as possible to fit on existing posts, resulting in significant savings.
2020-2021	Maintenance Management System (MMS)	\$ 2,730,000	MMS is a Governor's award winning, web-based software from which Maintenance staff can assign and document work, record and approve fleet usage calculations, look up information on a wide variety of assets, and access data from multiple data tables at MoDOT. MMS consolidates multiple programs into one easy-to-use, tailor made single platform making retrieving data far more efficient, and improving decision-making capabilities. MMS benefits nearly 3,000 Maintenance workers, as well as the state and traveling public because better data translates into better decisions, more efficiency, dollars saved and more work accomplished in shorter time.
2016 - 2021	Choosing the Most Cost-Effective Sign Posts	\$ 400,000	By changing its one-size-fits-all sign post philosophy, MoDOT saves by choosing the smallest post for the job at hand and avoids costs associated with well-intentioned over-building.
2016-2021	Energy Saving Lighting	\$ 498,000	When existing bulbs for overhead and task lighting burn out, MoDOT replaces them exclusively with LED lamps. LEDs consume much less energy and last far longer, saving both electricity and labor costs. The effort expands beyond offices and maintenance areas. The Rock Port, Mo., welcome center earned LEED Silver certification in part because of its use of LED lighting. For FY20 and FY21, the amounts include utility savings due to office staff working from home due to COVID from March 2020 through May 2021.

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2016-2021	Reassessing Road Sign Needs	\$	150,000	MoDOT looked at every type of sign and learned some were not essential to safe roadways. These are not replaced when they deteriorate.
2013-2021	Paperless Contract Storage	\$	63,000	By using electronic storage, MoDOT reduces its long term document storage costs. Contracts and bonds prepared for road and bridge work average well over 100 pages each. Creating, modifying and delivering them electronically for approval cuts processing time from 30 days to 3 days. MoDOT's other agreements, such as reciprocal agreements and memorandums of understanding are stored and often produced paperlessly. This expedites the research, review and handling of such documents, saving staff time and other costs.
2019-2021	Converting Roadway Lighting to LED	\$	290,987	Replacing high pressure sodium highway lights with LED lighting results in remarkable energy savings. Also, because LEDs last longer, they are changed less often, resulting in lower labor costs.
2016-2021	Merging Operations Software	\$	75,000	By merging multiple software contracts into one we found efficiencies for our system.
2012-2021	Remapping Snow Plow Routes	\$	38,000	MoDOT's St. Louis District reexamined the routes its snowplow operators drive, discovering changes that resulted in a savings of 10 minutes per cycle. Pavement is treated faster, saving \$9,400 per storm and making the way safer for the millions of travelers in the region in less time.
2009-2021	Realty to Roads Property Sales Program	\$	1,460,838	MoDOT sells state-owned property no longer needed for the operation of the state's system. The proceeds from this program are reinvested into the road fund. In 2010, MoDOT's Right of Way Division earned the 2010 FHWA Excellence in Right of Way Technical Specialty Award for the team's aggressive approach and rationale in selling excess property.
2013-2021	Realizing Revenue Through Recycling	\$	139,778	Recycling paper, plastic, ink cartridges and more is second nature for MoDOT office employees. Field staff routinely collect scrap metal, tires, anti-freeze and the like. All of the items are sold with the revenue invested in Missouri's highway system.
2007-2021	Cost Share and Cost Participation Programs	\$	134,505,000	Communities contribute to state highway projects to receive needed upgrades faster. Revenues from local tax initiatives often provide the local portion in Cost Share Program projects.

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2007-2021	Encouraging Economic Opportunity and Competition Using Federal Funds	\$ 439,363	MoDOT uses Federal Highway Administration funds to administer programs that expand business opportunities for historically disadvantaged groups. By educating business owners how to pursue opportunities with the state and by providing real-world experiences through apprenticeships, MoDOT benefits from an expanded pool of competitive vendors and increased numbers of skilled laborers.
2019-2021	Revenue Generated from Leasing Property	\$ 338,488	MoDOT leases Commission owned property when it does not interfere with the operation of the system and benefits the public. Areas leased are utilized for agriculture purposes, parking facilities, highway patrol regional sites to list a few. The additional revenue is reinvested in Missouri's highways.
2020-2021	FAA Airport Improvement Program Competitive Discretionary Grant Awards	\$ 14,798,878	Funds intended for high-scoring projects using FAA's project prioritization formula; projects seeking discretionary funding compete against other projects in FAA Central Region.
2020-2021	Grade Crossing Improvements	\$ 378,617	Highway-railroad at-grade crossings are eligible for state and federal funding for safety improvements. By partnering with railroads, additional private funds are also invested for safety improvements. Highway-railroad at-grade crossings are eligible for state and federal funding for safety improvements. By partnering with railroads, additional private funds are also invested for safety improvements. During FY20 MoDOT invested \$4.6 million of Federal funds, \$1.2 million in State funds and Railroads contributed \$667,000 to these important safety projects.
2021	Coronavirus Response and Relief Supplemental Appropriation Act (CRRSAA) - Aviation	\$ 954,324	The Federal government is providing aviation assistance to airports in the State Block Grant Program. These funds are available for costs to prevent, prepare for, and respond to the COVID-19 pandemic, including airport operating costs and debt service payments.
2021	Coronavirus Response and Relief Supplemental Appropriation Act (CRRSAA) - Transit	\$ 851,394	This program provides one hundred percent (100%) funding for capital and operating expenses to public transportation providers.
2021	American Rescue Plan Act (ARPA) - Aviation	\$ 2,207,000	This additional funding is for construction, capital improvements, operations, or planning of publicly owned airfields by cities or other political subdivisions, including land acquisition.

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2021	American Rescue Plan Act (ARPA) - Enhanced Mobility of Seniors and Individuals with Disabilities	\$ 851,407	This program provides one hundred percent (100%) grant funds for capital and operating expenses to entities that provide public transportation to seniors and those with disabilities.
2021	American Rescue Plan Act (ARPA) - Intercity Bus Service	\$ 2,841,247	One hundred percent (100%) federal funding is available to provide regularly scheduled bus service for the general public that operates with limited stops over fixed routes connecting two or more areas not in close proximity.
2021	American Rescue Plan Act (ARPA) - Transit Formula Grants for Rural Areas	\$ 9,058,625	One hundred percent (100%) federal funding is available for capital, planning, and operating assistance to states to support public transportation in rural areas with populations of less than 50,000.
2021	American Rescue Plan Act (ARPA) - Rural Transit Assistance Program	\$ 152,411	The Rural Transit Assistance Program (RTAP) provides resources, training and technical assistance to rural transit providers.
2021	Increased General Revenue funding investment for Waterways Capital Improvements Program	\$ 11,600,000	The General Assembly appropriated \$11.6 million in General Revenue (GR) for the Waterways Port Capital Improvement Program (CIP) for Fiscal Year 2022. This is double the previous year's appropriation and the second highest amount appropriated for this program. MoDOT worked with legislators and the Missouri Port Authority Association to identify CIP needs and provide economic impact data to support this appropriation.
2021	Missouri Vanpool COVID-19 Discretionary Grant	\$ 450,000	MoDOT received \$450,000 in FTA discretionary grant funding to develop and implement a pilot vanpooling program to get individuals to and from work. MoDOT is partnering with Commute with Enterprise to develop and implement the program. This pilot program will utilize vanpooling to get individuals to and from work, expand job access, and utilize state-of-the-art technology to help riders match and pay in real-time.
2021	Consolidated Rail Infrastructure and Safety Improvements (CRISI) program - Webster County	\$ 10,500,000	Safety improvements along the U.S. Highway 60 corridor in southern Webster County, including the construction of an outer road beginning at State Highway Z near Fordland running to a new interchange at State Highway A.

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2021	Economic Impact of Amtrak's Missouri River Runner Service	\$ 10,850,000	impact of Amtrak's Missouri River Runner service yields: 1,250 jobs, \$65 million in labor income, \$208 million in economic activity, and more than \$22 million in tax revenue. Passenger rail service provides important economic development benefits to Missouri communities by improving accessibility, connectivity, and travel efficiency for both in-state and out-of-state travelers. The General Assembly appropriated \$10.85 million for passenger rail in Fiscal Year 2022, a record state investment level in Missouri.
2007-2021	Web-Based Motor Carrier Credentialing	\$ 8,670,073	Motor Carrier Express, an online business portal, allows trucking companies to conduct business with MoDOT anytime and drastically reduces the need to speak with an agent. Customers transact more than 125,000 actions each year on their own and receive most required credentials electronically rather than by mail or shipment. Since 2007, Missouri motor carriers realized significant time savings through electronic credential delivery. Trucks get on the road - making money - faster.
2013-2021	Keeping Cars on the Road with High Friction Surface Treatment	\$ 19,711,877	MoDOT achieved a 20 percent reduction in run-off-road crashes in areas with high rates of ROR incidents by installing high-grip surface treatments. Ideally, the alignment of those road sections would be corrected, but until that is possible, the pavement helps hold vehicles on the driving lanes, reducing skidding.
2007-2021	Electronic Truck Pre-Screening at Weigh Stations	\$ 16,101,782	Electronic pre-screening using weigh-in-motion scales and other technology helps identify the "good players" among commercial truck traffic in Missouri. Transponder-equipped trucks found in good standing are allowed to bypass weigh stations so Missouri State Highway Patrol Commercial Vehicle officers' inspection efforts are more efficient. Motor carriers who participate in the voluntary service save time, fuel and money while Missouri uses the same resources to process an increasing number of trucks.
2007-2021	Making Highways Smoother and Safer, Sooner	\$ 118,678,838	10 The Smooth Roads Initiative and Better Roads, Brighter Future program were back-to-back efforts that improved 5,600 miles of highways. Completed earlier than scheduled, the efforts delivered smoother pavement, brighter striping, rumble stripes and other safety improvements to the highways that carry 80 percent of Missouri's traffic. These improvements have resulted in over \$1 billion of safety benefits to the customers since 2007.

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	Reducing Crossover Crashes				Missouri's median guard cable is successful in slowing and guiding wayward vehicles from crossing into opposing lanes. Guard cable is used on portions of all Missouri interstates and other major routes. It drastically reduces the number of median crossover crashes which can be devastating, often fatal.
2007-2021	with Median Guard Cable	\$ 506,138,743		50	
	TOTAL	\$ 97,658,431	\$ 830,875,248	\$ 202,377,370	103