Organizational Results
Fiscal Year 2007
in Review
Introduction

Fiscal year 2007 was another year of significant accomplishments. Organizational Results staff continued to deliver projects that directly impact the performance of MoDOT. Our group of professionals from business and engineering backgrounds has become a vital source for department managers to access the latest information, tools and resources to close performance gaps. Through partnerships with public and private sectors, Organizational Results delivers best practices and innovative solutions designed to deliver a world-class transportation experience.

This year-end review is intended to bring you up to date on OR’s accomplishments for this past fiscal year.

Respectfully submitted,

Mara Campbell
Organizational Results Director
# Table of Contents

Accomplishments Overview ..............................................................3-6
Completed Research Projects ............................................................7-12
Active Contract Research .................................................................13-16
In-House Research .............................................................................17
Pooled Fund & NCHRP .......................................................................17-18
Budget Summary ................................................................................18
Contract Expenditures .......................................................................19-21
Organizational Support

- Completed performance incentive pilot and rolled out statewide implementation
- Launched Solutions at Work, statewide best practices system
- Designed Tool and Equipment Challenge as an off-shoot of the best practice system
- Expanded performance measurement reports to districts and divisions
- Facilitated the annual strategic advance meeting
- Coordinated the Missouri Quality Award application
- Hosted a partnering meeting to speed up final project payments
- Hosted AASHTO’s national quality conference in St. Louis

*Partnering for Innovative Efficiencies Meeting Kickoff*
Research

- Initiated Web-based request for proposal process for contract research
- Hosted the first transportation research forum bringing together research experts from public and private sectors for daylong discussions on a research focus area
- Hosted a formal peer exchange
- Coordinated an internal research prioritization process involving 30 department managers
- Initiated Performance Advisory Teams to expand research input from all areas of the department
Innovative Solutions

- Awarded Local Transportation Assistance Program to the University of Missouri-Rolla
- Improved internal and external OR web sites
- Streamlined new product evaluation process
- Published quarterly Fast Forward newsletters
- Partnered with the Missouri State Library to house the Missouri Transportation Library
- Established a service using a professional document researcher to conduct literature searches and industry summaries for department staff

New Product Online Database
Innovative Solutions (cont’d.)

Published the following Staff Summaries:
  o Public Perception of Wetlands and Their Possible Impact on Property Values
  o Practical Design Case Study
  o Non-Traditional Transportation Funding
  o Metropolitan Mobility and Congestion
  o Highway-Railroad Crossing Safety
  o Median Guard Cable Performance in Relation to Median Slope
  o Pavement Smoothness and Fuel Efficiency
  o Container-on-Barge Feasibility
  o Container-on-Barge Service for Missouri Waterways

MoDOT Test Truck on Rough Pavement
Completed Research Projects

Slope Stabilization Using Recycled Plastic Pins, Phase III
The objective of this project was to produce a user’s guide for field application of recycled plastic pins for slope stabilization projects. The manual has been distributed to the appropriate MoDOT work areas.

Image Analysis of Hardened Concrete
This project was a national pooled fund study in which Missouri was the lead state. The findings indicated an automated process can reliably replace hand counting air-void bubbles in concrete. The report included software development and hardware configurations to implement the automated process. MoDOT has begun to use this process.

Field readings of stabilized slope
Pavement Smoothness and Fuel Efficiency: An Analysis of the Economic Dimensions of the Missouri Smooth Roads Initiative
The objective of this in-house project was to validate previous research on the correlation of pavement smoothness and increased fuel efficiency for Missouri specific conditions. The results showed a 53 percent improvement in road smoothness, as part of the Smooth Roads Initiative, resulted in a 2.46 percent improvement in miles per gallon for large trucks. This information has been shared through department communication with Missouri legislators and the general public.

Assessment of Karst Activity at Construction Sites Using the Electrical Resistivity Method
This project was focused on two specific construction sites in Greene and Jefferson counties in close proximity to active sinkholes. Application of this technology at these sites demonstrated that electrical resistivity profiling could be successfully used to image the subsurface in karst terrain. This tool will be used as similar projects are identified.
Investigation of Cause of Cracked Stringer on the Blanchette Bridge
This investigation sought to find the cause of cracked stringers on the approach spans of the Blanchette Bridge in the St. Louis area. The results of the study indicated the stringer cracking occurred at details that had very high stress concentration factors due to open shim butt joints with fillet welds crossing the joint. Preventive measures have been implemented within the appropriate MoDOT divisions.

Southview Bridge Rehabilitation, Design and Construction
This project was undertaken to evaluate the use of post-tensioned fiber reinforced polymer for bridge-deck construction. The results showed how FRP, in the form of GFRP as passive and CFRP bars as active internal reinforcement, could be a feasible solution replacing the steel reinforcement of concrete slab bridges. Long-term results from this location will determine additional applications.
Assessing MoDOT’s Efforts to Provide the Right Transportation Solution
This project developed and deployed a survey tool to 12,000 Missourians to determine customer perceptions of recently completed transportation projects. Projects were evenly distributed throughout the state and varied in size. The survey provided project specific, regional and statewide results showing most Missourians are satisfied with MoDOT’s efforts in providing the right transportation solution. The survey analysis has been shared with the appropriate MoDOT managers.

Bridge Deck Concrete Sealers
This in-house project analyzed a number of potential bridge deck sealers and the approach used by other states. The results showed linseed oil is still the best overall approach for small cracks on new bridge decks. The study did identify one new product for sealing larger cracks. The results will be incorporated into department specifications.
Post Construction Business Location Analysis, Highway 67 Relocation Project
This project studied business location patterns associated with the construction of a highway relocation project near Poplar Bluff. Five years of business data showed the city’s business district has remained stable and not moved toward the relocated highway interchange. However, a subsequent site visit did show some new business and real estate growth toward the new route. This information has been shared with department transportation planners.

Six-Mile Corridor
Economic Impact Study, I-44 and I-70
Corridor Summaries
MoDOT teamed with the Missouri Department of Economic Development to study the economic impact of the state’s two major interstate systems. The results showed that more than one out of every three people working in Missouri works within three miles of Interstates 70 and 44 and annual commerce for these two roads adds more than $130 billion to Missouri’s gross state product. This information has been shared through department communication with Missouri legislators and the general public.
Customer Satisfaction: Fiscal Year 2007 Survey of Missouri Adults
This project is an annual update of a statewide telephone survey on customer satisfaction. Statistically valid samples of Missouri adults showed a 4 percent increase in overall satisfaction to 79 percent. This information has been shared with all department employees.

Review and Critique of MoDOT’s State Revenue Forecasting Model
The objective of this project was to compare Missouri’s state revenue forecasting model with national best practices. The results provided MoDOT with recommended changes to its current process. These recommendations have been implemented by MoDOT’s resource management staff.

Viability and Durability of Shotcrete for Repairing Bridges
This in-house study evaluated shotcrete for making overhead and vertical repairs on bridge structures. Manual methods with rapid set mortar are effective, but time consuming. Field and laboratory testing showed Shotcrete to be a viable option for these types of bridge repairs if contractors follow specifications and some best practices. This information will be incorporated into MoDOT specifications.
Active Contract Research

Development of Hand-Held Thermographic Inspection Technologies
The goal of this study is to provide state highway agency maintenance and inspection personnel with an effective, nondestructive tool for detecting and monitoring structural concrete deterioration without disrupting traffic flow. A guideline and written practice for utilizing thermal cameras for the inspection and monitoring of concrete structures will allow for the widespread implementation of this new technology to enhance bridge inspection capability and improve maintenance operations. The implementation of this technology will improve the safety of the traveling public by reducing the possibility of the loose concrete falling into traffic lanes, and improve maintenance operations by providing engineers with a tool to better evaluate the boundaries of deteriorated areas on bridge decks. The results will also improve the efficiency of the highway infrastructure by reducing the number of lane closures required to evaluate deteriorating concrete structures.
Contract/Grant Number: TPF-5(152)
Total Dollars: $245,000

Analysis of MoDOT Communication and Outreach Effectiveness
The study will review the efficiency and effectiveness of MoDOT’s communication strategies and procedures as well as provide areas where opportunities to improve exist. The analysis will include an independent assessment of MoDOT’s customer groups (and potential customer groups) and an analysis of MoDOT approaches to servicing each customer group.
Contract/Grant Number: RI07-009
Total Dollars: $43,750
Study of Roadside Vegetation Establishment on Critical Areas
Lack of permanent vegetation along Route 60 in Carter County has left large areas of the right-of-way unprotected from soil erosion. There is erosion occurring on large areas of slopes that range from slight to severe. The sediment from this erosion is leaving deposits in the drainage systems and moving off site to areas that are within the national scenic river watershed of the Current River, which is listed as an outstanding national water resource. MoDOT is studying optimal vegetation and procedures for establishing vegetation on these roadsides where planting has been a challenge.
Contract/Grant Number: RI07-016
Total Dollars: $25,000

Benefit/Cost of MoDOT’s Total Striping and Delineation System
MoDOT has recently completed the Smooth Road Initiative (SRI) to improve delineation on approximately 2,200 miles of roadway, including freeways and major highways. The objectives of the research are to evaluate the safety effectiveness of the improvements (including specific combinations of improvement types), to use the safety evaluation results together with improvement cost data to perform a benefit-cost evaluation, and to assess public perception or satisfaction with the improved delineation.
Contract/Grant Number: RI06-043
Total Dollars: $50,000
Investigating Tractor Trailer-Passenger Vehicle Interactions
With the growing numbers of vehicle miles traveled (VMT) in the commercial trucking industry, there is concern regarding the safety impact of this increase. This issue has raised much debate about how MoDOT regulates large trucks on its roadways. In terms of lane restrictions, states have different ways of handling truck-car interactions on highways. The study should provide MoDOT with sufficient information to either better defend its current policies regarding truck speeds and lane usage or consider modifications to these policies to improve safety and benefit the traveling public. Furthermore, an analysis of crash causation will benefit safety efforts in engineering, enforcement, and education to prevent future severe crashes involving large trucks.
Contract/Grant Number: RI07-006
Total Dollars: $25,000

Comparison of Automated Vehicle Status and Location Systems
The objective of this project is to compare Fleet Point and International's vehicle monitoring systems that use global positioning systems, cell phone service, Internet, and data collection boxes and sensors to report vehicle status and location information.
Contract/Grant Number: RI07-045
Total Dollars: RFP not completed
**Before and After Surveys of 2007 Pick-up Truck Campaign**
To assess the impact of a media campaign and law enforcement effort related to safety in pickup trucks, a pre and post survey will be conducted. The survey questionnaire will assess the knowledge, attitudes, and behavior of Missourians ages 18-34 who have driven a pickup in the 30 days prior to the survey. A phone survey questionnaire will be similar to the one used last year to assess another pickup truck safety campaign for annual comparisons.
Contract/Grant Number: RI07-008
Total Dollars: $35,000

**Arc Spray Galvanic Anode for Bridge Substructures**
This project describes how Aluminum-Zinc-Indium (AL-Zn-In) Arc sprayed anode was applied on three bridge substructures on I-44, St. Louis City & St. Louis County. An Aluminum, Zinc, Indium Arc Sprayed Galvanic Anode (CORRSPAY) cathodic protection system will be applied over concrete repairs to the superstructure and substructure of three bridges. This will be the first use of this technology by MoDOT. This is a preventive maintenance contract, which was to repair the concrete and then seal the areas with epoxy coatings. This product will replace the epoxy coating at some locations to provide a more active way of preventing continued corrosion of the rebar and protect the new concrete patches from coming out. It will be directly compared to the epoxy coating to determine the better repair.
Contract/Grant Number: RI05-044
Total Dollars: $25,000
In-house Research

Active Projects

RI 06-020  Investigation of Failures of Epoxy Polymer Overlays in Missouri
RI 06-021  Evaluation of Soil Nail Launcher Slide Repair, Rte. 24 Monroe County
RI 06-022  Field Evaluation of Concrete Pavements for Aggregate Specifications
RI 07-016  Critical Area Roadside Vegetation Establishment
RI 07-027  Update the Port Study Needs
RI 07-028  Fleet Optimization Study

Pooled Fund Research & NCHRP

SPR-3(017)  Midwest States Pooled Fund Crash Test Program
SPR-3(078)  Wind-induced Vibration in Cable Stay Bridges
TPF-5(021)  North Central Superpave Center
TPF-5(048)  Accelerated Testing Facility
TPF-5(066)  Material and Construction Optimization for Prevention of Premature Pavement Distress in PCCP
TPF-5(124)  Accelerated Performance Testing on the 2006 NCAT Pavement Test Track
TPF-5(092)  Test and Evaluation of Material, Equipment and Methods for Winter Highway Maintenance
TPF-5(111)  Development of Standards for Geotechnical Management Systems
TPF-5(112)  Midwest States Pooled Fund Pavement Preservation Partnership
Budget Summary

<table>
<thead>
<tr>
<th>Budget Amount</th>
<th>Expenditures</th>
<th>Percent Expended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>$625,318</td>
<td>$774,875</td>
</tr>
<tr>
<td>Research</td>
<td>2,211,435</td>
<td>1,735,458</td>
</tr>
<tr>
<td>Development</td>
<td>42,956</td>
<td>6,795</td>
</tr>
<tr>
<td>Technology Transfer</td>
<td>225,000</td>
<td>41,679</td>
</tr>
<tr>
<td>Total</td>
<td>$3,104,709</td>
<td>$2,558,807</td>
</tr>
</tbody>
</table>

During FY 2007, Organizational Results Division realized a 17.6 percent budget surplus. This is an increase of 9.4 percent over FY 2006. Contract time extensions were granted on several projects resulting in lower than expected expenditures in research for the year. Due to staffing decreases, in-house project budgets for development were not fully expended. However, all SPR funding is obligated to existing research contracts and was included in the FY 2008 SPR budget.
## Contract Expenditures for Fiscal Year 2007

<table>
<thead>
<tr>
<th>Project #</th>
<th>Project Title</th>
<th>Contractor</th>
<th>Status</th>
<th>Obligated</th>
<th>Expended</th>
<th>FY08</th>
</tr>
</thead>
<tbody>
<tr>
<td>RI 98-007D</td>
<td>Slope Stabilization Using Recycled Plastic Pins - Phase III</td>
<td>UMC</td>
<td>Complete</td>
<td>$0</td>
<td>$14,009</td>
<td>--</td>
</tr>
<tr>
<td>RI 98-026D</td>
<td>Library Systems Development at the RDT Division of MoDOT</td>
<td>UMC</td>
<td>Active</td>
<td>$60,800</td>
<td>$51,963</td>
<td>$6,786</td>
</tr>
<tr>
<td>RI 02-022</td>
<td>Validation of FRP Composite Technology Through Field Testing</td>
<td>UMR</td>
<td>Active</td>
<td>$150,300</td>
<td>$44,283</td>
<td>$300,676</td>
</tr>
<tr>
<td>RI 02-023</td>
<td>Adaptive Traffic Signal System</td>
<td>UMR</td>
<td>Complete</td>
<td>$8,900</td>
<td>$8,747</td>
<td>--</td>
</tr>
<tr>
<td>RI 03-007</td>
<td>Precast Concrete Panels in New Highway Construction</td>
<td>UMC</td>
<td>Complete</td>
<td>$120,500</td>
<td>$120,502</td>
<td>--</td>
</tr>
<tr>
<td>RI 03-056</td>
<td>Missouri Airport Investment Study</td>
<td>UMR</td>
<td>Complete</td>
<td>$121,500</td>
<td>$44,721</td>
<td>--</td>
</tr>
<tr>
<td>RI 04-002</td>
<td>AASHTO ME Pavement Design Guide Implementation in MO</td>
<td>ARA (ERES)</td>
<td>Active</td>
<td>$123,900</td>
<td>$24,154</td>
<td>$160,100</td>
</tr>
<tr>
<td>RI 05-021</td>
<td>MTI Work Plan &amp; Budget</td>
<td>MTI</td>
<td>Active</td>
<td>$125,000</td>
<td>$148,551</td>
<td>$150,000</td>
</tr>
<tr>
<td>RI 05-023</td>
<td>Analysis of Seismic Instrumentation of Cape Girardeau Bridge</td>
<td>UMR</td>
<td>Complete</td>
<td>$37,600</td>
<td>$37,660</td>
<td>--</td>
</tr>
<tr>
<td>RI 05-036</td>
<td>Structural Assessment of the I-70 Blanchette Bridge</td>
<td>UMR</td>
<td>Complete</td>
<td>$49,200</td>
<td>$47,123</td>
<td>--</td>
</tr>
</tbody>
</table>
### Contract Expenditures for Fiscal Year 2007 (cont'd.)

<table>
<thead>
<tr>
<th>Project #</th>
<th>Project Title</th>
<th>Contractor</th>
<th>Status</th>
<th>Obligated</th>
<th>Expended</th>
<th>FY08</th>
</tr>
</thead>
<tbody>
<tr>
<td>RI 05-048</td>
<td>Using Best Practices to Model Economic and Non-Economic Benefits of Transportation Research in Missouri</td>
<td>UMC/UMR</td>
<td>Active</td>
<td>$0</td>
<td>$21,080</td>
<td>$35,000</td>
</tr>
<tr>
<td>RI 05-053</td>
<td>Passenger Rail and Freight Capacity Analysis</td>
<td>UMC</td>
<td>Complete</td>
<td>$99,200</td>
<td>$109,127</td>
<td>--</td>
</tr>
<tr>
<td>RI 05-054</td>
<td>Public Opinion Survey on Primary Seat Belt &amp; Motorcycle Helmet Law</td>
<td>UMR</td>
<td>Complete</td>
<td>$0</td>
<td>$3,360</td>
<td>--</td>
</tr>
<tr>
<td>RI 05-057</td>
<td>Route Relocations and Bypassed Communities Study of Impact on Economic Development</td>
<td>DED</td>
<td>Complete</td>
<td>$0</td>
<td>$17,000</td>
<td>--</td>
</tr>
<tr>
<td>RI 06-001</td>
<td>Resilient Moduli of Typical MO Soils and Unbound Granular Base Materials</td>
<td>UMR</td>
<td>Active</td>
<td>$94,800</td>
<td>$69,936</td>
<td>$23,406</td>
</tr>
<tr>
<td>RI 06-007</td>
<td>Evaluation of Experimental Traffic Sign / Signal Photo Enforced</td>
<td>UMKC</td>
<td>Active</td>
<td>$20,000</td>
<td>$1,180</td>
<td>$20,000</td>
</tr>
<tr>
<td>RI 06-010B</td>
<td>Engineering for Non-Engineering</td>
<td>UMC</td>
<td>Complete</td>
<td>$0</td>
<td>5,960</td>
<td>--</td>
</tr>
<tr>
<td>RI 06-011B</td>
<td>Assessment of the Dynamic Merge System</td>
<td>UMR/UMC</td>
<td>Complete</td>
<td>$35,000</td>
<td>$34,995</td>
<td>--</td>
</tr>
</tbody>
</table>
## Contract Expenditures for Fiscal Year 2007 (cont’d.)

<table>
<thead>
<tr>
<th>Project #</th>
<th>Project Title</th>
<th>Contractor</th>
<th>Status</th>
<th>Obligated</th>
<th>Expended</th>
<th>FY08</th>
</tr>
</thead>
<tbody>
<tr>
<td>RI 06-017</td>
<td>Determination of Missouri Aggregate Specific Gravities</td>
<td>UMR</td>
<td>Complete</td>
<td>$5,000</td>
<td>$4,943</td>
<td>--</td>
</tr>
<tr>
<td>RI 06-019</td>
<td>Tracker Measures for FY 2007</td>
<td>UMR</td>
<td>Complete</td>
<td>$0</td>
<td>$161,884</td>
<td>--</td>
</tr>
<tr>
<td>RI 06-024</td>
<td>Assessment of MoDOT’s Revenue Forecasting Method</td>
<td>HDR</td>
<td>Complete</td>
<td>$25,000</td>
<td>$68,487</td>
<td>--</td>
</tr>
<tr>
<td>RI 06-025</td>
<td>Right Transportation Solution Survey</td>
<td>UMC</td>
<td>Complete</td>
<td>$0</td>
<td>$45,000</td>
<td>--</td>
</tr>
<tr>
<td>RI 06-026</td>
<td>Evaluation of Flashing Yellow Arrow</td>
<td>UMKC</td>
<td>Active</td>
<td>$0</td>
<td>$7,008</td>
<td>$18,000</td>
</tr>
<tr>
<td>RI 06-042</td>
<td>Economic Impact Analysis of Design-Build vs Design-Bid-Build</td>
<td>REMI</td>
<td>Complete</td>
<td>$0</td>
<td>$66,000</td>
<td>--</td>
</tr>
<tr>
<td>RI 06-045</td>
<td>Best Practices for Bio-Diesel Programs</td>
<td>MRI</td>
<td>Active</td>
<td>$0</td>
<td>$3,644</td>
<td>$40,000</td>
</tr>
<tr>
<td>RI 06-046</td>
<td>2+1 Simulation Project</td>
<td>FHWA</td>
<td>Complete</td>
<td>$0</td>
<td>$40,000</td>
<td>--</td>
</tr>
<tr>
<td>RI 07-005</td>
<td>Amphibian Conservation in Mitigation Wetlands</td>
<td>UMC</td>
<td>Active</td>
<td>$0</td>
<td>$4,939</td>
<td>$22,250</td>
</tr>
<tr>
<td>RI 07-006</td>
<td>Tractor Trailer Passenger Vehicle Interactions</td>
<td>UMC</td>
<td>Active</td>
<td>$0</td>
<td>$3,096</td>
<td>$15,000</td>
</tr>
<tr>
<td>RI 07-008</td>
<td>Pick-Up Truck Surveys</td>
<td>UMC</td>
<td>Active</td>
<td>$0</td>
<td>$6,948</td>
<td>$28,000</td>
</tr>
<tr>
<td>RI 07-034</td>
<td>Transportation Research Forum</td>
<td>UMR</td>
<td>Complete</td>
<td>$0</td>
<td>$5,530</td>
<td>--</td>
</tr>
</tbody>
</table>