



STATE DOTs

Transportation Innovators

RESEARCH IMPACTS: Better • Safer • Faster • Cheaper

State transportation agencies share a mission to deliver safe, long-lasting highways and bridges, as well as rail, transit, air, and maritime facilities, for passengers and freight customers alike. To accomplish this mission, especially in today's fiscally challenging circumstances, state departments of transportation turn to research for solutions to their toughest problems. The American Association of State Highway and Transportation Officials recently identified six critical areas of national concern—safety, asset preservation, congestion, system operations, freight/economics, and environment—and states are focusing research on these and other vital areas beyond those identified by AASHTO to improve the country's transportation system.

STATE PLANNING AND RESEARCH PROGRAM

For decades, transportation research has been a key component of federal aid funding, with states and the federal government jointly investing in innovation. Each state receives federal aid funding through the State Planning and Research program at a fixed percentage of its core highway program apportionment, and the state matches a portion of that funding. Through SPR funds, fully a quarter of which are dedicated to research, development, and technology transfer, states continue to serve as the laboratories and proving grounds for innovative excellence.

LOCAL AND NATIONAL RESEARCH

DOTs develop local solutions for local problems and also collaborate on projects with other states through the Transportation Pooled Fund program. In addition, states fund and apply the results of the National Cooperative Highway Research Program conducted through the Transportation Research Board of the National Academies. As the examples on the following pages illustrate, the states' diverse research efforts help them deliver a better, safer, faster, and cheaper transportation system.



COSTS AND BENEFITS OF NEW HIGHWAY CAPACITY IN MONTANA

To better understand the impacts of adding capacity to two-lane highways, Montana DOT developed analytical software to evaluate the economic benefits and costs of highway reconfiguration. The resulting Highway Economic Analysis Tool achieved this goal and more, allowing the agency to model the economic impact of highway investments on commerce and industry statewide.

Making smarter decisions

The information generated by this tool is extremely valuable to the state. By quantifying the benefit of transportation as it intersects with the economy (such as mobility of the labor force and transport of goods), Montana DOT can better select and prioritize projects while ensuring that its investments align with agency policy.

“The National Cooperative Highway Research Program sets the standard for collaborative innovation. Year in and year out, each state voluntarily provides the funding support for NCHRP—a testament to the value of the research in meeting state DOTs’ needs.”

**Susan Martinovich, CEO, Nevada DOT
Chair, AASHTO Standing Committee on Research**



ENVIRONMENTAL AND SUSTAINABILITY RESEARCH IN NEW YORK

New York exemplifies environmental leadership at the state level. New York State DOT puts its SPR funding to work in preserving the environment and reducing the negative impacts of the transportation system. For example, by applying its research on managing

pathogens related to animals killed on the road, New York State DOT has solved a major environmental problem and saved millions of dollars in disposal costs. The state has also implemented research on herbicide alternatives for vegetation management and on reducing environmental effects of road salts.

Tackling emissions and energy

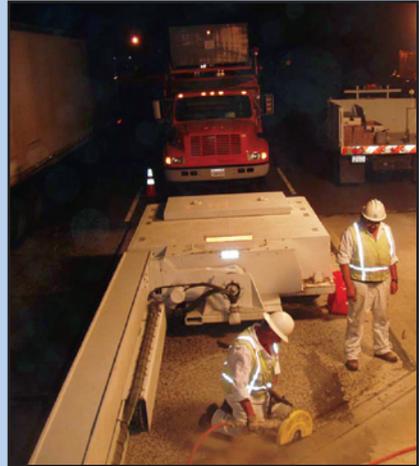
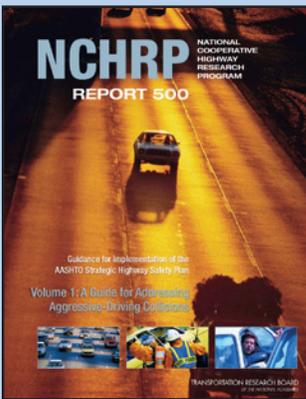
New York State DOT partners with the New York State Energy Research and Development Authority to take on today’s toughest environmental challenges. The two agencies jointly fund research and deployment initiatives to reduce energy consumption and emissions across all modes of transportation in New York, including motor vehicles, transit, high-speed rail, air, maritime, and freight. To address emissions and energy issues, New York State DOT also takes advantage of multistate research efforts, including NCHRP research (for example, Project 25-25 reports on air quality) and pooled fund projects.

NCHRP SAFETY GUIDES

Highway safety is a paramount issue for transportation agencies large and small. Since 2003, NCHRP has worked with hundreds of technical experts to publish a series of 23 guides on a range of safety issues. These guides provide practical counsel to agencies on specific topics, such as strategies to avoid collisions involving alcohol (or involving seniors, or in work zones), enhance emergency service, and encourage seatbelt use.

Shared concern—shared benefit

This national cooperative effort is a prime example of how research can address a common concern and advance the best approaches and solutions developed by practitioners across the nation and around the world. The guides raise the bar for all transportation agencies, helping leaders develop policy, measure performance, implement long-range plans, and most importantly, improve safety.



PORTABLE WORKER PROTECTION IN CALIFORNIA—THE BALS BEAM

A severe work zone accident drove California DOT to invent a new way to safeguard its roadside workers. Caltrans' truck-mounted Balsi Beam provides a new level of worker protection on highway construction and maintenance projects: a double-beam barrier that shields workers on the edge of a live traffic lane. Caltrans developed the first prototype in 2003, and has made several design improvements in the years since.

Innovation at its best

The Balsi Beam represents a significant step forward in roadside protection. Caltrans is continuing to acquire more of these safety devices to protect its highway workers and is taking steps to make the technology available to state and local agencies across the country.

MISSOURI'S STATEWIDE INSTALLATION OF CABLE MEDIAN BARRIERS

Missouri DOT installed some 500 miles of cable median barriers from 2004 to 2006 on the state's busiest highways. The results were remarkable: Crash data from the following year showed a drop in median crossover fatalities from 55 to only two. Research made this safety success story possible.

Beginning with a goal

With a target of eliminating crossover crashes, Missouri DOT investigated a number of possible methods before selecting cable median barriers. Based on additional research and smaller-scale implementation,



the agency developed and deployed a strategy that has made extraordinarily effective use of cable barriers across the state. Highway travel in Missouri, as in many other states that use these devices, is fundamentally safer as a result.

FASTER

Transportation through research



POOLED FUND STUDY: TRANSPORTATION MANAGEMENT CENTERS

Transportation management centers keep the nation's complex transportation networks moving. TMCs collect, analyze, and share system data to coordinate and optimize the interconnected parts of the system: highway agencies, law enforcement, emergency responders, transit systems, and travelers.

Keeping traffic moving

Research that improves TMCs means better mobility and reduced delay. The TMC pooled fund study builds from the collective experience of its members—including some 30 state DOTs—to address such issues as implementation (for example, how best to configure a TMC, or how to optimize staffing) and operations (such as effectively using changeable message signs and managing travel for special events).

Research that improves TMCs means better

“The Transportation Pooled Fund Program is a real strength of SPR. Many of Iowa’s most promising and productive research projects are pooled fund studies that leverage SPR contributions from multiple states as well as national expertise, time, and funds. With a pooled fund study, we not only get a high-quality product, but we get that product at a much lower cost than if we did it alone. A quality product at low cost is a hard-to-beat combination!”

**Nancy Richardson, CEO, Iowa DOT
Chair, NCHRP Project 20-24 Panel**



ACCELERATED BRIDGE CONSTRUCTION

Lost time and productivity for motorists due to construction delays are the rule in highway improvement projects, but DOTs are breaking this rule through the innovative and time-saving practice of prefabricating bridges or bridge components off-site

and then installing the structures in a very short time frame. The economic promise of accelerated bridge construction is tantalizing: A recent [demonstration](#) in Utah saved almost a million dollars in construction costs and over \$3 million in road user costs. However, technical challenges and opportunities for improvement remain.

States investigate and share

A multitude of state research efforts have addressed accelerated bridge construction technical needs. Examples include design, construction, and evaluation of prefabricated bridge components in [Virginia](#) and [Iowa](#), and standards development in [Utah](#). Research collaboration and exchange of experiences with accelerated bridge construction are common among states, as demonstrated by recent workshops hosted by Iowa and Utah DOTs.

NCHRP PROJECTS FOR EXECUTIVES

Over the last two decades, NCHRP has conducted focused research with the needs of transportation agency CEOs and senior managers in mind. The Project 20-24 series of reports has addressed and continues to respond to the evolving challenges facing state DOT decisionmakers.

Answers when they're needed

NCHRP 20-24 reports deliver timely information on topics including asset management, innovative financing and contracting, performance measures, and e-business. They provide the facts that DOTs rely on to make wise financial choices to get the best return on taxpayer dollars.



“Transportation research is about finding better ways to get the job done. Good research is an investment, with a payoff that helps us deliver better systems and services.”

**Pete Rahn, CEO, Missouri DOT
Past President, AASHTO**



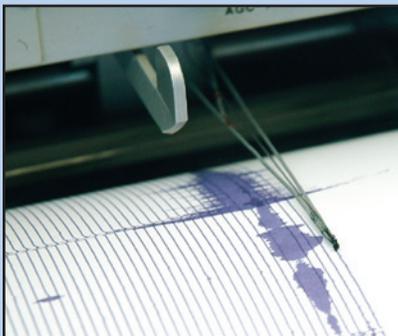
GEOGRAPHICAL INFORMATION SYSTEMS FOR ROCK CUTS IN NEW HAMPSHIRE

To more effectively address possible rock fall hazards, New Hampshire DOT invested in research to develop a geographical information system for cut rock faces along highways throughout the state. Part of this effort included collecting new information with the aid of global positioning system technology. The new system has become a valuable asset management tool, saving the state time (some 2,000 work-hours per year) and money (\$75,000 annually). It allows immediate access to information such as past inspection records and photographs, and saves hours every day during field inspections. Moreover, the system enables engineers to efficiently identify and locate rock cuts that need inspection.

Putting the best tools to work

Transportation research can include the identification and application of existing tools from a wide array of fields. Here, New Hampshire DOT turned to geographical technologies originally developed outside the transportation industry and efficiently put them to use in improving agency practices.

STATE SOLUTIONS TO SEISMIC CHALLENGES



Seismic activity, along with approaches to address it, varies by state. In addition to national efforts, such as the Federal Highway Administration's seismic research program, state agencies undertake targeted research to safely and cost-effectively deal with earthquakes.

Targeting trouble spots in South Carolina

South Carolina DOT needed better information on where to employ special earthquake-resistant structure designs. The agency

conducted customized [seismic mapping research](#) to identify varying hazard levels throughout the state. The results yielded substantial savings by focusing enhanced bridge foundation designs on areas of the state with significant hazard levels.

Asset management on the West Coast

Another facet of seismic research is asset protection. Both [California](#) and [Washington state](#) have long-standing bridge retrofitting programs. Retrofitting can be very cost-efficient, sometimes costing as little as a fifth of the price of reconstruction and yielding six-figure savings on large projects. But policy differs between these states on how and when to retrofit, so customized research on identifying high-risk bridge types and developing new retrofitting methods has provided critical information for both agencies as they continue to retrofit hundreds of bridges.

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