



MoDOT's Approach to Program Management

Giving Missourians the Best Value for their transportation investment.

The environment in which the Missouri Department of Transportation operates is not unlike that of other DOTs across the country – stagnant revenues, increasing costs (especially asphalt, concrete and steel), and heightened expectations of its customers who nonetheless are unwilling to invest more in the system they desire.

MoDOT recently completed its long-range planning update – called the “Missouri Advanced Planning” initiative, or “MAP.” It demonstrated that the price tag for Missourians’ expectations of the transportation system totals \$37 billion for the next 20 years

As the chart (bottom right) shows, without bond proceeds, MoDOT’s available revenue is fairly stagnant. The expected available funding for these same 20 years totals \$19 billion.

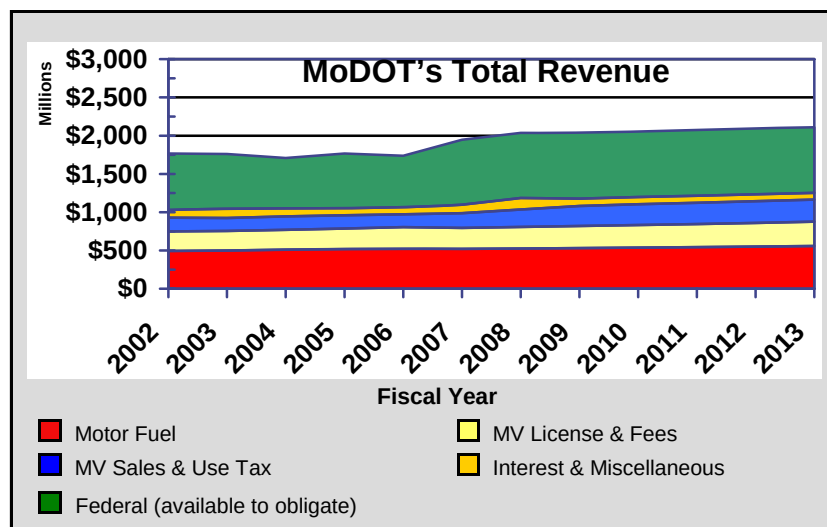
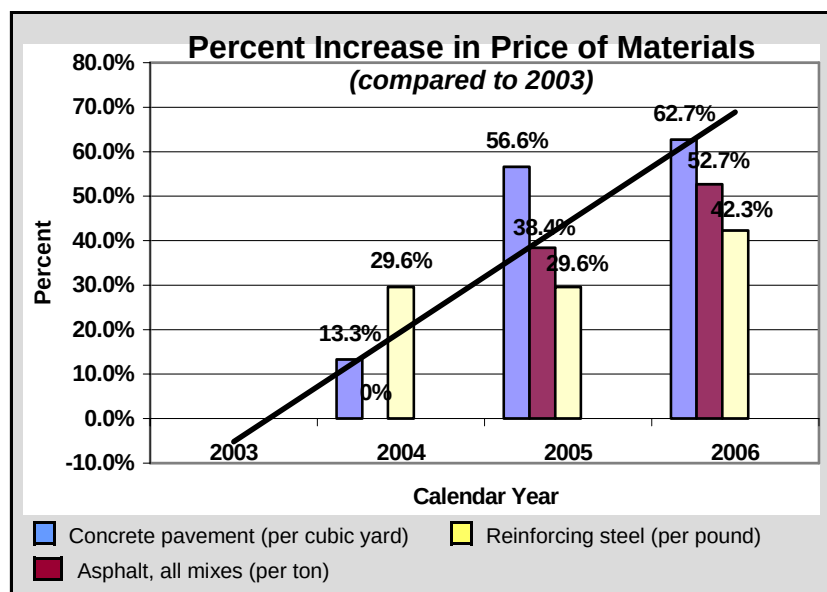
So how does Missouri close the resulting \$18 billion gap that will only continue to grow?

Missourians have said MoDOT must explore new innovative treatments, technologies, strategies and policies to get the most value for each tax dollar invested in Missouri’s transportation system. Even before the MAP process began, MoDOT was implementing new ideas to stretch transportation dollars, helping decrease the gap between Missourians’ expectations

and the existing transportation funds. MoDOT works with transportation partners throughout the state to combine resources and align efforts to achieve the best value for transportation investments.

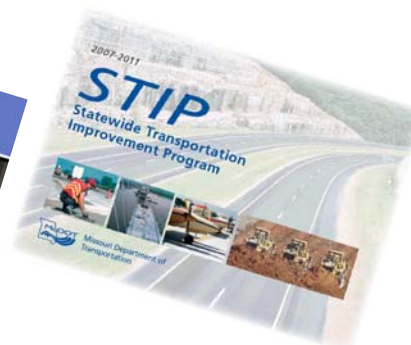
“We can’t control the amount of money we receive; we can only control how we spend what we receive,” says MoDOT Chief Engineer Kevin Keith.

And that has forced MoDOT’s



program delivery team — Design, Bridge, Construction & Materials, Right of Way, Transportation Planning — to focus on changes to the MoDOT culture. The charge is:

- Seek Innovation
- Radically Control Cost, and
- Maximize Competition.



Reaction to the resulting moves was predictable — reluctance, skepticism, fear ... some even called the department “crazy.”

But in less than three years MoDOT significantly improved its ability to stretch its resources, deliver its commitments (STIP), improve the condition of its major roads and improve public perception.

STIP = Commitment

Critical to MoDOT's reputation with its customers, planning partners and elected officials is its

ability to live up to its promises. Once a project is added to the five-year Statewide Transportation Improvement Program (STIP), MoDOT is committed to deliver that project within budget and on schedule.

Because a project's budget is not allowed to grow more than four percent once it is in the STIP, project managers and core teams are charged with due diligence — thorough fact-finding and making the appropriate choices during the scoping process to ensure that there are no surprises once the

project is committed to in the STIP, and ultimately at award.

It all starts with developing a documented purpose and need statement for each project. It could be as simple as reducing accidents, eliminating hydroplaning, replacing a deficient bridge, roadway resurfacing, etc., or as complex as adding capacity to reduce congestion.

During project scoping, the Project Manager and the core team use the purpose and need of the project to develop a scope. In so

MoDOT Value Statements

- MoDOT will support and develop employees because we believe they are the key to our success.
- MoDOT will be flexible because we believe one size does not fit all.
- MoDOT will honor our commitments because we believe in integrity.
- MoDOT will encourage risk and accept failure because we believe in getting better.
- MoDOT will be responsive and courteous because we believe in delighting our customers.
- MoDOT will empower employees because we trust them to make timely and innovative decisions.
- MoDOT will not compromise safety because we believe in the well-being of employees and customers.
- MoDOT will provide the best value for every dollar spent because we're taxpayers too.
- MoDOT will value diversity because we believe in the power of our differences.
- MoDOT will be one team because we all share the same mission.
- MoDOT will use teamwork because it produces the best results.
- MoDOT will foster an enjoyable workplace because we care about each other and our mission.
- MoDOT will be open and honest because we must be trustworthy.
- MoDOT will listen and seek to understand because we value everyone's opinion.
- MoDOT will treat everyone with respect because we value their dignity.
- MoDOT will seek out and welcome any idea that increases our options because we don't have all the answers.
- MoDOT will always strive to do our job better, faster and cheaper because we want to meet more of Missouri's needs.



doing, any items that do not directly support the purpose and need can be re-evaluated, redesigned or eliminated altogether. In other words, the purpose and need is to be revisited often.

A poorly identified scope that is broader than the purpose and need will result in an unnecessarily high project budget and lengthy schedule, while a scope that falls short will yield a project that accomplishes little of significance. The complete project scoping process involves determining the root causes of the need, developing a range of possible solutions to address the need, choosing the best solution, setting the physical limits of the project, accurately estimating the cost of the project and forecasting its delivery schedule.

Early involvement of the public is also critical to the scoping process. Public input helps to determine purpose and need, but it's also important that the public understand the difficult choices that need to be made in determining the solution before a commitment is made in the STIP.

Once a project is adequately scoped, it may — or may not — be committed to in the STIP as tough choices are made regarding available funding, priorities, etc.

A close adherence to good scoping while making project managers and core teams accountable to what has been committed in the STIP has enabled MoDOT to hold the line on “scope creep” and has paid dividends. While stories abound about other DOTs running more than 20 percent over budget and being forced to withdraw projects from their STIPs, MoDOT has lived up to its commitments.

Through the April bid opening (May awards) of Fiscal Year 2007, MoDOT is 6.0 percent (\$66 million) **under** budget.

Over the last five-plus years (FY02-FY07), MoDOT has completed \$5.3 billion worth of projects within 0.3 percent of the program budget (includes right of way, utilities, construction and change orders).

Seeking Innovation

MoDOT has a responsibility to get the most value for each tax dollar invested in Missouri's transportation system and is successfully using a variety of innovations.

In 2003, MoDOT collaborated with representatives from both the asphalt and concrete industries to develop a process of Alternate Bidding to allow contractors

ALTERNATE BID PAVING PROJECTS

Through February 2007

63 projects = \$830 million.

58 full depth – 23 asphalt; 35 concrete.

5 rehabilitation – 1 asphalt; 4 concrete.

Total – 24 asphalt; 39 concrete.

to bid asphalt or concrete on construction projects. Traditionally, MoDOT had specified either asphalt pavement or concrete pavement on construction projects, with no consideration for alternative bids. By allowing bidders to determine which type pavement they could deliver for the best price and still meet the expected performance requirements, MoDOT has seen a 25 percent increase in bidders and cost savings between 9-10 percent. Since late 2003, an estimated savings of over \$17 million has been realized due to alternate bidding of pavements.

That experience has prompted an expansion of the alternate bidding philosophy to drainage structures (pipes/culverts) and bridges.

In 2004, MoDOT made improvements in how projects are engineered and designed by changing from construction specifications that prescribed methods and materials to construction specifications that focus on results and

**Concrete or
Asphalt?
Let the market-
place decide.**



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Spring 2007



define performance. Rather than specify the procedure a contractor must follow, or the materials that must be used in delivering a transportation improvement, MoDOT specifies how the improvement must perform. This performance-based specification system allows contractors to apply innovative techniques to their work, producing quality transportation improvements at a cost-savings to the taxpayers (customers).

MoDOT is also using the innovative concept of design-build project delivery for complex transportation projects in Missouri. MoDOT currently has legal authority to initiate three design-build projects.

Design-build allows for faster project completion and contractor cost-saving innovations throughout the project. Typically, projects are designed by MoDOT or by a consultant, then let for bid by MoDOT and finally constructed by private contractors. In the design-build process, private contractors and designer teams join together to design and build large and complex transportation projects. This partnership yields cost-effective solutions in dramatically less time than traditional construction management strategies.

MoDOT is redefining

the traditional design-build model with two urban projects that feature a set budget that requires the proposing teams to compete on the amount of scope that can be delivered within that budget, and the third that delivers a systemwide structures improvement with finance and maintenance components over many years.

MoDOT's first design-build project is **The New I-64** in St. Louis. This project is the largest single construction project in Missouri's highway history, rebuilding and upgrading all pavements and building 12 new interchanges on 10 miles of I-64 including a high-speed interchange at I-170. This innovative approach has already saved money and time, while also creating a model workforce diversity partnership for the St. Louis region.

In Kansas City, MoDOT is pursuing the department's second design-build project, **kcICON**, to improve the corridor over the Missouri River and replace the existing Paseo Bridge. This project will reduce traffic congestion

and provide greater mobility in the Kansas City area, while reducing construction costs and accelerating project completion in comparison to traditional project delivery methods. In addition, kcICON breaks new ground for community involvement. A 12-member community advisory group has been formed whose members were selected by local officials to provide input and a public perspective regarding the architectural design of the bridge.

MoDOT's third design-build project is the **Safe & Sound** bridge improvement program, providing for the improvement of 802 bridges, statewide, by 2012. This project consists of large-scale system improvements to bridges in each of Missouri's 114 counties. MoDOT is proposing the private sector finance the cost of the project, estimated to be between \$400 million and \$600 million, and that the contractor be responsible for maintaining these bridges for a minimum of an additional 25 years. MoDOT's goal is a financial plan that requires no state payments during the initial five-year construction period,

with equal annual payments spread over the remaining maintenance period. Considering the size and approach to this project, the potential for innovative efficiencies in both price and schedule are unprecedented.



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Radical Cost control

In 2004, the department implemented *Practical Design* – a method that challenges project engineers to use non-traditional project design methods to develop efficient solutions for today's project needs.

Practical Design places a premium on projects that deliver system wide improvements, and is rooted in the principle that building a series of **good**, not **great**, projects will result in a **great system**. It maximizes the value of a project by ensuring that it is the correct solution for its surroundings.

Stated another way, *Practical Design* helps a project achieve its

TECHNICAL DEFINITION

prac•ti•cal de•sign (prāk'tī-kəl dī-zīn') *n.* **1.** A process by which the value of a project is maximized. **2.** Ensuring that a project is the correct solution for its surroundings: **RIGHT SIZING.** **3.** An approach to transportation in which an improvement is considered on the basis of its contribution to the entire system instead of its individual perfection.

LAYMAN'S DEFINITION

"Why drive the Cadillac when the Chevy will get you where you're going?"

purpose and need so that funds are saved instead of being spent on over-designed items. These savings allow other projects that may have remained unfunded to be accomplished and more of the MoDOT system improved.

When first unveiled, some critics said it was just cutting corners, but they couldn't have been more wrong because of *Practical Design's* fundamental ground rules:

- We will not compromise safety, and
- We will collaborate on the solution.

St. Louis County, I-64/I-170 Interchange — Saved \$37M



Currently under construction as part of The New I-64 D-B project in St. Louis. The design team was able to significantly reduce its complexity, reducing the 3-level structure to two levels. Design speeds and shoulder widths were reduced. The interchange was simplified to provide access to local roads without providing direct interstate ramps to each location, resulting in simpler signing, fewer decisions required by motorists inside the interchange, a reduced number of ramps and bridges and a design that is more in line with driver expectancy. As originally conceived, the interchange would have cost \$69 million as opposed to the current estimate of \$32 million.

New Madrid County, Route VV — Saved \$139,000



BEFORE



AFTER

Purpose & Need — Condition 3 Deck
ADT—100 (mostly agricultural), Width—20'
Original scope—Triple 10'x10' box culvert with 200' of roadway ... estimated at \$300,000

Replaced the deck at 24'. Constructed low-height curbs (20") to accommodate farm implements and patched 20' of roadway on each end of bridge. 46% savings over what we would have traditionally built.

DeKalb County, Route N — Saved \$95,000



BEFORE



AFTER

Purpose & Need — Replace a deteriorating bridge on 350 ADT rural route.

Bridge replaced with triple-cell box culvert. Three-span bridge originally considered.

Necessary adjacent roadway rebuilt to match existing template.



Jackson County, The Triangle — Saved \$500,000



Practical design was applied to the pavement on this project in Kansas City, reducing the concrete thickness from 14 to 10 inches. That resulted in a VE proposal from the contractor to cut the base rock thickness from 22 to 18 inches. Excavation was consequently reduced and the total savings on a \$33 million project was \$500,000.

Practical Design savings of \$400 million were made in projects included in the 2005 – 2009 Statewide Transportation Improvement Program. These savings were then invested in additional transportation projects.

Since that time, *Practical Design* has been incorporated into all projects from the conceptual stages and is becoming MoDOT's way of doing business. According to MoDOT's perform-

ance measures documented through a process called *Tracker*, the department realized savings between 30 to 60 percent on specific types of work like minor system bridge replacements and resurfacing work in fiscal year 2006 through the use of *Practical Design* techniques.

As previously discussed, alternate bidding techniques have worked well and saved money as a new innovation. The practical design component of MoDOT's

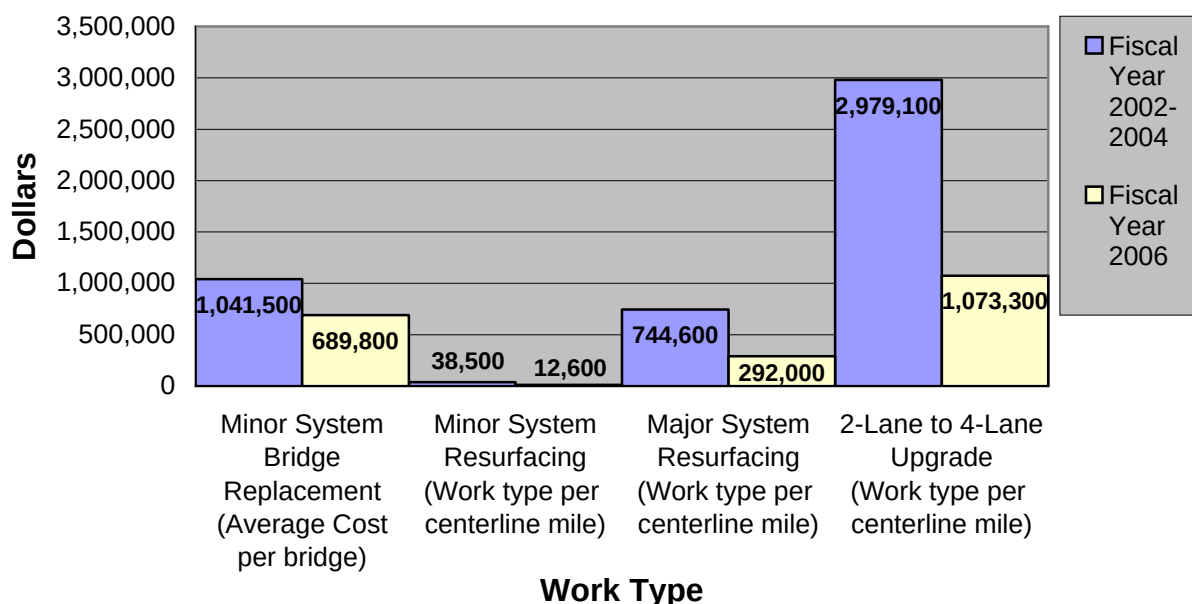
pavement designs is estimated to have saved an additional \$17 million.

In 2007, MoDOT and the American Council of Engineering Companies-Missouri collaborated to sponsor the first annual *Practical Design Awards Competition* for MoDOT's 10 districts and its consultant partners. The 30 submitted projects represented savings of \$381 million, while the eight winners accounted for \$83 million in savings.

Awards were given in the categories of:

- Large Bridge Project
- Small Bridge Project
- Large Rehabilitation Project
- Small Rehabilitation Project
- New Large Construction Project
- New Small Construction Project
- Most Innovative Large Project Most Innovative Small Project.

Dollar Amount Saved by Implementing Practical Design (Practical Design Comparison)



Innovative Major Bridge Projects on the Missouri River



BEFORE



AFTER

Glasgow, MO

BEFORE



AFTER

Miami, MO

MoDOT is embarking on a pair of innovative projects to improve two aging bridges across the Missouri River. Replacing the bridges would have cost more than \$20 million each (not including roadwork to connect to the new structures, right of way, utility relocation, etc.), required environmental clearances, and likely taken years to complete.

Instead, MoDOT has proposed to extend the life of the bridges by another 50 years and increase the roadway width to 26 feet by removing the existing deck and steelwork from the supporting piers, then provide new steel and roadway on top to produce a new driving surface. The cost — \$14-15 million — is not much more than the cost of rehabilitation, is affordable and saves money and effort by reusing existing infrastructure. These improvements could be scheduled within the next three years provided an aggressive, practical and teamwork approach is applied to these improvement plans.

Another tool is Value Engineering during the project design and construction phases. During FY06, it is estimated that MoDOT saved over \$39 million in design-phase value engineering and over \$3 million in the construction phase. In FY07 construction-phase value engineering is expected to result in savings between \$10-\$15 million for contractors and MoDOT alike.

Increasing Competition

MoDOT is also working on narrowing the gap between Missouri's transportation expectations and available transportation funding by structuring contracts and schedules that increase competition among bidders. An analysis of bidding history on MoDOT projects indicates that projects with more competition generally receive lower bids. As a result, MoDOT works to increase competition through a variety of approaches.

In addition to alternate bidding offering innovation with pavement design and costs, it also gives MoDOT advantages in competition in contractor bidding of projects.

Another method MoDOT uses to increase competition among bidders is its detailed bid analysis process. Each month MoDOT requests invitations for bids on transportation construction projects. Interested bidders submit a bid for the work included in the invitation. MoDOT performs a line-item review of each bid received. If, in this review, MoDOT engineers determine the project bids are excessive for the project to be constructed, the bids are rejected.

The project is then analyzed to determine how it could be repackaged to increase more competition among bidders. Sometimes this involves combining two smaller jobs into one. Other times it may mean dividing a large project into two more manageable jobs. Using this approach, MoDOT estimated a savings of \$22 million on 52 projects in FY06 and to date in FY07 has saved \$4.3 million on 13 projects.

Also, MoDOT strategically places projects in the letting schedule to take advantage of contractor's bidding and bonding limitations so that they don't

have to decide on which jobs to bid in any given month. This has been critically important recently because of the similar nature and schedule of a number of projects that were advanced by the passage of Amendment 3 in 2004.

Amendment 3 was a bonding program, approved by Missouri voters, that returned certain highway dollars to MoDOT that previously had been diverted to other state agencies. The proceeds fueled a three-pronged program, that among other things, advanced a number of major corridor projects that had been awaiting funding.

Workforce Incentives

MoDOT launched a program in 2006 called "Performance Plus" that is designed to compensate its employees (up to \$2,000 annually) for going above and beyond the call of duty to increase MoDOT's productivity.

It began with a pilot project to compensate construction project office employees for achieving a final construction cost of one percent above the contract award amount (or less) on pro-



jects in the STIP. The pilot program's success paved the way for Performance Plus to become a permanent program beginning Feb. 1, 2007.

In addition to what is now called the Construction Cost Savings Incentive, a Project Scoping and Estimating Incentive has been added that benefits employees who accurately estimate project costs so that project award amounts are within one percent over or five percent under the STIP construction budget.

Other Strategies

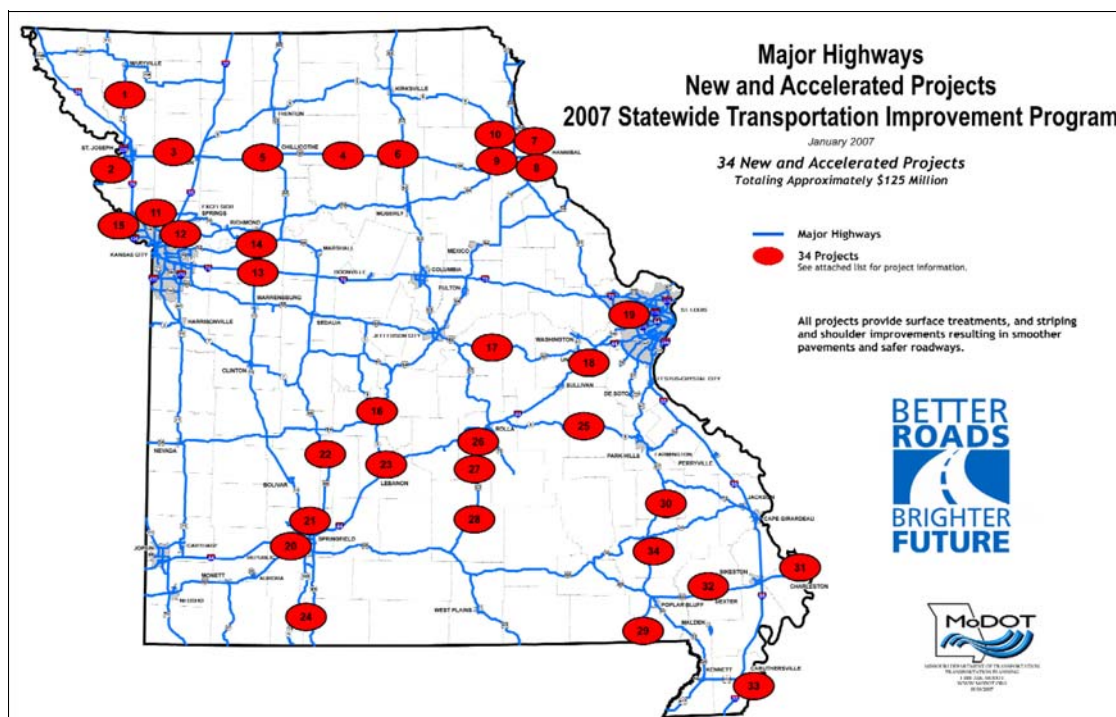
Another approach MoDOT employs to minimize the gap between Missourian's expectations for transportation and the available funds for transportation is effective partnering with other groups. By combining efforts and working toward common goals, MoDOT and other transportation partners can make the best

use of resources to deliver efficient and innovative system improvements.

MoDOT continually involves and solicits input from industry leaders, government officials and interested citizens to improve Missouri's transportation system through meetings called **Partnering for Innovative Efficiencies**. Discussions between MoDOT and these groups attempt to find ways to build transportation projects faster, better and cheaper within our limited resources. To date, MoDOT has involved 132 participants and generated more than 177 concepts, including making better use of technology, examining ways to get projects finished quicker and using innovative methods for project delivery and contracting. Nine teams of partner volunteers have investigated and implemented 22 creative solutions.

MoDOT recognizes the impact the system has on the economic health of the state. In an effort to stretch transportation funding, MoDOT dedicates \$30 million annually for an economic development cost-share program. This program allows cities, counties or private industry to recommend projects to be considered for a 50-50 cost share opportunity. Approved projects generally receive 50 percent of the project costs (but under certain conditions could receive up to 100 percent) from the economic development-cost share program and the partnering entity provides the other 50 percent.

This program accelerates economically beneficial transportation projects and allows MoDOT to partner with other groups to stretch the funds currently available for transportation. From FY 2000 to the present, cost-sharing and other partnering agreements



have generated \$466 million to enable projects that might not have been otherwise possible.

Applying Resources To Priorities

The Missouri constitution says MoDOT is the caretaker of the state's transportation system. With this responsibility, MoDOT must identify and address the most critical transportation needs. MoDOT must use effective planning and decision-making to ensure Missouri's limited transportation dollars are spent in the most responsible way.

MoDOT begins this process by analyzing the system and establishing system condition goals based on public involvement and system use. For example, with the **Better Roads Brighter Future Program**, MoDOT plans to bring 85 percent of Missouri's busiest highways — the major highway system — to good condition by 2011. Improvements to these roads include smooth pavements, improved shoulders, rumble stripes, brighter striping and bigger signing.

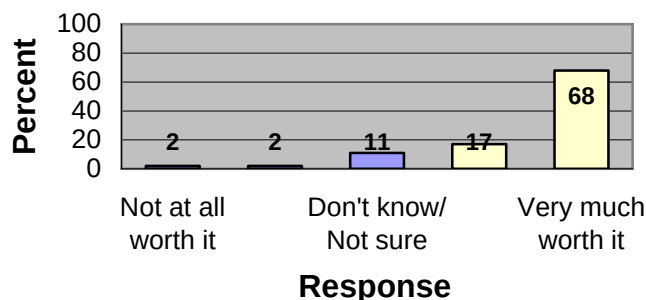
These 5,600 miles of roads carry 80 percent of all traffic

OVERDRIVE®

MOST IMPROVED ROADS—2006

1. I-40, Arkansas
2. I-44, MISSOURI
I-80, Pennsylvania
3. I-70, MISSOURI
4. I-30, Arkansas
5. I-10, Texas

Percent of Customers Who Feel Completed Projects Are The Right Transportation Solutions



on the state highway system and 95 percent of Missourians live within 10 miles of one of these roads. At the same time, MoDOT intends to maintain the 27,000 miles of lesser-traveled roads — the minor highway system — at its current condition of 69 percent good. Focusing transportation resources on routes that serve the most Missourian's translates to highly effective transportation investments.

In addition, MoDOT works year-round with planning partners to identify and prioritize the transportation needs throughout the state. This process, referred to as the **Planning Framework**, outlines involvement of local communities in transportation decision-making by defining the opportunities to influence decisions before they are made. This process helps ensure our limited transportation resources are allocated to the highest priorities of the state.

MoDOT is seeing results

In addition to cost savings realized as a result of MoDOT's approach to managing its sys-

tem, results are being seen with a "system" approach to improving roadway conditions and improving safety.

The percentage of Missouri's major system that is in good condition increased from 47 to 74 percent in 2006 due to the **Smoother Roads Initiative**. SRI was the first phase of Amendment 3 related projects that sought to improve the condition of Missouri's

MoDOT, "has turned over a new leaf, and infrastructure repair work started to flourish over the last year."

— *Roads & Bridges magazine*

MoDOT is the leader in innovation among Midwest states.

— *Midwest Contractor magazine*

MoDOT deserves credit for considering "new approaches to financing infrastructure."

— *Kansas City Star*

MoDOT has gained momentum and that "The best way to restore credibility is with action, not talk, and the department has done precisely that."

— *Jefferson City News Tribune*





2,200 miles of most heavily traveled highways. Envisioned as a three-year program, SRI was actually completed one year early.

Concurrent with the SRI “system” approach, there was a 14 percent (173) decrease in fatalities and 29 percent reduction in run-off-the-road accidents in 2006.

Others are recognizing these improvements, too. Nearly 80 percent of all newspaper editorials that deal with MoDOT have been positive in tone,

and 85 percent of MoDOT's customers believe we are delivering the right transportation solutions.

Where Do We Go From Here?

MoDOT has chosen to focus its efforts on improving and maintaining Missouri's system of Major highways, while holding its own with the condition of the Minor system. A continued focus on building good, not great, projects so that the state's system of highways and bridges gets better

will enable MoDOT to make continued progress with its available resources.

The numbers don't lie ... the department's emphasis on innovations, cost control, competition and the other tactics described in this document demonstrate that the strategy is working.

The journey of the last several years has demonstrated to MoDOT that there is no silver bullet — hard work in many different areas has been required to change the culture- and produce these types of results.

More hard work to stay focused on the task ... to refine MoDOT's policies and practices ... to push the envelope even further ... will be required to avoid slipping into the pitfalls of the past while trying to deal with the market and funding uncertainties of the future.

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PRACTICAL DESIGN MANUAL <http://www.modot.mo.gov/business/PracticalDesign.htm>
 ENGINEERING POLICY GUIDE http://epg.modot.org/index.php?title=Main_Page

