Year(s) 2007-2011	Innovation/Efficiency	Total MoDOT Savings Total \$ 1,500,000,000 \$			Lives Saved Cost-Benefit Details 20 MoDOT saved millions by replacing standard highway practices with practical design concepts. Building without frills allows us to address more customer needs than 0 previously possible. \$	007 MoDOT Savings 2008 N 350,000,000 \$	10DOT Savings 2009 Mo 400,000,000 \$	10DOT Savings 250,000,00
					By reexamining everything we do, MoDOT achieved substantial savings through the sale of obsolete facilities and equipment and a significant workforce reduction (1,200 employees). We transferred these savings to meet customers' road and bridge expectations. This effort began in 2010. Savings are reinvested in the Missouri			
2010-2018	MoDOT's Bolder Five-Year Direction	\$ 993,000,000	\$ - \$		 0 highway system. 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 			
2007-2018	Alternating Passing Opportunities with Shared 4- Lane Design	\$ 330,463,000 \$	\$ 332,601,468 \$		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 36 not shown, but are thought to be significant.	131,823,000		
2007 2010		ý 330, 4 03,000 ,	y 332,001,+00 \$		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	131,023,000		
2007-2018	Paving With Recycled Materials	\$ 296,107,738	\$-\$	<u> </u>	asphalt can reduce material costs by \$5-10 per ton. This effort began in 2004 and 0 savings are ongoing. \$	13,185,015 \$	20,457,106 \$	20,108,9
					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 ten Design-Build Projects that were completed 60 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			
	Achieving the Improbable With Design-Build				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			
2010-2018	Approach Engineering Reviews Enhance Value	\$ 274,951,000 \$ \$ 250,704,543 \$			 0 completed more efficiently, with less impact on travelers. 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 0 project practicality and the bottom line. 	54,893,700 \$	13,310,600 \$	29,911,0
2007 2020		φ 200,701,510 ·	r		MoDOT installed 5,917 lane 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	5 ()55 5)7 5 5 ¥	10,010,000 ¢	
2011-2018	Building Slim Shoulders Where None Existed	\$ 243,270,000	\$ 292,123,742 \$	- -	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 27 and reduces the cost to obtain sufficient right-of-way. The Missouri Department of Corrections partners with MoDOT to allow 452			
2007-2018	Offender Work Crews	\$ 237,085,324	\$\$	-	offenders to perform labor-intensive work. This allows MoDOT to focus its resources on more skilled tasks. Due to several new policies and safety concerns, this program is growing more and more challenging but Maintenance Division is currently seeking 0 resolutions to these challenges. \$	18,455,197 \$	18,455,197 \$	18,455,1
					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,			
2007-2018	At-Grade Crossing Conversion to J-Turn	\$ 121,800,000	\$ 245,373,195 \$	-	 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- 23 Turn was built in 2007. 	4,200,000	\$	21,000,0
					Springfield, Mo., is the site of the first-in-the-nation diverging-diamond interchange. Initial estimates for traditional interchange improvements at Interstate 44 and Mo. 13 were estimated at \$10 million with up to 2 years to complete. Changing the design to a DDI reduced project costs to \$3.2 million and it was built in 6 months. This innovative and cost-effective interchange design handles high traffic volumes so			
2009-2018	Nation's First Diverging Diamond Interchange	\$ 121,800,000 \$	\$\$. <u>-</u>	efficiently that 24 now exist in Missouri. Nearly all other states have followed suit, 0 with at least one DDI of their own. Because we found that stripes on low-volume highways show less wear than those on major roads, we chose to extend the duration of the minor route restriping		\$	6,800,0
2011-2018	Optimizing Pavement Striping Strategies	\$ 100,814,400			 schedule. As a result, we sold 30 percent of our specialized striping equipment and reassigned employees to other needed work. This approach maintains traveler safety 0 and meets customer expectations. MODOT refinanced and paid off some bond debt years early, allowing millions to be 			
2007-2018	Innovative Finance	\$ 68,117,658 \$	\$ - \$,	 0 directed to Missouri's roads and bridges. Since October 2003, the alternate bidding process in MO has resulted in the average number of bidders per project rising to 5.5. The three-year average asphalt price/ton for alternate paving projects is 5.1% below that for non-alternate projects, and the 	186,807 \$	1,401,053 \$	1,401,0
2007-2018	Alternate Pavements	\$ 44,701,609 \$	\$ - \$		 three-year average concrete price/CY for alternate paving projects is 8.6 percent below that for non-alternate projects. Overall, it shows a decrease in asphalt prices on 0 alternate bid projects. When contractor bids come in above initial estimates, MoDOT takes another look. Often we discuss cost-saving adjustments with industry, such as eliminating 	11,686,707 \$	8,743,025 \$	9,641,9
2007-2018	Rethinking Over-Estimate Contractor Bids	\$ 27,818,096	\$ - \$. <u>-</u>	unnecessary contractor risk, then release the proposal for new, nearly always lower- 0 cost bids. \$ 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.	4,337,410 \$	4,741,208 \$	5,375,6
					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.			
2007-2018	Converting Roadside Assets to Truck Parking	\$ 22,525,244	\$-\$		Motor carriers praise Missouri. The conversions doubled the number of publicly provided truck parking spaces in the state, making it easier to find a safe place to 0 sleep. Rested drivers are safer drivers. \$	28,242 \$	303,826 \$	478,6
2015-2018	Building on a Strong Base - Intelligent Compaction	\$ 21,179,100	\$\$		Improvements to soil and aggregate compaction under the highway increase pavement service life and decrease maintenance costs for MoDOT. The approach also o saves considerable time and labor costs for contractors. Bidders sometimes propose an alternative technical concept when presented with			
					a MoDOT-supplied base design configuration, project scope, design criteria or construction criteria. ATCs often provide solutions that are equal or better to the original bid requirement.			
2007-2018	Acceptance of Alternate Technical Concepts	\$ 15,250,000 \$	\$-\$		 ATCs provide flexibility to the bidders in order to enhance innovation and achieve efficiency. ATCs have been used on multiple projects since 2007, including the Stan Musial Veterans Memorial Bridge in St. Louis. ATCs resulted in \$7.5 million in savings on the \$229 million dollar project. 	4,000,000 \$	3,750,000 \$	7,500,0
					By merging multiple software contracts into one and scrutinizing every aspect of traffic signal design and operation, we found efficiencies and now transfer more than \$1.5 million from traffic signal budgets to road and bridge work each year. We shared our discoveries with Missouri cities, counties and developers. As a result, the savings			
2009-2018	Efficient Traffic Signal Design	\$ 15,225,000 \$	\$ - \$		 0 opportunities stretch beyond MoDOT alone. 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, 		\$	1,500,0
2011-2018	Mowing Smart	\$ 12,000,000	\$-\$;	 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 0 assure there are no sight distance issues. Replacing incandescent signal bulbs with LED lighting results in remarkable energy 			
2007-2018	Converting Signals to LED Lighting	\$ 11,828,785	\$-\$	-	savings. Also, because LEDs last longer, they are changed less often, resulting in lower labor costs. MoDOT's LED efforts earned an AASHTO Sweet Sixteen award and is 0 emulated by other states. Salt brine, a liquid solution, soaks into pavement. It is used to pretreat roads for	677,790 \$	692,634 \$	902,6
					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.			
2007-2018	Fighting Snow with Beet Juice and Salt Brine	\$ 9,181,620 \$	\$ - \$	-	0 Both innovations reduce MoDOT's salt usage. \$ As MoDOT reduced the number of maintenance buildings, we reevaluated the quantity of signs and posts kept in inventory. Materials are drawn from supplies on	51,375 \$	71,925 \$	497,3
2010-2017	Sign and Post Inventory Reduction	\$ 9,003,162	\$ - \$		 hand until we reach the new, lower reorder point. Sign and post inventories have leveled off by 2018. Obsolete and old/out of date signs that would not have been used were purged from inventories and districts were seeking out available posts from each other's inventories. 			
2007-2018	Bridge Redecking Template	\$ 7,374,300 \$	\$ - \$		 When bridge supports are in good shape, MoDOT redecks older bridges rather than replacing the entire structure. MoDOT uses a standard template for the design of bridge redecking projects to save design time and costs. Travelers enjoy the 0 design time savings and Missourians benefit from cost savings. 	599,250 \$	747,300 \$	2,115,0
2011-2018	Achieving Savings Through Research	\$ 6,400,000			MoDOT actively pursues academic and other research to discover new methods to drill bridge support shafts. Methods derived from spread footing geotechnical 0 research conducted in 2011, for example, will save \$100,000 in a typical year.	, <u>,,,,,,,,,</u>	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	2,113,0
					The TowPlow was created by a former MoDOT employee. The TowPlow blade swings out to the side of a snow plow-equipped truck to help clear more lane miles with fewer trucks and operators.			
2007-2018 2011-2018	TowPlow - Missouri-Made Snow Fighter Sign Design Modifications	\$ 4,703,832 \$ \$ 4,000,000 \$			MoDOT includes 83 TowPlows in its snow-fighting arsenal. Many other four-season 0 states investigated our success and obtained TowPlows for their own fleets. \$ MoDOT designs as many signs as possible to fit on existing posts, resulting in 0 significant savings.	51,408 \$	179,928 \$	212,0
2012-2018	Streamlining Survey Costs with Light Detection and Ranging (LiDAR) Technology	\$ 3,372,508	\$ - \$		LiDAR instruments measure distance to a target by illuminating it with a laser light. O Adopting this technology reduced the cost of survey design. The federal standard calls for a single mile marker sign with nine reflective delineators spaced evenly between each sign. MoDOT sought and received permission for the			
					variation. The five signs per mile prove much more durable than the nine reflective delineators. MoDOT recouped the cost of the signs realizing savings in materials and maintenance			
2007-2018	Durable, Informative Emergency Reference Makers	\$ 3,120,000	\$-\$	-	 costs. MoDOT enjoys the overwhelming support of EMS personnel and 911 operators for the decision. Interstate travelers can now provide more accurate location information 0 to dispatchers when they call for emergency services, speeding response time. 	260,000 \$	260,000 \$	260,0
	Achieving Efficiency with Bridge Analysis				New LARSBridge software helps bridge engineers more quickly and accurately conduct structural analysis for the movement of specially-permitted super-heavy truckloads. The quicker response and more accurate restrictions save motor carriers time and money while reducing the need for staff resources and improving bridge preservation			
2010-2018	Software	\$ 2,434,987	\$ - \$	-	0 efforts. MoDOT adopted federal standard spacing for installation of chevron signs in curves, eliminating the need for an engineer's field visit. The change also reduced the need for			
					an average of two signs per curve, a savings of \$720 on each. This savings will essentially end after 2019 when the chevron installations are complete to comply with federal standards. After that point in time, chevron			
2014-2018	Modifying Chevron Sign Spacing Efficiently Mitigating Wetland Impacts- MoDOT	\$ 2,338,335	<u>\$</u> -\$	-	 0 installation will be limited to isolated locations. Wetland banking allows MoDOT to mitigate for wetland impacts by restoring larger wetland sites that are more ecologically beneficial for the environment. Wetland banking aids in reducing the realty, construction and maintenance burdens 			
2007-2018	Wetland Mitigation Banks	\$ 1,984,344	\$-\$	-	0 imposed by creating wetland mitigation for individual projects. \$			
2007-2018	LISING INNOVATION TO MULTIDATE IMPACTS TO				MoDOT replaced several low water crossings with environmentally friendly bridges, earning stream bank mitigation credits to offset impacts to streams elsewhere. MoDOT also uses the Stream Stewardshin Trust Fund to mitigate stream impacts to	115,270 \$	14,030 \$	70,1
2016 - 2018	Using Innovation to Mitigate Impacts to Streams- Stream Mitigation Banks Choosing the Most Cost-Effective Sign Posts	\$ 1,342,521 \$ \$ 1,200,000 \$				115,270 \$ 412,974 \$	14,030 \$ 228,494 \$	
	Streams- Stream Mitigation Banks Choosing the Most Cost-Effective Sign Posts	\$ 1,200,000	\$ - \$	-	 earning stream bank mitigation credits to offset impacts to streams elsewhere. MoDOT also uses the Stream Stewardship Trust Fund to mitigate stream impacts to reduce long term maintenance costs. 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. 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 			
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2016-2018 2013-2018 2016-2018	Streams- Stream Mitigation Banks Choosing the Most Cost-Effective Sign Posts Energy Saving Lighting Paperless Contract Storage Reassessing Road Sign Needs Remapping Snow Plow Routes	\$ 1,200,000 \$ \$ 607,800 \$ \$ 451,000 \$ \$ 450,000 \$	\$ - \$ \$ - \$ \$ - \$ \$ - \$		earning stream bank mitigation credits to offset impacts to streams elsewhere. MoDOT also uses the Stream Stewardship Trust Fund to mitigate stream impacts to 0 reduce long term maintenance costs. 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 0 over-building. 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 0 certification in part because of its use of LED lighting. 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 pagerlessly. This expedites the research, review and handling of such 0 documents, saving staff time and other costs. MoDOT looked at every type of sign and learned some were not essential to safe 0 roadways. These are not replaced when they deteriorate. 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 59,400 per storm and making the way safer for the millions of 0 travelers in the region in less time. MoDOT took an innovative approach to research the load capacity of concrete box culvert bridges. By proving that soil fill helps distribute the truck traffic weight carried by this type of bridge, we are able to reduce the number of detailed structural analysis studies needed and avoided placing unnecessary weight restr			
2016-2018 2013-2018 2016-2018 2012-2018	Streams - Stream Mitigation Banks Choosing the Most Cost-Effective Sign Posts Energy Saving Lighting Paperless Contract Storage Reassessing Road Sign Needs Remapping Snow Plow Routes Using Research to Challenge Culvert Load Standards Saves Cost and Motorist	\$ 1,200,000 \$ \$ 607,800 \$ \$ 451,000 \$ \$ 450,000 \$ \$ 266,000 \$	\$ - \$ \$ - \$ \$ - \$ \$ - \$ \$ - \$		earning stream bank mitigation credits to offset impacts to streams elsewhere. MoDOT also uses the Stream Stewardship Trust Fund to mitigate stream impacts to 0 reduce long term maintenance costs. 8 y 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 0 over-building. 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 0 certification in part because of its use of LED lighting. By using electronic storage, MoDDT 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 0 documents, saving staff time and other costs. MoDOT looked at every type of sign and learned some were not essential to safe 0 roadways. These are not replaced when they deteriorate. MoDOT 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 0 travelers in the region in less time. MoDOT took an innovative approach to research the load capacity of concrete box culvert bridges. By proving that soil fill helps distribute the truck traffic weight carried by this type of bridge, we are able to reduce the number of detailed structural analysis studies needed and avoided placing unnecessary weight restri			
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2016-2018 2013-2018 2016-2018 2012-2018 2014-2016 2007-2018	Streams- Stream Mitigation Banks Choosing the Most Cost-Effective Sign Posts Energy Saving Lighting Paperless Contract Storage Reassessing Road Sign Needs Remapping Snow Plow Routes Using Research to Challenge Culvert Load Standards Saves Cost and Motorist Inconvenience Reducing Crossover Crashes with Median Guard Cable Making Highways Smoother and Safer, Sooner	\$ 1,200,000 \$ \$ 607,800 \$ \$ 451,000 \$ \$ 450,000 \$ \$ 266,000 \$ \$ 100,000 \$ \$ - \$	\$ - \$ \$ 1,186,788,380 \$		earning stream bank mitigation credits to offset impacts to streams elswhere. MoDDT also uses the Stream Stewardship Trust Fund to mitigate stream impacts to 0 reduce long term maintenance costs. By changing its one-size-fits-all sign post philosophy, MoDDT saves by choosing the smallest post for the job at hand and avoids costs associated with well-intentioned 0 over-building. When existing builss for overhead and task lighting burn out, MoDDT 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 samed LEED Silver 0 certification in part because of its use of LED lighting. By using electronic storage, MoDDT 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. MDDDTs other agreements, such as reciprocal agreements and memorandums of understanding are stored and often produced pagerlessity. This expedites the research, review and handling of such 0 documents, saving staff time and other costs. MoDDT looked at every type of sign and learned some were not essential to safe 0 roadways. These are not replaced when they deteriorate. MoDDT took an innovative approach to research the load capacity of concrete box culvert bridges. By proving that soli fill helps distribute the truck traffic weight carried by this type of bridge, were areal be to reduce the number of detailed structural analysis on 0 box culvert bridges. By proving that soli fill helps distribute the truck traffic weight carried by this type of bridge, were areal be to reduce the number of reduced structural analysis on 0 box culvert bridges. By proving that soli fill helps distribute the truck traffic weight carried by culverts statewide. The effort earned an ASHTO Swe			
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/Efficiency Total M	IoDOT Savings Total Customer Savings	Total Additional Funds Total Lives Saved Cost-Benefit Details 2007 MoDOT Savings 2008 MoDOT Savings	2012 Lives Saved 2013 Lives Saved 2013 Lives Saved 2013 Lives Saved 2014 Lives Saved 2009 Lives Saved 2013 Lives Saved 2014 Lives Saved 2013 Lives Saved 2013 Lives Saved 2013 Lives Saved 2013 Lives Saved 2014 Lives Saved 2013 L
	1,500,000,000 \$	 MoDOT saved millions by replacing standard highway practices with practical design concepts. Building without frills allows us to address more customer needs than - \$ - 0 previously possible. By reexamining everything we do, MoDOT achieved substantial savings through the sale of obsolete facilities and equipment and a significant workforce reduction (1,200 	3,000 \$ 250,000,000 \$ 300,000 \$ 200,000
Bolder Five-Year Direction \$	993,000,000 \$	 - \$ - 0 highway system. 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 	\$ 88,000,000 \$ 130,000,000 \$ 168,000,000 \$ 121,000,000 \$ 121,000,000 \$ 121,000,000 \$ 121,000,000 \$ 121,000,000 0
ng Passing Opportunities with Shared 4- ign \$	330,463,000 \$ 332,601,46	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	\$ 97,840,000 \$ 100,800,000 \$ 27,716,789 \$ 27
		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	
ith Recycled Materials \$	296,107,738 \$	- \$ - 0 savings are ongoing. \$ 13,185,015 \$ 20,457, In the early 2000s, Missouri's legislators authorized MoDOT to use a design-build	,106 \$ 20,108,998 \$ 26,841,925 \$ 34,217,790 \$ 30,950,893 \$ 30,420,529 \$ 32,177,625 \$ 24,497,430 \$ 21,534,141 \$ 21,959,346 \$ 19,756,940.00
		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 ten Design-Build Projects that were completed 60 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.	
	274,951,000 \$	- \$ - Concentrating on project goals, innovation, schedule and budget, construction is - \$ - 0 completed more efficiently, with less impact on travelers. 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	\$ 144,000,000 \$ 59,000,000 \$ 59,000,000 \$ 5,900,000 \$ 6,900,000 \$ 6,900,000 \$
ng Reviews Enhance Value \$	250,704,543 \$	- \$ - 0 project practicality and the bottom line. \$ 54,893,700 \$ 13,310, MoDOT installed 5,917 lane 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),600 \$ 29,911,000 \$ 87,075,700 \$ 7,292,300 \$ 15,544,327 \$ 8,750,950 \$ 10,271,339 \$ 1,003,148 \$ 12,819,000.00
Slim Shoulders Where None Existed \$	243,270,000 \$ 292,123,74	742 - 27 and reduces the cost to obtain sufficient right-of-way. 742 - 27 and reduces the cost to obtain sufficient right-of-way. 742 - The Missouri Department of Corrections partners with MoDOT to allow 452 0 offenders to perform labor-intensive work. This allows MoDOT to focus its resources	\$ 18,232,000 \$ 24,698,000 \$ 44,838,000 \$ 40,492,000 \$ 40,492,000 \$ 23,426,000.00 \$ 40,492,000 \$ 23,426,000.00 \$ 5 48,045,822 \$ 58,908,277 \$ 65,173,970.00 \$ 5 48,045,822 \$ 58,908,277 \$ 65,173,970.00 \$ 5 48,045,822 \$ 58,908,277 \$ 65,173,970.00 \$ 5 48,045,822 \$ 58,908,277 \$ 65,173,970.00 \$ 5 48,045,822 \$ 58,908,277 \$ 65,173,970.00 \$ 5 48,045,822 \$ 58,908,277 \$ 65,173,970.00 \$ 5 48,045,822 \$ 58,908,277 \$ 65,173,970.00 \$ 5 48,045,822 \$ 58,908,277 \$ 65,173,970.00 \$ 5 48,045,822 \$ 58,908,277 \$ 65,173,970.00 \$ 5 5 48,045,822 \$ 58,908,277 \$ 65,173,970.00 \$ 5 48,045,822 \$ 58,908,277 \$ 65,173,970.00 \$ 5 48,045,822 \$ 58,908,277 \$ 65,173,970.00 \$ 5 48,045,822 \$ 58,908,277 \$ 65,173,970.00 \$ 5 48,045,822 \$ 58,908,277 \$ 65,173,970.00 \$ 5 40,492,000 \$ 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
Work Crews \$	237,085,324 \$	 on more skilled tasks. Due to several new policies and safety concerns, this program is growing more and more challenging but Maintenance Division is currently seeking - \$ - 0 resolutions to these challenges. \$ 18,455,197 \$ 18,455, 	,197 \$ 18,455,197 \$ 18,455,197 \$ 20,647,893
		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-	
Crossing Conversion to J-Turn \$	121,800,000 \$ 245,373,19	Springfield, Mo., is the site of the first-in-the-nation diverging-diamond interchange. Initial estimates for traditional interchange improvements at Interstate 44 and Mo. 13 were estimated at \$10 million with up to 2 years to complete. Changing the design to a DDI reduced project costs to \$3.2 million and it was built in 6 months.	\$ 21,000,000 \$ 21,000,000 \$ 21,000,000 \$ 21,000,000 \$ 21,045,971 \$ 27,218,964 \$ 32,791,957 \$ 32,
First Diverging Diamond Interchange \$	121,800,000 \$	 This innovative and cost-effective interchange design handles high traffic volumes so efficiently that 24 now exist in Missouri. Nearly all other states have followed suit, \$ - 0 with at least one DDI of their own. Because we found that stripes on low-volume highways show less wear than those on major roads, we chose to extend the duration of the minor route restriping	\$ 6,800,000 \$ 10,000,000 \$ 5,000,000 \$ 20,000,000 \$ 5,000,000 \$ 5,000,000 \$ 10,000,000.00
ng Pavement Striping Strategies \$ e Finance \$	100,814,400 \$ 68,117,658 \$	 schedule. As a result, we sold 30 percent of our specialized striping equipment and reassigned employees to other needed work. This approach maintains traveler safety \$ - 0 and meets customer expectations. MODOT refinanced and paid off some bond debt years early, allowing millions to be 	\$ 14,400,000 \$ 14,400
		Since October 2003, the alternate bidding process in MO has resulted in the average number of bidders per project rising to 5.5. The three-year average asphalt price/ton for alternate paving projects is 5.1% below that for non-alternate projects, and the three-year average concrete price/CY for alternate paving projects is 8.6 percent below that for non-alternate projects. Overall, it shows a decrease in asphalt prices on	
Pavements \$	44,701,609 \$ 27,818,096 \$	- \$ - 0 alternate bid projects. \$ 11,686,707 \$ 8,743, - \$ 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-	,025 \$ 9,641,999 \$ 3,757,065 \$ 1,483,585 \$ 1,602,455 \$ 1,019,152 \$ 1,393,595 \$ 958,072 \$ 1,464,671.57 .208 \$ 5,375,669 \$ 2,053,722 \$ 217,461 \$ 1,744,615 \$ 1,125,344 \$ 707,478 \$ 4,260,385 \$ 803,022 \$ 798,626 \$ 1,653,155.95
		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	
ng Roadside Assets to Truck Parking \$	22,525,244 \$,826 \$ 478,682 \$ 882,698 \$ 1,758,066 \$ 2,195,750 \$ 2,734,438 \$ 2,667,102 \$ 2,869,110 \$ 2,869,110 \$ 2,869,110 \$
on a Strong Base - Intelligent tion \$	21,179,100 \$	 - \$ - 0 saves considerable time and labor costs for contractors. Bidders sometimes propose an alternative technical concept when presented with a MoDOT-supplied base design configuration, project scope, design criteria or 	\$ 4,878.000 \$ 15,301,100.00
		ATCs provide flexibility to the bidders in order to enhance innovation and achieve efficiency. ATCs have been used on multiple projects since 2007, including the Stan Musial	
nce of Alternate Technical Concepts \$	15,250,000 \$	- \$ - 0 \$229 million dollar project. \$ 4,000,000 \$ 3,750, - \$ - By merging multiple software contracts into one and scrutinizing every aspect of traffic signal design and operation, we found efficiencies and now transfer more than - \$ - - \$ - - 3,750,	,000 \$ 7,500,000 \$ - \$ -
t Traffic Signal Design \$	15,225,000 \$	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,	\$ 1,500,000 \$ 1,500,000 \$ 1,500,000 \$ 1,500,000 \$ 1,500,000 \$ 1,575,000 \$ 1,575,000 \$ 1,575,000 \$ 1,575,000 \$
Smart \$	12,000,000 \$	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	\$ 1,500,000 \$ 1,50
ing Signals to LED Lighting \$	11,828,785 \$	 - \$ - 0 emulated by other states. 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. 	,634 \$ 902,640 \$ 881,901 \$ 981,618 \$ 974,630 \$ 1,011,117 \$ 1,104,294 \$ 1,118,435 \$ 1,167,551 \$ 1,171,279 \$ 1,144,896.00
Snow with Beet Juice and Salt Brine \$	9,181,620 \$,925 \$ 497,310 \$ 493,200 \$ 314,415 \$ 858,990 \$ 1,791,960 \$ 1,485,765 \$ 690,480 \$ 1,040,000 \$ 1,393,000.00
		As MoDOT reduced the number of maintenance buildings, we reevaluated the quantity of signs and posts kept in inventory. Materials are drawn from supplies on hand until we reach the new, lower reorder point. Sign and post inventories have leveled off by 2018. Obsolete and old/out of date signs that would not have been used were purged from inventories and districts were	
Post Inventory Reduction \$	9,003,162 \$ 7,374,300 \$	 - \$ - 0 seeking out available posts from each other's inventories. When bridge supports are in good shape, MoDOT redecks older bridges rather than replacing the entire structure. MoDOT uses a standard template for the design of bridge redecking projects to save design time and costs. Travelers enjoy the - \$ - 0 design time savings and Missourians benefit from cost savings. 	3.00 \$ 2,115,00 \$ 466,50 \$ 465,30 \$ 253,80 \$ 514,650 \$ 1,002,40 \$ 298,91 \$ 726,512 \$ 1,304,185 \$ 541,66 \$.
ig Savings Through Research \$		 A construction of a construction of	
γ - Missouri-Made Snow Fighter \$	4,703,832 \$	 out to the side of a snow plow-equipped truck to help clear more lane miles with fewer trucks and operators. MoDOT includes 83 TowPlows in its snow-fighting arsenal. Many other four-season - \$ - 0 states investigated our success and obtained TowPlows for their own fleets. 	1,928 \$ 212,058 \$ 353,430 \$ 436,968 \$ 436,968 \$ 449,820 \$ 481,950 \$ 501,228 \$ 533,358 \$ 533,358 \$ 533,358 \$
ign Modifications \$ hing Survey Costs with Light Detection ging (LiDAR) Technology \$		 - \$ - 0 significant savings. - \$ - 0 Adopting this technology reduced the cost of survey design. 	\$ 500,00 \$<
		The federal standard calls for a single mile marker sign with nine reflective delineators spaced evenly between each sign. MoDOT sought and received permission for the variation. The five signs per mile prove much more durable than the nine reflective delineators. MoDOT recouped the cost of the signs realizing savings in materials and maintenance	
Informative Emergency Reference \$	3,120,000 \$		1,000 \$ 260,000
g Efficiency with Bridge Analysis \$	2,434,987 \$	 New LARSBridge software helps bridge engineers more quickly and accurately conduct structural analysis for the movement of specially-permitted super-heavy truckloads. The quicker response and more accurate restrictions save motor carriers time and money while reducing the need for staff resources and improving bridge preservation - \$ - 0 efforts. 	\$ 194,000 \$ 218,426 \$ 241,620 \$ 298,745 \$ 325,121 \$ 288,540 \$ 301,661 \$ 302,854,00
		MoDOT adopted federal standard spacing for installation of chevron signs in curves, eliminating the need for an engineer's field visit. The change also reduced the need for an average of two signs per curve, a savings of \$720 on each. This savings will essentially end after 2019 when the chevron installations are	
ng Chevron Sign Spacing \$		 - \$ - 0 installation will be limited to isolated locations. Wetland banking allows MoDOT to mitigate for wetland impacts by restoring larger wetland sites that are more ecologically beneficial for the environment. Wetland banking aids in reducing the realty, construction and maintenance burdens 	\$ 467,667 \$ 467,667 \$ 467,667 \$ 467,667.00
y Mitigating Wetland Impacts- MoDOT Mitigation Banks \$ novation to Mitigate Impacts to Stream Mitigation Banks \$		- \$ - 0 imposed by creating wetland mitigation for individual projects. \$ 115,270 \$ 14, - MoDOT replaced several low water crossings with environmentally friendly bridges, earning stream bank mitigation credits to offset impacts to streams elsewhere. MoDOT also uses the Stream Stewardship Trust Fund to mitigate stream impacts to	1,030 \$ 70,186 \$ 63,666 \$ 1,061,730 \$ 137,893 \$ 352,896 \$ 82,485 \$ 86,188 \$ - \$ - \$ -
the Most Cost-Effective Sign Posts \$		 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 - \$ - 0 over-building. When existing bulbs for overhead and task lighting burn out, MoDOT replaces them 	1,494 \$ 235,242 \$ - \$ - \$ 465,811 \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$
ving Lighting \$	607,800 \$	 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 - 0 certification in part because of its use of LED lighting. 	\$ 405,000 \$ 171,000 \$ 31,800.00
		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	
ing Road Sign Needs \$		- \$ - 0 documents, saving staff time and other costs. MoDOT looked at every type of sign and learned some were not essential to safe	\$ 60,00 \$ 60,00 \$ 118,00 \$ 69,00 \$ 84,000,00 \$ 150,000 \$ 150,000 \$ 150,000 \$ 150,000 \$
ng Snow Plow Routes \$	266,000 \$	 - \$ - 0 travelers in the region in less time. MoDOT took an innovative approach to research the load capacity of concrete box 	\$ 38,000 \$ 38,000 \$ 38,000 \$ 38,000 \$ 38,000 \$ 38,000 \$
earch to Challenge Culvert Load Saves Cost and Motorist ence \$	100,000 \$	 culvert bridges. By proving that soil fill helps distribute the truck traffic weight carried by this type of bridge, we are able to reduce the number of detailed structural analysis studies needed and avoided placing unnecessary weight restrictions on 3,150 culverts statewide. The effort earned an AASHTO Sweet Sixteen award and other states are using our research results to fine tune their approach for structural analysis on \$ obs culvert bridges. Missouri's median guard cable is 95.6 percent successful in slowing and guiding 	\$ 33,333 \$ 33,334 \$ - \$ -
Crossover Crashes with Median ble \$		Missouri's median guard cable is 95.6 percent successful in slowing and guiding wayward vehicles from crossing into opposing Interstate 70 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 - 438 fatal.	5 294,106,575 \$ 341,675,918 5 386,008,767 \$ 434,205,847 \$ 398,033,585 \$ 438,697,817 \$ 425,731,93 \$ 401,583,949 \$ 271,214,605 \$ 383,811,686 \$ 317,626,282 \$ 324,217,555.00
ghways Smoother and Safer, Sooner \$	- \$ 1 186 799 20	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 100 customers since 2007.	\$ 23,735,768 \$ 47,471,535 \$ 71,207,303 \$ 94,943,070 \$ 118,678,838 \$ 118,
		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	
c Truck Pre-Screening at Weigh Stations \$	- \$ 216,628,14	140 \$ - 0 of trucks. 140 \$ - 0 of trucks.	\$ 11,438,860 \$ 20,179,151 \$ 20,620,451 \$ 19,030,666 \$ 21,092,860 \$ 19,087,106 \$ 19,087,106 \$ 19,087,106 \$ 19,087,106 \$ 19,087,106 \$ 19,087,106 \$ 19,162,020 \$ 13,132,632.00
		with an agent. Customers transact more than 165,000 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.	
ed Motor Carrier Credentialing \$		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	\$ 4,674,393 \$ 7,735,224 \$ 7,056,524 \$ 7,055,799 \$ 7,603,385 \$ 7,873,342 \$ 8,184,801 \$ 8,556,431 \$ 8,812,245 \$ 8,911,488 \$ 8,354,523 \$ 6,560,248,00 5 1,369,496 \$ 4,360,017 \$ 5,561,230 \$ 3,374,455 \$ 16,660,580 \$ 50,006,127,00
eatment \$ ompetitive Federal TIGER Grants \$	- \$ 81,331,90 - \$	 The federal TIGER Discretionary Grant program supports innovative projects and collaborative approaches to difficult transportation issues nationwide. This program allows Missouri to address transportation system needs using federal \$ 28,903,000 0 funds. 	\$ 1,369,496 \$ 4,360,017 \$ 5,561,230 \$ 3,374,455 \$ 16,660,580 \$ 50,006,127.00 5 8,003,000 5 · \$ 10,000,000 5 · \$ 10,000,000.00
Roads Property Sales Program \$	- \$	 MoDOT sells state-owned property no longer needed for transportation purposes. The proceeds from this program during the past 10 years 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. \$ 39,500,000 	\$ 4,300,000 \$ 4,400,000 \$ 5,600,000 \$ 1,800,000 \$ 1,800,000 \$ 7,500,000 \$ 7,500,000 \$ 5,900,000 \$ 5,900,000 \$
Revenue Through Recycling \$	- \$	 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 \$ 2,432,210 the items are sold with the revenue invested in Missouri's highway system. 	5 927,942 \$ 610,783 \$ 220,136 \$ 187,163 \$ 207,017 \$ 279,168,52
ng Sign Production \$	- \$	 Renegotiating the terms and renewing the contract between MoDOT and the vendor that manages business and tourist directional signs on highway right-of-way guarantees MoDOT an additional \$600,000 in revenue annually. The terms also shifted responsibility for sign production and installation to the vendor, freeing \$ 1,800,000 0 MoDOT employees for other work. Communities contribute to state highway projects to receive needed upgrades faster.	\$ 600,000 \$ 600,000.00
e and Cost Participation Programs \$	- \$		\$ 63,756,000 \$ 212,868,000 \$ 82,679,000 \$ 280,451,000 \$ 75,726,000 \$ 111,931,000 \$ 127,872,000 \$ 56,547,000 \$ 133,254,000 \$ 56,016,000 \$ 73,229,000.00
		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-	
ing Economic Opportunity and ion Using Federal Funds \$	- \$	world experiences through apprenticeships, MoDOT benefits from an expanded pool- \$ 6,298,3920 of competitive vendors and increased numbers of skilled laborers.	\$ 155,000 \$ 689,889 \$ 939,789 \$ 762,912 \$ 407,400 \$ 385,739 \$ 529,445 \$ 964,876 \$ 476,359 \$ 142,020 \$ 324,765.00