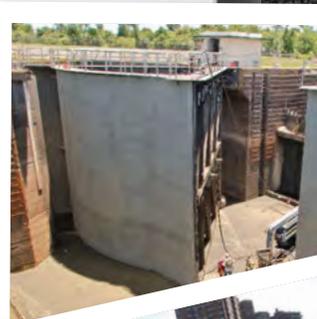


Partners in Performance Management

Findings from the Transportation Research Board's 2013 State Partnership Visits Program

Specialists in the Transportation Research Board's Technical Activities Division identify current issues, collect and generate information on the issues, and disseminate the information throughout the transportation community. The TRB Annual Meeting, TRB-sponsored conferences and workshops, standing committee meetings and communications, publications, and contact with hundreds of organizations and thousands of individuals provide TRB staff with information from the public and private sectors on all modes of transportation.

A major source of this information is the TRB annual state partnership visits program. Transportation professionals on the TRB staff meet on site with representatives of state departments of transportation (DOTs) and with representatives of universities, transit and other transportation agencies, and industry. In addition, TRB staff is involved with planning and delivering conferences, workshops, and meetings. This report summarizes what TRB staff learned from visits and activities during the past year.



Crews repair a bridge deck in West Virginia. Pavement condition and other state DOT initiatives are subject to performance measurements required by MAP-21.



PHOTO: WEST VIRGINIA DOT

According to the December 2013 Fiscal Survey of States, “state budgets are slowly improving, but when ... the impacts of inflation [are factored in], spending and revenue are both still below their prerecession peaks.”¹ The report forecasts that growth in state revenues and spending in 2014 will continue below historical averages.

In recent years, with limited resources, many state departments of transportation (DOTs) have relied increasingly on performance management and measurement to guide and manage programs. Moving Ahead for Progress in the 21st Century (MAP-21), the federal surface transportation legislation passed in 2012, establishes a performance- and outcome-based approach for states to measure performance in the context of collective progress toward national goals.

MAP-21 requires state transportation agencies to measure and gauge performance from the condition of roadway pavement to improvements in safety. Although experiences and approaches vary among states and agencies, performance management—and the underlying data programs required—is defining transportation institutions in the 21st century.

State DOTs and other transportation organizations are working to ensure a high return on investment from limited resources by adopting performance management techniques and by implementing innovative solutions.

Institutional Issues

Policy, Management, and Leadership

With performance-based management a key tenet, U.S. DOT is promulgating performance requirements through a series of nine rulemakings scheduled in several phases.

¹ <http://www.governing.com/topics/finance/State-Budgets-Improving-But-Growth-Still-Below-Historic-Rates.html>.

Washington State DOT initiated an agencywide performance reporting process in 2001. A quarterly report, the *Gray Notebook*, provides system performance and project delivery updates on six policy goals: preservation, safety, mobility, environment, stewardship, and economic vitality.² With more than a decade of experience in measuring and managing performance, Washington State DOT is well positioned to meet the forthcoming MAP-21 requirements.

In Tennessee, state DOT employees rely on the *Performance Measurement Reference Guide*, which defines what the agency is measuring, how the results are collected and calculated, and why it matters.³

² www.wsdot.wa.gov/accountability/graynotebook.pdf.

³ www.tdot.state.tn.us/osp/pdfs/TDOTReferenceGuideDefinitions.pdf.



PHOTO: WASHINGTON STATE DOT

The *Gray Notebook*, Washington State DOT’s quarterly performance report, judges such performance measures as the safety of rest areas, including the new electric vehicle charging station at the Gee Creek rest area on I-5 near Vancouver, Washington.



A plan for a new passenger train station in downtown Raleigh, North Carolina, has received funding from the TIGER grant program.

The Transportation Investment Generating Economic Recovery (TIGER) discretionary federal grant program allocated a fifth round of funding in 2013, providing more than \$123 million dollars for infrastructure projects in 37 states. TIGER grants have totaled more than \$3.6 billion dollars and have funded 270 projects in all 50 states, the District of Columbia, and Puerto Rico. U.S. DOT has received more than 5,200 applications for TIGER grants, requesting more than \$114.2 billion for transportation projects.

Planning

Planners across the country have focused on the rule-making for MAP-21, which aims to transform the transportation planning and programming processes into performance-based systems. Staff from state DOTs, metropolitan planning organizations, local transportation agencies, and transit agencies have been providing information for developing the rules, as well as detailed comments on the proposed rules. Performance goals identified in the legislation include the preservation and improvement of highways, the improvement of safety, and support for economic growth.

Many planners and programmers have not waited for federal rules to implement performance-oriented policies and practices. For example, Ohio DOT staff has explored the use of new data, such as cell phone trace data, for planning and performance monitoring.

In North Carolina, the state legislature adopted the Strategic Mobility Formula, which changes the way of selecting and funding transportation projects. The goal is to fund more transportation projects, boost the economy, and maximize the benefits of transportation spending. North Carolina DOT staff is working out the details of applying condition data, plan forecasts, and local input to prioritize projects.

These and other initiatives across the country will help transportation agencies implement the final MAP-21 rules.

Legal Issues

Risk management practices are a major legal concern in transportation agency operations, including enterprise risk management programs to identify issues in day-to-day operations and to develop cost-effective solutions. Commercial insurance products offer an economic risk management tool, particularly for so-called megaprojects and for long-term public-private partnership concessions.

States have increasingly sought legal assistance in monitoring and managing operations and in initiating related training and research projects. The effects of the *Manual on Uniform Traffic Control Devices: 2009 Edition* on state traffic and highway operations remain a concern.

New developments have emerged in the quest for more efficient environmental reviews of transportation projects. Reduced review times and simplified processes are performance goals inherent in recent actions by President Barack Obama, the Federal

In June 2013, North Carolina Governor Pat McCrory signed into law the Strategic Mobility Formula, a new way of funding infrastructure investments.



Transit Administration, and the Federal Highway Administration.

On May 17, 2013, a presidential memorandum, “Modernizing Federal Infrastructure Review and Permitting Regulations, Policies, and Procedures,” directed federal agencies to work together to reduce the time to complete project environmental reviews. The memorandum increases the potential for categorically excluded projects that require little evaluation or documentation; this should speed the environmental review process.

As state DOTs increase involvement in data retention and management and prepare for the advent of automated vehicles and highways, questions arise in the following areas:

- ◆ The conceptualization of “control” in the context of automated vehicles;
- ◆ Ownership of the data required or generated by automated systems;
- ◆ The potential liability of the parties involved in the manufacture and development of automated vehicles; and
- ◆ The control of the liability exposure of the driver, the owner, and the manufacturer through private or contractual means.

Environment, Energy, and Climate Change

The lingering recovery efforts from the so-called superstorms—which include hurricanes, tornadoes, and other extreme weather events—have many states reevaluating priorities for long-term transportation

In October 2012, Superstorm Sandy washed out parts of NC-12 in Pea Island Wildlife Refuge in North Carolina. Many states are incorporating the potential effects of intense storms into their long-term infrastructure plans.



PHOTO: NORTH CAROLINA DEPARTMENT OF TRANSPORTATION PHOTOGRAMMETRY UNIT



PHOTO: PAT GAINES, FLICKR

State DOTs are developing plans for repairing infrastructure assets damaged by extreme weather events.

infrastructure. Climate change adaptation plans adopted by states are playing an important role in decisions about long-term investments. State budgets are not increasing, and the repair or rebuilding of storm-ravaged roads and the benefits of new technologies must be analyzed.

State legislation is influencing transportation research in California, particularly the Global Warming Solution Act of 2006, which requires state agencies to identify strategies for reducing greenhouse gas (GHG) emissions. Another bill, SB 391, requires the California Statewide Transportation Plan for 2015 to include strategies for reducing GHG emissions to 1990 levels by 2020 and to 80 percent below the 1990 levels by 2050.

Accordingly, the California Air Resources Board, California DOT, and the California Energy Commission are meeting quarterly in a unique partnership to share research proposals, projects, and other initiatives to reach the state’s Climate Change and Sustainability targets. Researchers at the University of California, Berkeley, are developing a state “mitigation roadmap” for sustainable transportation, based on a comprehensive assessment of strategies for reducing GHG emissions.

Other high-visibility issues include reducing the air quality impacts of freight transportation; effects of noise on the increasing number and type of properties designated as historic; lessons from the development and deployment of environmental management systems; and innovative methods of facilitating wildlife crossings and preserving critical habitats. State DOTs are also continuing to adapt to increasingly strict regulations for stormwater management, which can affect construction costs and timelines.



A downed power line in Prattsville, New York, after Hurricane Irene in 2011. States are studying the connection between transportation infrastructure and other networks, such as the power grid.

Critical Infrastructure Protection and Security

In the aftermath of Superstorm Sandy and other extreme weather events, states have increased focus on system resilience and on understanding the interrelationships between transportation infrastructure and other major lifeline systems, such as the power grid, fuel supply chains, and water systems. The cascading failures of these systems during Superstorm Sandy affected the region’s ability to recover within a reasonable time. In New York and New Jersey, filling stations faced two major problems: inadequate fuel, because of limited prepositioned supplies, and power outages.

In collaboration with the Regional Resiliency Assessment Program of the U.S. Department of Homeland Security (DHS), New Jersey is examining the interdependencies in the state’s petroleum distribution system, applying the lessons learned from Superstorm Sandy. The state has instituted the Retail Fuel Station Energy Resiliency Program, which

includes grants to help retail fuel stations along key routes purchase generators and “quick connects” to power the pumps.

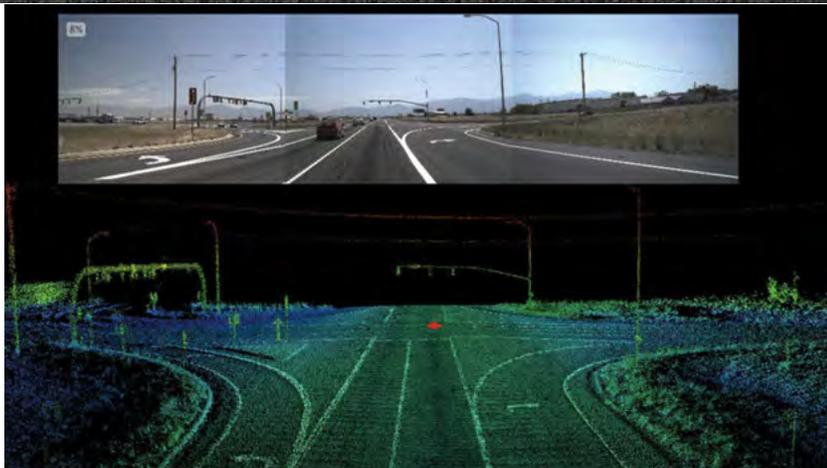
In May 2013, DHS issued an update to the National Response Framework that “mandates the development of a series of policy and planning documents to explain and guide the nation’s collective approach to ensuring and enhancing national preparedness.” Working with the American Association of State Highway and Transportation Officials (AASHTO), states are prioritizing support for the implementation of the National Response Framework, the National Incident Management System, and the National Infrastructure Protection Plan.

Data and Information Technologies

States are developing data approaches to support enterprise management initiatives, such as performance management and asset management. Constrained resources, however, have focused data efforts



Residents of Queens, New York, stand in line for gas. New York and New Jersey experienced fuel shortages and fuel station power outages after Superstorm Sandy.



A Utah DOT project uses mobile lidar to map the state's roadway assets.

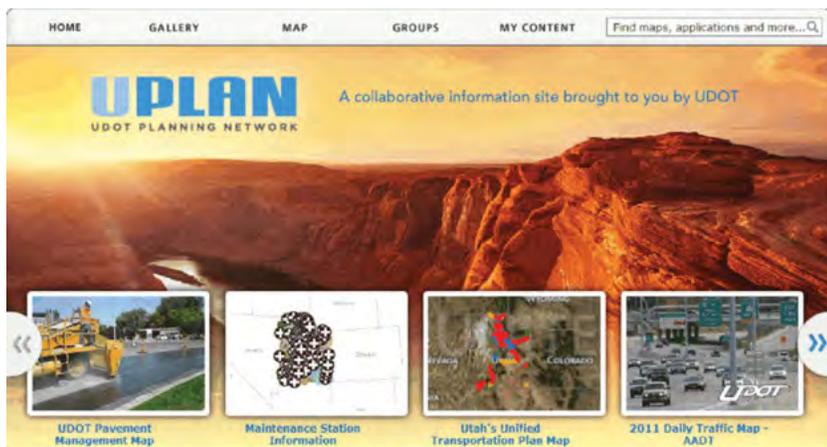
on providing information for decision making, often to explore the trade-offs between maintenance and capital expenditures, among links, and between modes. The Maryland State Highway Administration uses improvement to the entire transportation system as a criterion. TRB's National Cooperative Highway Research Program (NCHRP) is developing tools to improve the use of data for investment decisions, both for intermodal trade-offs and for identifying and prioritizing areas for improvement.⁴

Spatial location has proved to be a valuable tool for interrelating information from different sources. Utah DOT's UPlan is a spatial framework that can array data from different programs and from other agencies in the state. An AASHTO Technology Implementation Group is helping other states pursue this model. Iowa DOT has made spatial location a facet of all information sources.

Working under funding constraints for data programs, states are using technology and partnerships to improve the quality and availability of information. Wyoming DOT has implemented a cooperative program with the National Park Service for traffic counts in and around Yellowstone National Park.

⁴ <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2725>; <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3399>.

Utah DOT's mapping and planning tool UPlan allows data sharing among units and assembles and disseminates roadway information in a user-friendly environment (<http://uplan.maps.arcgis.com>).



Improved understanding and communication of the transportation system's role in supporting the state economy and businesses is gaining importance as officials make the case for the needed investments. For businesses, understanding freight flows and supply chains is key; the U.S. DOT Freight Analysis Framework, which uses data from the Commodity Flow Survey of the Bureau of Transportation Statistics, provides a foundation for business freight planning.

Aviation

Government funding issues continue to affect the national aviation system. Budget cuts resulting from the sequestration temporarily forced the closure of more than 100 air traffic control towers at smaller airports; the staff limitations and the reduced staff hours for air traffic controllers caused major delays at larger airports and throughout the aviation system. Although the restrictions were temporarily over-



Photo: The Columbus Dispatch

Federal budget cuts in 2013 forced the closures of air traffic control towers at smaller airports, such as Don Scott Field at Ohio State University in Columbus.

turned, the ongoing uncertainty about the budget makes the system susceptible to costly failures and delays and slows the implementation of much-needed system improvements through the NextGen program.

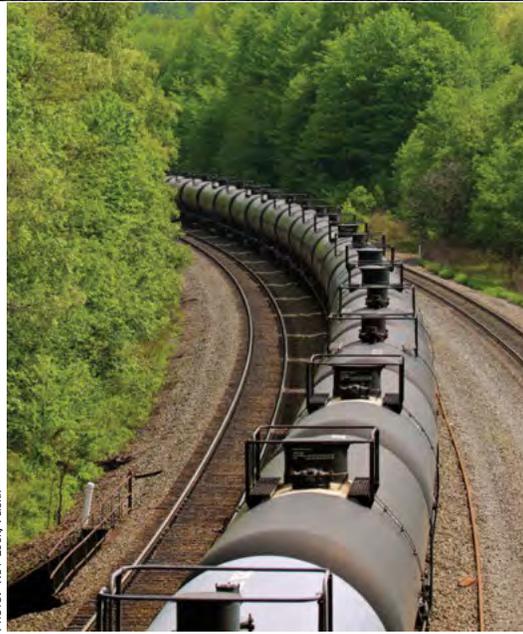
The airline consolidation trend proceeded with the merger of American Airlines with U.S. Airways. Objections raised by the U.S. Department of Justice only delayed what many considered inevitable; nevertheless, some concerns continue about the impacts on consumers from ticket prices and in the availability of flights to and from less-served airports.

Other issues at the forefront include the incorporation of unmanned aircraft into U.S. civilian airspace; new safety-related rules changing the flight-hour requirements for pilots to fly commercially and the effects this may have on the availability of qualified pilots; new technologies that enable more extensive use of alternative fuels in commercial aircraft; and how the collection and analysis of big data—large and complex data sets—may change aviation.

PHOTO: KELLY MARTIN, FLICKR



PHOTO: ROY LUCK, FLICKR



(Far left:) The U.S. DOT's initial Primary Freight Network includes I-70—which runs from Maryland to Utah—and other major Interstates.

(Left:) Empty oil tanks travel from East Coast refineries to North Dakota, which has seen a large increase in oil- and gas-related freight transportation.

Freight Systems

In implementing the freight provisions of MAP-21 for the rulemaking due this year, U.S. DOT and states are working to define performance measures for freight movement on the Interstate Highway System. U.S. DOT has drafted an initial designation of the Primary Freight Network and has established a National Freight Advisory Committee of public officials, private-sector stakeholders, and academicians, including several TRB leaders. State DOTs are adopting freight plans and establishing advisory committees to be eligible for higher federal funding matches for freight-related highway projects.

Dramatic increases in freight transportation related to oil and gas hydraulic fracturing operations have presented challenges in North Dakota, Texas, New York, West Virginia, Louisiana, and other states. In many cases, oversize trucks carrying heavy equipment, as well as the inputs and outputs from the operations, are causing problems for road maintenance and safety on two-lane, low-volume roads not engineered for heavy truck traffic.

The domestic energy boom also affects freight rail, particularly with increases in mile-long unit trains carrying the fracturing sand and petroleum. In rural areas, a passing wall of tanker cars along an at-grade rail crossing effectively can cut a small town in half and can create issues for emergency management and residents' mobility.

Highway Design

To improve highway performance, designs are applying pavement and bridge management data, information from bridge monitoring systems, and procedural innovations. Florida DOT, for example, is examining management system data to determine if

infrastructure performance is consistent, predictable, and repeatable. When a performance rating is lower than expected, the agency uses the data to improve the designs.

Connecticut DOT is incorporating creative, research-based solutions into designs. To extend bridge performance, the agency is implementing damping systems to reduce fatigue damage. Nationwide, similar efforts are under way to improve the design of accelerated bridge construction projects, including seismic connections—such as sacrificial structural fuses—to mitigate damage.

Minnesota DOT has heavily instrumented the I-35 West–St. Anthony Falls Bridge to monitor time-dependent behavior, such as shrinkage and creep. Although the posttensioned, precast concrete box-girder bridge is only five years old, the department has collected a significant amount of data on concrete behavior, enabling better prediction of long-term per-

States use data from bridge monitoring systems for performance management of repairs and construction.

PHOTO: WIKIMEDIA COMMONS





The new I-35 West–St. Anthony Falls Bridge in Minnesota has more than 300 sensors that monitor bridge conditions.

formance. The agency’s bridge designers are applying the information to improve concrete bridge plans.

Many state DOTs are cooperating in pooled-fund studies of design-related performance, to spur innovation and address uncertainties. Through statistical and probabilistic analyses, several studies are developing more accurate design methodologies to improve performance and maximize return on investment.

Highway Construction and Materials

State transportation agencies are working to deliver high-quality highway infrastructure projects faster and at less cost. Many are completing larger projects under any one of a variety of alternative project delivery systems. Construction manager-at-risk is a newcomer to the toolbox; an NCHRP project has

prepared a guidebook.⁵ States recognize the need for alternative quality management systems for these project delivery approaches. Another NCHRP project is identifying the systems and developing guidelines.⁶

State agencies have been emphasizing sustainability and recycling. Many are open to using recycled waste materials or by-products in highway construction, as long as the materials are evaluated in the same way as virgin or traditional construction materials, for structural integrity, cost, and environmental implications. Reclaimed asphalt pavement (RAP) is now common in most states, and the use of reclaimed asphalt shingles (RAS) is on the rise. Some states have applied asphalt mixtures with up to 35 percent RAP; others allow RAP–RAS mixtures.

Cold-recycling technology is gaining attention. An NCHRP project is exploring cold in-place recycling and full-depth replacement.⁷ Virginia and Maryland have used slag cement as a sustainable material, and others have indicated interest. Two-lift concrete paving construction promotes recycling but limits the higher-quality materials to the upper lift. The Illinois State Toll Highway Authority has used the technique on an Interstate 90 project.

⁵ <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2963>.

⁶ <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2714>.

⁷ <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2530>.



PHOTO BY BRIAN K. DIERENBERGER, VIRGINIA CENTER FOR TRANSPORTATION INNOVATION AND RESEARCH

Material is stabilized with lime kiln dust in an in-place recycling project on I-81 in Virginia. Many states have adopted the use of reclaimed asphalt in construction projects.

Geotechnical Engineering

Emerging issues and concerns of geotechnical engineering practitioners in the public and private sectors include the following:

- ◆ Critical projects are requiring large amounts of geotechnical and construction data, raising concerns about how to collect, compile, process, and interpret these data efficiently.

- ◆ The use of geotechnical engineering instrumentation before and during construction has helped verify design criteria and soil and rock properties. This approach has reduced costs and risk; disseminating information about the new techniques is important.

- ◆ Soil and aggregate are compacted to increase the density of embankments and pavements and improve performance. To measure density, most states use the nuclear density gauge (NDG), which has high operating costs and raises safety concerns—the device contains radioactive material. States therefore are exploring nonradioactive devices as an alternative to NDG. An NCHRP Synthesis project is expected to provide useful information on nonnuclear devices for practitioners and researchers.⁸

- ◆ States are considering the reuse of foundations in bridge rehabilitation to reduce project costs, construction delays, environmental impacts, and traffic congestion. States are developing guidelines and methodologies for the approach.

⁸ <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3362>.



PHOTO: MINNESOTA DOT

In Kansas, the Mission Gateway Project, a design-build megaproject, is riddled with old underground limestone mines. Kansas DOT's geotechnical engineering unit prepared a three-dimensional digital model for contractors interested in submitting bids—a first for a U.S. design-build project.

Geotechnical engineering instrumentation can help lower costs and risks associated with construction projects.

Highway Operations

Agencies are exploring a range of newer intersection and interchange configurations that have improved traffic operations and reduced crashes. These include diverging diamond interchanges, continuous-flow intersections, superstreets, Michigan lefts, and J-turns.



PHOTO: MISSOURI DOT

A school bus enters a J-turn on US-65, south of Buffalo, Missouri. New configurations can lead to safer intersections and better traffic flow.



Many commercial vehicle-to-infrastructure technologies already are on the market, including the Drivewyze system that provides weigh-station bypasses for truck drivers.

Proactively managing and operating the roadway cross section is becoming commonplace in many states. Agencies are attempting to optimize use of the entire roadway to improve the performance of specific lanes or of the entire freeway or highway. Under the active traffic management approach, the operating agency proactively manages demand and available capacity on a facility by applying operational countermeasures or modifying strategies.

Active traffic management strategies include dynamic speed limits, restricted lanes allowing only high-occupancy vehicles or trucks, access controls such as express or reversible lanes, motorist information such as electronic dynamic message signs and lane control signs, peak-hour shoulder use, ramp metering, and priced and managed lanes. These solutions have proved cost-effective in reducing delay and improving travel-time reliability.

Vehicle-to-vehicle and vehicle-to-roadway technologies, along with road vehicle automation, are anticipated to be the next major breakthroughs in operations and safety. Federal and state agencies, the automobile industry, and other private-sector partners have been researching the effectiveness and feasibility of advanced vehicle technology. Deployment could fundamentally change the way people drive, advance real-time operations, and prevent crashes.

Many industry and academic experts predict limited automated driving as early as 2015, with fully automated vehicles by 2020. To prepare the way, a few states have enacted legislation allowing the operation of automated vehicles on their roadways, and other states are contemplating similar legislation.

Infrastructure Preservation

In preparation for the maintenance-related performance measures for pavement and bridge assets under MAP-21, many agencies are updating their maintenance management systems. Some, like Tennessee DOT, are determining which activities are better suited for the agency to handle and which for a contractor. The justification now relies less on agency perceptions and more on data from maintenance management systems.

State DOTs are applying preservation principles in managing infrastructure. States recognize the importance of preserving and maintaining not only their infrastructure but also their equipment fleets, a significant operational expenditure. Savings in the operational costs of fleet equipment can have an impact on an agency's ability to deliver its program. Okla-

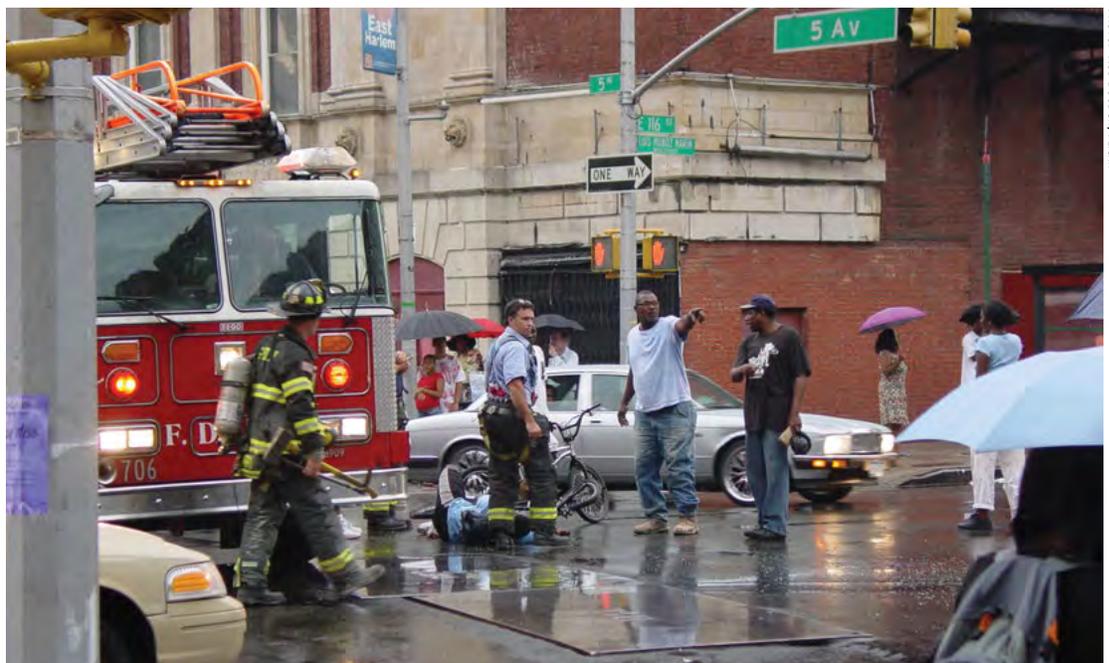
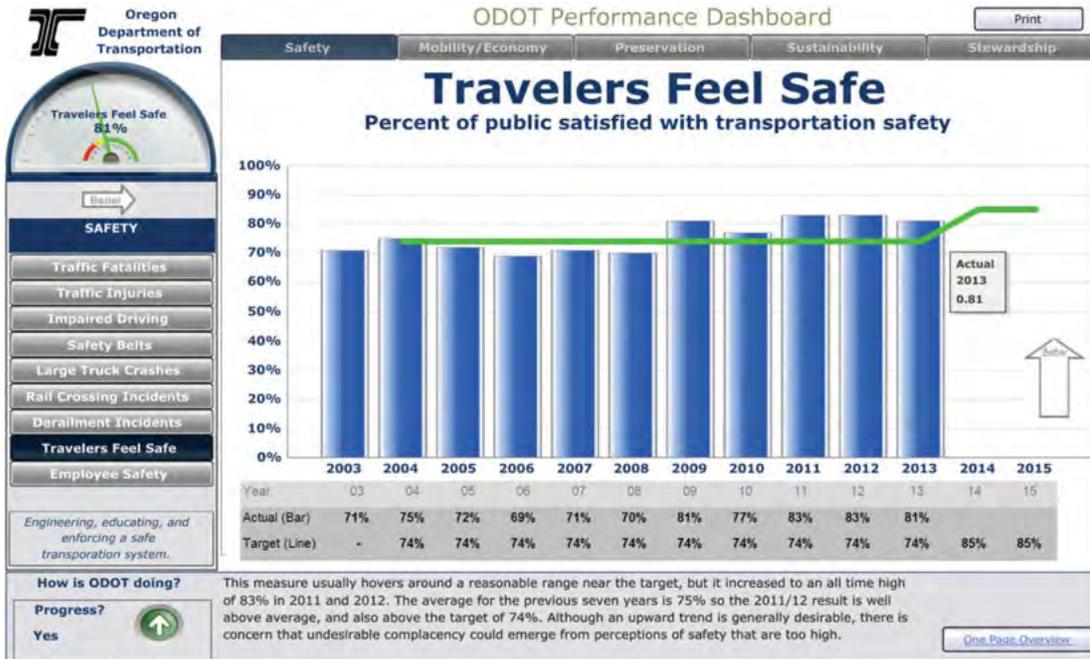


Photo: Ross Bourdon, Flickr

Some states have experienced increases in bicycle- and pedestrian-related crashes.



Oregon DOT's Performance Dashboard website reviews the safety of its travelers, roads, rail systems, and employees.

homa DOT, for example, is converting its fleet to compressed natural gas; the estimated annual savings with full implementation will be \$3 million.

Highway Safety

In 2012, 33,561 people lost their lives in motor vehicle crashes in the United States, according to the National Highway Traffic Safety Administration (NHTSA). Although this increase after six years of declining fatalities does not constitute a trend, it demonstrates the complexity of highway safety.

Decision makers are trying to understand how various factors have affected highway fatality trends, to invest limited resources most efficiently in programs with the greatest potential for reducing fatalities and serious injuries. Increased safety belt use, safer vehicles, better roads, increased funding for infrastructure improvements, the economic downturn, changes in teen licensing laws, and enhanced enforcement efforts are among the factors identified as possible contributors to the downward trend in crashes.

The recent increases in fatalities appear to be associated with a variety of crash characteristics. The rise in pedestrian and bicyclist fatalities and injuries has raised concern in several states. Massachusetts now conducts road safety audits after most pedestrian- or bicycle-related fatalities to understand the nature of the crash and to explore the measures necessary to prevent similar crashes.

MAP-21 requires states to focus on safety performance targets, especially involving fatalities and serious injuries. Oregon DOT has developed a

Performance Dashboard Website, which posts gauges, graphs, trend symbols, and text to summarize progress in the state toward various targets, including safety indicators.⁹

Ports and Waterways

After the major system disruptions caused by weather-related events in 2012, including Superstorm Sandy on the East Coast and drought conditions in the Midwest, states and their federal agency partners with stewardship over ports and waterways have been examining the resilience of the marine

⁹ www.oregon.gov/ODOT/CS/PERFORMANCE/docs/2014%20Dashboard.swf.

Workers repair the dewatered Algiers Lock in New Orleans, Louisiana. Locks closed for repairs cause delays for cargo on the network.

PHOTO: U.S. ARMY CORPS OF ENGINEERS



Did You Know?

- ◆ Wyoming has more “blow off the road” crash locations than any other state. Wyoming DOT posts a “No Light Trailer” message on information systems when wind gusts exceed 50 mph under any road conditions. In locations with wind gusts of 65 mph or more and with adequate signage, Wyoming DOT will initiate closure to light, high-profile vehicles. The closure targets vehicles that are prone to being blown over, such as recreational vehicles, moving vans, and lightly loaded commercial vehicles; the restriction also includes smaller vehicles pulling trailers.
- ◆ Wyoming has a population of nearly 600,000 in nearly 100,000 square miles; officials describe their state as “one community with very long streets.”
- ◆ Bicycle traffic is increasing by 4.6 percent per year in Minneapolis, Minnesota, according to a planning model developed in research on the city’s bicycle and pedestrian traffic.
- ◆ In December 2013, Michigan became the fourth state to pass legislation that allows the testing of automated vehicles on public roadways. The law requires a human in the driver’s seat at all times to monitor performance and take control if necessary. Other states that have passed similar laws include Nevada, in 2011, and Florida and California, in 2012.



On days with high winds, Wyoming DOT closes roads to vehicles prone to being blown over.

PHOTO: FRANCES BENJAMIN JOHNSTON COLLECTION, LIBRARY OF CONGRESS



An automobile outside a garage in Greenwich, Connecticut, in 1908. The state had established the nation’s first speed limit only 7 years earlier.

- ◆ The average number of deer–vehicle collisions in Virginia approaches 50,000 a year, the fifth highest in the United States. Virginia DOT spends approximately \$4 million annually to remove animal carcasses from the road for proper disposal in landfills. A recent study by the Virginia Center for Transportation Innovation and Research shows that Virginia DOT could save \$0.5 million by windrow composting the deer carcasses.
- ◆ In 1901, to get speeders under control and make the roadways safer, Connecticut passed the nation’s first speed limit: 12 mph.
- ◆ Road dust is the leading source of particulate matter in Montana. Of the state’s 14 areas designated by the Environmental Protection Agency for nonattainment of air quality standards, 10 were cited for high levels of particulate matter.
- ◆ Belle Fourche, South Dakota, is the site of the geographic center of the 50 United States of America.
- ◆ In 2012, Minnesota DOT’s Library Services provided a return on investment—in time saved in dollars and in actual dollars saved—of \$1.90 for each \$1 the agency spent on library staff and materials.
- ◆ Union Pacific’s rail switch yard in western Nebraska is the largest in the country, according to Nebraska Department of Roads and the University of Nebraska.

PHOTO: WYOMING DOT



PHOTO: SIEMENS

The new Amtrak Cities Sprinter high-speed electric locomotive undergoes tests at the U.S. DOT Transportation Technology Center in Pueblo, Colorado, in 2013.

transportation system. The concern for resiliency extends beyond natural events to the aging and inadequate infrastructure, which continues to cause delays and increase costs across the supply chain—for example, when locks on the inland waterways are taken offline for repairs, or when cargo vessels must light-load because navigation channels are not dredged to their federally authorized dimensions.

These issues have created unprecedented momentum for passage of the Water Resources Development Act, which authorizes the navigation and waterways infrastructure programs under the U.S. Army Corps of Engineers. Bringing waterways infrastructure up to a state of good repair and prioritizing expansion projects in a fiscally constrained environment are priorities for states that rely on seaports and the inland waterways system for economic prosperity and jobs. In August, the Kentucky Transportation Center at the University of Kentucky held a symposium in Louisville to discuss the movement of freight via the nation's inland waterways and connecting rail systems.

With the Panama Canal expansion scheduled for completion in 2015, larger vessels will be able to transit the canal and call on U.S. East and Gulf Coast ports. States continue to invest in their seaports and landside intermodal infrastructure to prepare for these cargo opportunities.

Rail

Passenger Rail

The Passenger Rail Investment and Improvement Act of 2008 requires that states share passenger train operating costs with Amtrak for routes of less than 750 miles; the Northeast Corridor, however, is exempt. The act mandated cost-sharing agreements

between Amtrak and the various states by October 1, 2013, and negotiations between Amtrak and the states were successfully completed without any loss of service. Amtrak continues to cover the costs of its long-distance trains and of trains in the Northeast Corridor.

In other passenger rail developments, planning for the California high-speed rail system continued despite efforts to halt the project because of environmental and fiscal concerns. Amtrak set new ridership records in the past year and began taking delivery of new high-speed electric locomotives for the Northeast Corridor.

Freight Rail

Changes in the energy production industry had a profound effect on freight rail in 2013. Sustained growth in well development increased rail traffic in drilling equipment and fracturing sand, but the most notable trend was the continued growth in the movement of crude oil by rail. A disastrous derailment and



PHOTO: SURETE DU QUEBEC VIA TWITTER

The June 2013 freight train derailment in Lac-Mégantic, Quebec, was one of the deadliest rail accidents in Canadian history.

According to a recent survey by the American Public Transportation Association, the younger generation of travelers is embracing alternatives to automobile travel—and many value mobile phone ownership above car ownership.



PHOTO: PEDESTRIAN AND BICYCLE INFORMATION CENTER

explosion in Canada has raised questions about safety. Repercussions and findings from the investigation of the accident will continue to affect the North American rail freight industry.

Public Transportation

Vehicle miles of travel continue to level off in the United States; automobile ownership is declining, while ridership on all modes of public transportation has grown by 16 percent since 2000. The following trends and advances present opportunities and challenges for the transit industry:

- ◆ **Demographics.** The American Public Transportation Association’s comprehensive survey of “new millennials”—persons born between 1982 and 2003—indicates a shift in attitudes about automobile ownership and willingness to walk, bike, ride

transit, or carpool when the choice is cost-effective and convenient. The survey indicates that this population values mobile phones more than automobiles as a personal possession.

- ◆ **Data and communications technology.** The creation and implementation of the General Transit Feed Specification provide transit customers with web- and smart phone-accessible information about schedules and service navigation. Cities from San Francisco to Denver, New York, and Boston have mobile apps in place to help users navigate multi-modal transit networks.

- ◆ **New services in urbanized areas.** Cities from Toronto, Ontario, to Washington, D.C., are hosting carsharing and bikesharing services, making door-to-door trips more convenient and inviting for transit riders and reducing congestion and the demand for parking in densely developed urban areas.

- ◆ **Policy focus.** Superstorm Sandy, high-profile accidents on commuter and subway trains, and MAP-21 are drawing policy attention to practical issues of safety, resilience, state of good repair, and performance measures for transit.

Chicago, Illinois, opened its first bikeshare station in June 2013.



PHOTO: ROBIN AMER, WBEZ

Enhancing System Performance

TRB salutes the transportation organizations, leaders, and innovators who—as the examples above demonstrate—are working to enhance the performance of transportation systems and services. TRB will continue to provide research and disseminate information on performance management and related areas across its programs and activities. More information on TRB resources in this area—including publications, committees, events, and webinars—is available on the TRB Performance Measurement Information Resource Center at www.TRB.org/ABC30/ABC30.aspx.