

Research Makes the Difference 2010

State DOTs Achieve More with Less

Innovation through research allows state agencies to efficiently deliver a safe, reliable, and sustainable transportation system while continuously improving facilities and services. The American Association of State Highway and Transportation Officials asked state DOT research directors across the nation to highlight research that is making a difference. These selected projects demonstrate states' commitment to finding smarter solutions across the wide range of DOT responsibilities.

The nation benefits from transportation research funded through...

The State Planning and Research program.

SPR is the nation's cornerstone state research program. SPR provides federal aid funding to the states, allowing each to address its own top concerns and identify solutions at the state level. States also leverage their financial resources through the Transportation Pooled Fund Program to address areas of common concern.

The National Cooperative Highway Research Program.

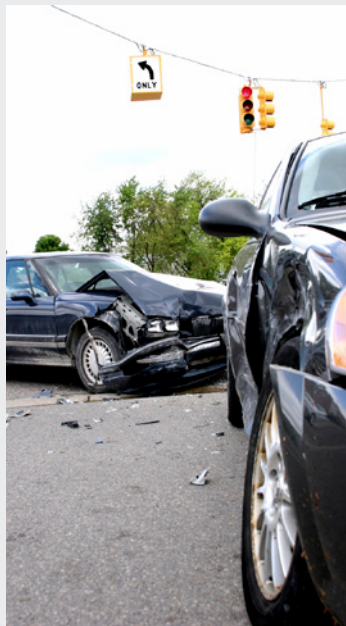
State DOTs continue to voluntarily fund and oversee NCHRP, which pools research dollars to find solutions to transportation challenges identified as critical by the states.

The U.S. Department of Transportation.

Research conducted through the Federal Highway Administration and other U.S. DOT channels allows the government to tackle high-priority needs and share new technologies and practices with the states.

SAFER ROADS AND WORK ZONES

NORTH CAROLINA TACKLES RISKY INTERSECTIONS



Unexpected traffic light changes on high-speed roads can lead to deadly collisions. North Carolina DOT needed a more efficient method to protect motorists from high-speed dilemma zones, where it is unclear to drivers whether to continue or stop when

the light turns yellow. The agency evaluated a cost-effective and easy-to-implement system of vehicle detectors and signal timing software. Tests showed a reduced likelihood of vehicles getting caught by onsetting yellow lights and an overall increase in safety.

This sophisticated system reduces collisions without an increase in the length of the traffic light cycle. The system is cost-effective as well: The annual benefits—factoring in reductions in collisions and user delay—are as high as \$400,000 per intersection.

PENNSYLVANIA'S SMART GUIDE TO BRIDGE REPAIR

With bridges, safety always comes first, and DOTs can deliver on safety when they have effective plans for inspection, rating, and repair. With this in mind, Pennsylvania DOT took a comprehensive approach to handling deterioration of its inventory of nearly 6,000 prestressed concrete bridges: a state-of-the-art review of assessment and repair techniques suitable for damaged prestressed concrete bridge systems. By drawing from international best practices and tailoring them to meet state needs, PennDOT is developing a guide focused on structural and load-bearing repair techniques. Knowing how to identify problems and how to apply the right solutions means better bridges and safer travelers.



“Challenging economic times present a unique opportunity for transportation research. Now is the time for greater efficiencies and smarter solutions.”

Susan Martinovich
Director, Nevada DOT
Incoming AASHTO president

SMARTER PLANNING AND MANAGEMENT



ILLINOIS AUTOMATED WARN-AND-TICKET SYSTEM SLOWS DOWN DRIVERS

Illinois DOT equipped a fleet of vans with automated speed enforcement equipment to change driver behavior in work zones. The dynamic “your speed” display gives motorists a chance to slow down before the system automatically issues a citation. Research shows that the system works. Tested in different traffic configurations in construction zones, the speed enforcement vans reduce traffic speed by as much as 8 mph and cut the number of speeders in half.

The system lets Illinois DOT make a bigger impact with limited resources, since a speed enforcement van can reach many more motorists than a police officer. The vans also bring down the number of speeding tickets, which is a good sign; the measure of safer roads is better driver behavior, not more tickets. Most importantly, the speed photo enforcement system frees up police officers to handle even greater hazards to workers, such as motorists who text or talk on cell phones in construction zones.

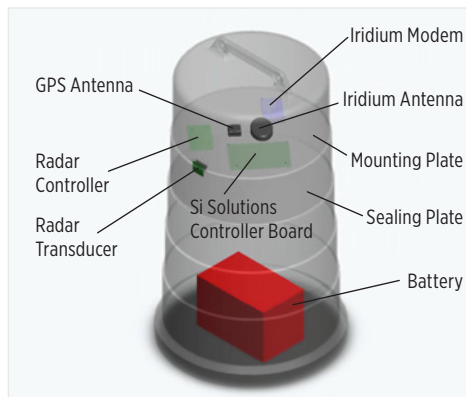


ALABAMA PLANS FOR SURGING FREIGHT VOLUME WITH IMPROVED FORECASTING

Meeting freight demand with properly planned infrastructure is critical for every transportation agency. Given the many economic factors involved and the high costs associated with adding capacity, Alabama DOT needed a better method for forecasting freight demand. Through its research program, the state developed a tool that analyzes population,

employment, payroll, and personal income to project freight traffic generated by retail sales. In a complementary research effort, Alabama also developed a method to determine intercity and interstate through-traffic demands by drawing from federal freight flow data. The end result is improved data for better-informed decisions on infrastructure planning.

FAST, FLEXIBLE DATA COLLECTION FOR ITS IN NEW YORK



Variable message signs and other intelligent transportation systems make work zones safer and improve traffic management. However, the effectiveness of ITS is dependent on real-time data collection, which requires costly installation of hardware systems in the roadway. The costs can often outweigh the benefits.

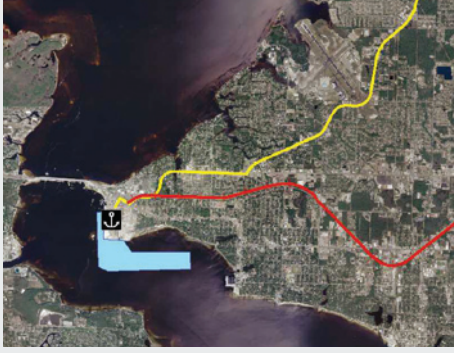
Enter the iCone. New York State DOT partnered with the New York State Energy Research and Development Authority to develop and test this innovative data collection device. The iCone measures traffic data in real time and relays information to highway officials, ITS networks, the Internet, and interactive GPS services.

Equipped with battery-powered traffic sensors, a GPS antenna, and wireless communication hardware, the self-contained traffic cone does away with the cabling, installation costs, and inflexibility associated with traditional ITS data collection systems. Now being tested in seven states across the country, the iCone promises unparalleled cost-effectiveness and versatility in data collection for ITS.

“Like all states, we know what needs doing in our own backyard, and SPR is absolutely critical in providing us with the means and the flexibility to tackle our most pressing concerns.”

John Halikowski
Director, Arizona DOT
Chair, AASHTO Standing Committee on Research

A GREENER TRANSPORTATION SYSTEM



FLORIDA GETS FASTER, BETTER ENVIRONMENTAL IMPACT INFORMATION

Florida DOT has environmental stewardship of the state's intermodal network of transportation facilities, which includes highways, railways, airports, coastal and intercoastal waterways, and a space center. To understand the environmental impacts of new infrastructure and better inform decision making, the agency's research program developed upgrades to its Web-

based application that links and extracts information from hundreds of databases of maps, reports, analytical tools, and related information. The upgraded system integrates and analyzes the environmental impacts of a complex facility (such as a port) while also determining the impacts of its individual components (the port's roads, bridges, and sea berths). The new automated system also provides significant time and cost savings through quicker analysis: Reviews of proposed changes to facilities that previously took planners a week to complete can now be completed in a day.

“NCHRP's environmental research series provides states with quick-turnaround solutions and complements the efforts of AASHTO's Standing Committee on the Environment. Our highways are greener and our communities are more livable as a direct result.”

John Horsley
Executive Director, AASHTO

NCHRP GIVES QUICK ANSWERS TO ENVIRONMENTAL QUESTIONS

State transportation agencies face a wide range of environmental challenges, ranging from climate issues to compliance with EPA regulations to preservation of the natural, cultural, and social environment. As priorities quickly shift on the state and national levels, agencies need answers more rapidly than ever.

Through its Project 25-25 research series, NCHRP addresses states' needs with quick-turnaround research. And by addressing issues of mutual concern among states, NCHRP continues to make efficient use of research dollars. Through more than 70 projects over eight years, this research effort has provided critical tools and support data for decision makers on such topics as air quality, cultural resources, climate change, and environmental processes and performance measures.



KANSAS DEVELOPS SIMPLE, GREEN SOLUTION TO CONTAMINANTS IN RUNOFF



Kansas DOT saw an opportunity to use a green solution to stormwater runoff on the state's highways: vegetated highway embankments that act as natural filters for roadway pollutants such as metals, hydrocarbons, and particulates. The agency's research found that these natural embankments are highly effective at filtering highway runoff, retaining over 70 percent of particles as small as 20 microns in size.

Vegetated embankments proved to be less complicated and more cost-efficient than highly engineered filtration systems designed for the same purpose. The technology turned out to be a good fit for Kansas. The embankments are compatible with the state's roadway design and maintenance requirements, making implementation quick and easy.

BETTER, LONGER-LASTING ROADS AND BRIDGES



STATES SAVE BIG BY RECLAIMING AND REUSING ASPHALT

DOTs can save money and resources by incorporating reclaimed asphalt pavement into new pavements. In partnership with state DOTs, FHWA conducted long-term comparison studies of pavements built with and without RAP. As part of a 20-year research program, FHWA found that pavements with RAP perform as well as those built with only virgin materials across a wide range of climates and traffic conditions.

Even given proof of performance, states faced practical design questions about using RAP. An NCHRP research study provided the seminal guidelines on blending RAP into asphalt mixes. One success story was the Louisiana Department of Transportation and Development, which went from zero asphalt recycling a decade ago to about 200,000 tons per year today, thanks in part to NCHRP's research findings. State DOTs continue to use the NCHRP findings to push the percentage of RAP in mixes even higher.

LONGER-LASTING PAVEMENTS STRETCH STATE BUDGETS

The best way to save on new pavement construction costs is to extend the life of existing infrastructure. In Oklahoma, a national leader in pavement preservation, researchers tested a wide range of preservation techniques and developed an analytical tool that helps maintenance engineers select the right treatment for the right road at the right time and price. Similarly, Indiana developed treatment guidelines for pavement preservation based on maximum benefit and efficiency. Applying these guidelines and looking at added years of pavement life per lane mile, Indiana found that preservation techniques add life at a mere tenth the cost of traditional rehabilitation or reconstruction. The message is applicable not just in Indiana and Oklahoma but nationwide: Find out when preservation will save dollars, and then make it happen.



BUILDING BRIDGES IN WEEKS AND AT HALF THE COST



Building from a pioneering idea from the U.S. Forest Service and Colorado DOT, FHWA developed the Geosynthetic Reinforced Soil Integrated Bridge System, which requires no special equipment, materials, or training to build. Engineers applied a straightforward concept of building bridge abutments and approaches with reinforced soil, resulting in a technique tailored to the construction of simple single-span bridges. It has already delivered real savings in both money and time. Compared with standard bridge construction, local transportation agencies have reduced costs by 25 to 60

percent. Since the technique is compatible with prefabricated bridge elements and doesn't require the installation of deep foundations or cast-in-place concrete, a bridge can be completed in just weeks.

With the assistance of FHWA, agencies in Ohio and New York have already applied this system twenty-seven times. FHWA has also developed design and construction guidelines to make this technology easier to implement for agencies nationwide.

Project links are available in the online version of this document (research.transportation.org):

North Carolina's high-speed intersection signals
Research report

Pennsylvania's repair guide for prestressed girder bridges
Research report

Illinois' speed enforcement vans
Research report

Alabama's freight demand forecasting
Research report

New York's iCone
Web page

Florida's intermodal environmental impacts system
Research report

NCHRP's environmental research series
Research brief

Kansas' vegetated highway embankments
Search the **research reports catalog**

FHWA's reclaimed asphalt pavement research
Web page

NCHRP's reclaimed asphalt pavement research
Research brief

Oklahoma's pavement preservation tool
SPR program guide, page 62

Indiana's guidelines for pavement preservation
Search the **current research database**

FHWA's geosynthetic-reinforced soil abutments
Public Roads article

See research.transportation.org for additional high value research projects.

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