

# State DOT Mission Evolution

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This white paper is one of three white papers commissioned for the State DOT CEO Leadership Forum 2013: Leading the 21st Century DOT. These papers synthesize current literature and research and outline the experiences of select states to provide context for launching discussion at the forum.

Each author interviewed CEOs or top staff from five states, which were chosen based on potential for uncovering interesting experiences related to the forum's theme. The papers were divided into three topical areas: the evolving DOT enterprise: today toward tomorrow; technology and business processes that work; and mission evolution, from facility design and construction to mobility-system management.

## **Disclaimer**

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## Executive Summary

This paper highlights the challenges faced by six state departments of transportation (California, Colorado, Florida, Massachusetts, Missouri, Oregon) and the views of their respective chief executive officers within the context of national trends. Each CEO has extensive experience within his department or in a transportation-related segment of the private sector. Collectively they have 126 years of practice in transportation.

The paper explores the remarkable transformation of the modern DOT from its roots as a public works road department to the multimodal engine of today by examining the mission statements of all 50 states and the organizational structure of 30 states. It then looks at specific challenges DOTs face and some changes they are implementing. For example:

- The growing demands to become more intermodal and supportive of economic development—without accompanying resources—is exasperating to the six CEOs, a view shared by many other DOTs.
- The funding gap for surface transportation is large and growing, as deferred maintenance and mounting congestion create an expanding backlog of needed work. Twenty-five states are now publically discussing how to increase funding to transportation, ranging from \$500 million to \$3 billion annually.
- The CEOs all report having to increase their emphasis on operations and maintenance in the absence of resources for construction and reconstruction of their aging networks.
- Over the course of the last two decades, DOTs have greatly expanded their communications efforts to engage the traveling public.
- Nearly all the state DOTs have now implemented traffic management centers to manage their systems more actively.
- Many DOTs are relying more on the private sector for traditional DOT services, and nearly all would like to utilize public-private partnerships to help fund large projects that can no longer be afforded with existing resources.

The CEOs share their views on emerging responsibilities and what a state DOT could look like in its next iteration. All six are concerned about the preparedness of their DOT staff to create a more business-oriented department that can engage the private sector and ensure the taxpayer is getting value. They unanimously stressed a need for succession planning within their organization.

## Origins of the Modern DOT

Most modern departments of transportation can trace their organizational roots to a subunit of an agricultural or public works agency that included roads as a function of a broader mission. One unique beginning is the Nebraska Department of Roads, originally a part of the Nebraska Department of Irrigation. Many early efforts were focused on accommodating the early automobile by providing asphalt and concrete roadways to replace the dirt and Macadam roads of the day. A later direction was to "get the farmers out of the mud" and improve agricultural production.

The earliest state highway department in the United States was established in 1895 in Connecticut. States began widely establishing formal highway departments in the 1900s to the early 1920s, normally funded with particularly small resources. An example is the Iowa State Highway Commission, charged with developing a statewide highway system in 1907 with a biennial budget of \$7,000. The department missions were straightforward: connect state population centers with modern roads. Soon states began collecting a gas tax to pay for highway construction and maintenance. Although by current standards the efforts were quite modest, they represented an alternative to the use of public and private turnpikes as a means of funding roads.

By the 1960s, transportation had grown exponentially in breadth and mode. The automobile easily replaced the passenger train of the 1940s as the dominant means of long-distance travel. Public transit remained primarily a locally funded and operated form of travel. The new interstate highway system was having a dramatic impact on travel and land use. Air travel had also exploded with the rise of modern aircraft and the introduction of the jet passenger airplane.

With each mode operating as essentially a stand-alone system, it became clear that more coordination between the modes was necessary. The concept of the modern department of transportation emerged by the mid-1960s when Washington State became the first state to officially create a Department of Transportation in 1964. The change accelerated after Congress established the U.S. Department of Transportation in 1967.

For many states, the goal had been to create a single point of contact and coordination of all modes. The transition to a department of transportation from disparate agencies is nearing ubiquity for states. The Massachusetts Department of Transportation was the most recent, being formed from five separate modal agencies in 2009.

There are exceptions in name only: The Kentucky Transportation Cabinet and the Vermont Agency of Transportation are fully functional DOTs but have different monikers. Also, the Arkansas State Highway and Transportation Department, which has a name that was more common in the 1970s, fulfills the role of a typical department of transportation, but because the agency was established by name in the state

constitution, it would require a voter-approved constitutional amendment to change its name. The only remaining single-mode agency, the Nebraska Department of Roads, has responsibility only for the state's highways.

Some states have broadened the responsibilities of their transportation agencies by including other functions. For example, the Alaska Department of Transportation and Public Facilities and the Louisiana Department of Transportation and Development have expanded roles beyond transportation modes.

It should be noted that while 49 state DOTs have been charged with responsibility for coordinating all modes of travel, most remain predominantly funded like a traditional highway department, with only limited resources available to non-highway modes. Twenty-three states have a constitutional prohibition against using state fuel taxes on anything other than highways. Eight more states have similar statutory restrictions.

# The Evolving DOT

## Mission Statements

One means of viewing the evolving mission of the modern department of transportation is through published mission statements. The 50 state DOTs and the District of Columbia's missions collected from their respective web sites are listed in Table 1.

The similarities are striking. First a caveat: some DOTs have mission statements that are broad affirmations. Kansas DOT's—"to provide a statewide transportation system to meet the needs of Kansas"—would clearly include components of the following categories; however, if the statement did not specifically contain the following elements, it was not included in the tabulations.

The most common mission element is safety. Thirty-seven DOTs include safety as a part of their mission. Clearly, state DOTs have assumed the mantle of traffic safety leader within their respective state. Next, 27 DOTs refer to either quality of life or environmental responsibility as a part of their mission. By comparing numerous DOT mission statements from a decade ago, two newer areas emerged: economic development or economic opportunity, and mobility/intermodal system responsibilities in some form—each cited 21 times.

The large number of statements that include some form of "supporting the state economy" is a departure from earlier times when economic development issues were routinely deferred to a sister state agency charged with it. It's unclear whether this is simply a recognition of the role of transportation in the overall economy or a smart marketing effort to attract additional resources—or both.

**Table 1: State DOT Mission Statements**

Formed	State	Department	MISSION STATEMENT
unknown	Alabama	DOT	Enriching lives in Alabama through excellence in transportation
unknown	Alaska	DOTPF	“Get Alaska moving through service and infrastructure.”
1974	Arizona	DOT	To provide a safe, efficient, cost-effective transportation system.
1977	Arkansas	SHTD	Its mission is to provide a safe, efficient, aesthetically pleasing and environmentally sound intermodal transportation system for the user.
1967	California	DOT	Caltrans improves mobility across California
1991	Colorado	DOT	To provide the best multi-modal transportation system for Colorado that most effectively moves people, goods, and information
1969	Connecticut	DOT	The mission of the Connecticut Department of Transportation is to provide a safe and efficient intermodal transportation network that improves the quality of life and promotes economic vitality for the State and the region.
1974	Delaware	DOT	Excellence in transportation
2002	Dist. of Col.	DOT	Develop and maintain a cohesive sustainable transportation system that delivers safe, affordable, and convenient ways to move people and goods—while protecting and enhancing the natural, environmental and cultural resources of the District.
1969	Florida	DOT	The department will provide a safe transportation system that ensures the mobility of people and goods, enhances economic prosperity and preserves the quality of our environment and communities.
1972	Georgia	DOT	The Georgia Department of Transportation provides a safe, seamless and sustainable transportation system that supports Georgia’s economy and is sensitive to its citizens and environment.
1959	Hawaii	DOT	To provide a safe, efficient, accessible, and inter-modal transportation system that ensures the mobility of people and goods, and enhances and/or preserves economic prosperity and the quality of life.
1974	Idaho	DOT	Your Safety. Your Mobility. Your Economic Opportunity.
1972	Illinois	DOT	The mission of IDOT is to provide safe, cost-effective transportation for Illinois in ways that enhance quality of life, promote economic prosperity and demonstrate respect for the environment
1989	Indiana	DOT	INDOT will plan, build, maintain and operate a superior transportation system enhancing safety, mobility, and economic growth.
1974	Iowa	DOT	Delivering a modern transportation system that provides pathways for the social and economic vitality of Iowa, increases safety and maximizes customer satisfaction.
1974	Kansas	DOT	To provide a statewide transportation system to meet the needs of Kansas
unknown	Kentucky	TC	To provide a safe, efficient, environmentally sound and fiscally responsible transportation system that delivers economic opportunity and enhances the quality of life in Kentucky.
1977	Louisiana	DOTD	To deliver transportation and public works systems that enhance quality of life and facilitates economic growth and recovery.
1972	Maine	DOT	To responsibly provide our customers the safest and most reliable transportation system possible, given available resources.
1971	Maryland	DOT	The Maryland Department of Transportation’s mission is to enhance the quality of life for Maryland’s citizens by providing a balanced and sustainable multi-modal transportation system for safe, efficient passenger and freight movement.

2009	Massachusetts	DOT	Deliver excellent customer service to people who travel in the Commonwealth, and to provide our nation's safest and most reliable transportation system in a way that strengthens our economy and quality of life.
1978	Michigan	DOT	Providing the highest quality integrated transportation services for economic benefit and improved quality of life.
1976	Minnesota	DOT	Provide the highest quality, dependable multi-modal transportation system through ingenuity, integrity, alliance and accountability.
unknown	Mississippi	DOT	The Mississippi Department of Transportation is responsible for providing a safe intermodal transportation network that is planned, designed, constructed and maintained in an effective, cost efficient, and environmentally sensitive manner
1996	Missouri	DOT	Our mission is to provide a world-class transportation experience that delights our customers and promotes a prosperous Missouri.
1992	Montana	DOT	MDT's mission is to serve the public by providing a transportation system and services that emphasize quality, safety, cost-effectiveness, economic vitality and sensitivity to the environment.
1957	Nebraska	DOR	We provide and maintain, in cooperation with public and private organizations, a safe, efficient, affordable, environmentally compatible and coordinated statewide transportation system for the movement of people and goods.
unknown	Nevada	DOT	Providing a better transportation system for Nevada through our unified and dedicated efforts
1986	New Hampshire	DOT	Transportation excellence enhancing the quality of life in New Hampshire.
1966	New Jersey	DOT	"Improving Lives by Improving Transportation."
2003	New Mexico	DOT	Provide a safe and efficient transportation system for the traveling public, while promoting economic development and preserving the environment of New Mexico.
1967	New York	DOT	It is the mission of the New York State Department of Transportation to ensure our customers - those who live, work and travel in New York State -- have a safe, efficient, balanced and environmentally sound transportation system
1979	North Carolina	DOT	Connecting people and places safely and efficiently, with accountability and environmental sensitivity to enhance the economy, health and well-being of North Carolina.
1990	North Dakota	DOT	Safely move people and goods.
1972	Ohio	DOT	To provide easy movement of people and goods from place to place, we will 1) take care of what we have; 2) make our system work better; 3) improve safety; 4) enhance capacity.
1976	Oklahoma	DOT	The mission of the Oklahoma Department of Transportation is to provide a safe, economical, and effective transportation network for the people, commerce and communities of Oklahoma.
1969	Oregon	DOT	To provide a safe, efficient transportation system that supports economic opportunity and livable communities for Oregonians.
1970	Pennsylvania	DOT	Through the active involvement of customers, employees and partners, PennDOT provides service and a safe, intermodal transportation system that attracts business and residents and stimulates Pennsylvania's economy.

unknown	Rhode Island	DOT	The mission of the Rhode Island Department of Transportation is to maintain and provide a safe, efficient, environmentally, aesthetically and culturally sensitive intermodal transportation network that offers a variety of convenient, cost-effective mobility opportunities for people and the movement of goods supporting economic development and improved quality of life.
1977	South Carolina	DOT	Striving to provide safe, reliable surface transportation systems and infrastructure and effective support for a healthy South Carolina economy through smart stewardship of all available resources.
1973	South Dakota	DOT	To provide a safe, efficient and effective transportation system.
1972	Tennessee	DOT	The mission of the Tennessee Department of Transportation is to plan, implement, maintain and manage an integrated transportation system for the movement of people and products, with emphasis on quality, safety, efficiency and the environment.
1991	Texas	DOT	Work with others to provide safe and reliable transportation solutions for Texas.
unknown	Utah	DOT	Our mission is to Preserve Infrastructure, Optimize Mobility, Improve Safety and Strengthen the Economy.
1979	Vermont	VAT	VTrans' mission is to provide for the safe movement of people and goods in a reliable, cost-effective and environmentally responsible manner.
1986	Virginia	DOT	Our mission is to plan, deliver, operate and maintain a transportation system that is safe, enables easy movement of people and goods, enhances the economy and improves our quality of life.
1964	Washington	DOT	The mission of the Washington State Department of Transportation is to keep people and business moving by operating and improving the state's transportation systems vital to our taxpayers and communities.
unknown	West Virginia	DOT	The West Virginia Department of Transportation's mission is to responsibly provide a safe, efficient and reliable transportation system that supports economic opportunity and quality of life.
1967	Wisconsin	DOT	Provide leadership in the development and operation of a safe and efficient transportation system.
1991	Wyoming	DOT	Provide a safe, high quality, and efficient transportation system.

From further examination of organization mission statements, many DOTs are assuming much greater responsibility for the travelling public's movement, with many going beyond the boundaries of their own system. For example, Caltrans' statement ("improves mobility across California") and Missouri DOT's ("...provide a world-class transportation experience that delights our customers...") are not bounded by their system. Massachusetts DOT Secretary Rich Davey said, "MassDOT considers the entire trip of the customer, not just the portion on our system."

The inclusion of "mobility"—typically defined in transportation parlance as the ease of movement of people and goods from origin to destination—infers a multimodal component. This would also indicate a return to the role envisioned by the original intent of a "department of transportation." In interviews conducted in November and December 2012, CEOs of six state departments of transportation all cited a greater emphasis on multimodal integration over the previous 10 years.

Four of six CEOs cited economic development and creating economic opportunity as priorities in determining project selection.

## **Department Organization**

A second means of viewing the evolving mission of the modern department of transportation is by how DOTs organize themselves. In examining 30 DOT organizational charts available on their websites, the overriding conclusion is that their similarity derives from a structure necessitated by the federal funding that states receive. All had at least a CEO and finance, highway operations, planning, engineering & construction, and intermodal offices.

There was a great deal of variability in what DOTs chose to publish in their organizational chart: a few chose to disclose very few positions; others, such as the Idaho DOT, decided on extensive disclosure. Fortunately, the bulk of DOTs chose to display enough to get a sense of their organizational priorities.

In looking beyond the typical positions required to fulfill federal compliance, the importance of communications is apparent. Of the 24 charts that reflected a communications office (also listed as public or external affairs), 13 of these offices reported directly to the chief executive officer and another 9 were one report away from the CEO. The Minnesota DOT went so far as to have an office of communications and an office of electronic communications.

Other emerging areas were "strategic performance" offices, with seven instances. Similar positions are likely to grow in number as the federal surface transportation authorization—"MAP-21", passed in 2012 by Congress—has mandated certain performance data to be collected and reported. Also, public-private partnership offices were shown six times, and five websites listed freight offices, both recent developments.

During interviews, the CEOs expressed common assessments of the evolving mission of their DOT. All reported their organization becoming more active in multimodal matters. Kevin Keith, director of the Missouri Department of Transportation, said, "MoDOT has become a manager of a transportation system from a builder of highways." All also reported that maintenance and system preservation had taken on a greater emphasis. Don Hunt, director of the Colorado Department of Transportation, said, "The prioritized core functions of CDOT are #1) maintenance, #2) system preservation, #3) system operations, and #4) design and construction."

Four of the six reported a greater emphasis on economic development and creating economic opportunity within their respective state. Ananth Prasad, secretary of the Florida Department of Transportation, said, "While we are still heavily highways, we are very involved in the economic drivers of Florida: ports, airports, and rail."

What emerged from these interviews was a new language coming from DOTs. The concept is that DOTs have a role in facilitating solutions to transportation problems, not

necessarily providing the solution. Oregon's Matt Garrett said, "ODOT sees its core function to be #1 the good stewardship of its existing system, and #2 facilitating the conversation to find transportation solutions." Malcolm Dougherty, director of the California Department of Transportation, said, "Planning, designing, and building projects are not a core function of the department. Caltrans does not exist to deliver projects...it exists to deliver solutions." Rich Davey of MassDOT said the department has moved away from thinking about moving vehicles to moving people.

All talked of having to "assemble funding" in some form for a growing list of projects that are needed but simply exceed their resources. This took the form of seeking public-private partnerships, working with other units of government, borrowing funds, and tolling. Malcolm Dougherty said that in excess of 50% of Caltrans' project delivery budget consists of local funds coming from "self-help counties" that have imposed a local sales tax for transportation. Ananth Prasad reported that every project developer in FDOT has the ability to use tolling as a part of its project finance plan.

## Issues that May Drive Mission Areas to Come

### Technology

Technology will have a greater impact on transportation in the next 50 years than it has in the past 50. Whether it's an advanced infrastructure with connected vehicles, completely automated vehicles, flying cars, automated shuttle buggies for freight, or new fleet fuel types, it's apparent that the department of transportation of the future will have to respond to an ever-changing transportation arena. And, it will have to respond faster. Both Garrett and Davey cited the need to respond to the public's needs faster. Garrett believes the DOT of the future must be less "silo-ed and more vertically integrated." Davey told of how MassDOT had to respond to a Massachusetts' company that is developing a flying car, ala *The Jetsons*.

### Demographics and Public Health

There are also implications of changing demographics in the United States. Will aging baby boomers still want to rely on the automobile? Are "Gen Yers" going to demand a different means of travel? Dougherty is concerned about both and how it will affect current system usage and future design needs, let alone how California will pay for this changing system.

DOTs of the future will have to bring better health considerations into their decisions as they design and operate their systems, according to Garrett. This will include placement of facilities, as well as access to safe transportation options that promote healthier lifestyles.

### Land Use

Nearly all transportation professionals understand there is a "chicken and egg" relationship between transportation and land use. California was an early state in attempting to address this issue. In fact, Malcolm Dougherty listed "promoting proper land use" as one of his department's responsibilities. Caltrans has been a subdivision of the California Business, Transportation and Housing Department, which was intended to expand the coordination of transportation with economic development and land use. (On July 1, 2013, Caltrans will become a standalone transportation agency due to the implementation of Governor Brown's state reorganization plan.) Land use is an issue many states struggle with, and as population grows and available funds remain scarce, it is reasonable to assume an expanding role in land use by DOTs.

### Energy Policy

Matt Garrett also believes there will be a role for DOTs in supporting sound energy policies. "ODOT intends to be 'ground zero' for the future of transportation alternative

energy usage through the placement of alternative energy infrastructure along critical corridors," he said.

## **Tolling**

While it might be difficult today for most DOTs to see tolling becoming an everyday consideration in design and operation of their highway systems, tolling is likely to grow in its use and as a revenue stream to all DOTs. Prasad explained how Florida DOT has "mainstreamed tolling where all internal project developers understand they have a tool available" to fund expansion projects. "Today toll revenues make up 13% of overall revenues to the DOT," he said.

## **System Investment Gap**

It is imperative that the distinction between funding and financing be recognized when discussing the funding gap for surface transportation in the United States. Simply, for the purposes of this paper, funding refers to the resources dedicated to a department of transportation. This would include fuel taxes, registration fees, toll revenues, sales taxes and sundry other mechanisms that produce—typically—dollars.

Again for the purposes of this paper, financing refers to utilizing existing (or at times expected) revenue streams and advancing them to be applied toward an existing need. In essence, these are revenues the agency would receive in the course of its normal operation, but will forgo the future use of them by spending them now.

When one examines the financial health of state DOTs over the past 20 years, the huge increased use of debt financing cannot be ignored. It can be argued that the truly bleak circumstance of transportation funding has been concealed by the issuance of significant amounts of public debt by the states. In fact, according to Federal Highway Administration (FHWA) Highway Statistics reports, the growth in debt carried by state DOTs has ballooned from \$18.6 billion in 1980 to \$154.6 billion in 2010. In all, over 10% of all state transportation expenditures in 2010 went to debt service and interest costs.

This has not occurred by accident. Great emphasis was placed on "innovative financing" in the mid-1990s. This represented a departure from the limited use of debt previously and the prevalent use of pay-as-you-go at the time. In 1996, Congress even created a means by which states could pledge future federal funds toward the repayment of bonds; these were named Grant Anticipation Revenue Vehicles, or GARVEES in honor of Jane Garvey, the deputy FHWA administrator at the time.

The reliance on financing over funding has been a political solution to the public's resistance to raising traditional transportation taxes. The gas tax remains one of the most hated of tax sources, even though it is a relatively efficient tax and arguably one of the closest to a "user fee." It could be said that the use of debt over adjusting the gas tax has conditioned the driving public to expect continuing projects without an accompanying increase in cost.

Only five states (Iowa DOT, Nebraska DOR, South Dakota DOT, Tennessee DOT, and Wyoming DOT) do not report any debt as of 2010. Many states are now facing heavy burdens to fund their existing debt service. Also reported in 2012 FHWA Highway Statistics (SF4-2012), 17 states (Arizona, Florida, Georgia, Kansas, Massachusetts, Michigan, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, South Carolina, Texas, Virginia, and Wisconsin) have debt service costs greater than their annual maintenance expenditures. Ten of these states operate toll roads that typically issue debt to be paid back from toll collections, which could be a factor in this calculation. It is likely that future debt service costs will impact more states' ability to manage their systems. Thirty-two states with outstanding debt do not report any debt reserve or sinking fund at the end of their fiscal year.

The funding gap to maintain and improve highway and transit systems is well documented by numerous organizations. The conclusions of these studies are summarized on the following pages. The origins of the gap can be seen in Tables 2 and 3. The population of the United States increased by over 82 million, or 36%, between 1980 and 2010. Public roads and streets increased by just over 200,000 miles, or 5%, during this period. Yet federal highway expenditures rose less than \$600 million (adjusted for inflation), or 6%, in the 30 intervening years.

**Table 2: Comparison Of Transportation Related Facts—1980 vs. 2010**

	<b>1980</b>	<b>2010</b>	<b>Increase</b>
<b>United States Population</b>	226,545,805***	308,747,508***	36%
<b>Public Roads and Streets (miles)</b>	3,859,837*	4,067,077*	5%
<b>Average Annual Hours Lost in Congestion</b>	16**	38**	138%
<b>Federal Highway Expenditures</b>	\$9,593,000,000*	\$10,176,000,000*#	6%
<b>Total State DOT Indebtedness</b>	\$18,600,000,000*	\$154,600,000,000*	731%

Source: \*FHWA Highway Statistics Report; \*\*Texas Transportation Institute, 2012 Urban Mobility Report; \*\*\*U.S. Census Bureau; #Inflation adjusted to 1980-BLS calculator

**Table 3: Federal and State Expenditures for Capital Outlay—Highways and Public Transit**

	1980	2010	Inflation Adjusted to 1980	Real Growth
<b>Federal Highway</b>	\$9,593,000,000 (41%)	\$26,931,000,000 (29%)	\$10,176,000,000*	6%
<b>Federal Transit</b>	\$2,510,000,000 (81%)	\$9,000,000,000 (44%)	\$6,993,000,000*	179%
<b>State Highway</b>	\$14,013,000,000 (59%)	\$66,483,000,000 (71%)	\$25,122,000,000*	79%
<b>State Transit</b>	\$570,000,000** (19%)	\$11,400,000,000 (56%)	\$4,910,000,000*	761%
<b>Total Highway</b>	\$23,606,000,000 (88%)	\$93,414,000,000 (82%)	\$35,298,000,000*	50%
<b>Total Transit</b>	\$3,080,000,000 (12%)	\$20,400,000,000 (18%)	\$11,903,000,000*	286%
<b>Total</b>	\$26,686,000,000	\$113,814,000,000	\$47,201,000,000*	77%

\*Bureau of Labor Statistics Inflation Calculator

\*\*Estimated

*Source: Highway expenditures from FHWA Highway Statistics Reports 1980 and 2010; Public Transit expenditures for 2010 are from FTA Conditions and Performance Report 2010; 1980 Public Transit expenditures are estimated from APTA: The Optimal Supply and Demand for Urban Transit in the United States HDR/HLB Decision Economics, February 22, 2008.*

The U.S. interstate system that began construction in 1956 and was declared complete in 1984 has, for much of the system, exceeded its design life and needs constant repair and replacement. Population growth and migration to urban areas have consumed much of the excess capacity built into the network. The nation's bridge inventory has significant numbers of structurally deficient or functionally obsolete spans.

Congress has not raised the federal fuel tax since 1993, when it set the current rate of \$.184 per gallon for gasoline and \$.244 for diesel. It should be noted that the 1993 fuel tax increase was to help balance the federal budget and not to fund transportation. The \$.043 increase didn't go into the Highway Trust Fund until 1998 with the passage of TEA-21. The last time Congress raised the fuel tax for transportation was 1987.

According to the FHWA Highway Statistics 2012 report, 25 states had not raised their fuel tax since 1997. Ten states have not increased their gas tax since the 1980s.

Public opinion polls show the general public is experiencing the results of the funding gap in tangible ways. National polling done by HNTB in its America Thinks series (August 2011) reports that 54% of randomly selected respondents complained of poor road conditions and 50% complained of congestion.

The Council of State Governments, in a 2013 webinar titled "States to Watch in 2013: Transportation Funding," cited 25 states exploring ways to increase revenues to support transportation. Examples of shortfalls at the state level: Virginia needs \$500 million a

year; South Carolina needs \$29.3 billion over the next 20 years; Texas needs an additional \$488 billion through 2030; Massachusetts needs \$648 million more annually for only operations; Maryland needs an additional \$870 million; Pennsylvania has identified \$3.5 billion needed annually; Wyoming needs \$442 million annually to maintain and improve its system; Indiana needs \$1 billion more annually (\$200 million for the state; \$800 million for locals). Certainly there are even more states discussing their shortfall behind closed doors.

In December 2012, the U.S. Government Accountability Office (GAO) issued a report titled *Highway Trust Fund; Pilot Program Could Help Determine the Viability of Mileage Fees for Certain Vehicles*. Within the report the GAO stated:

"Surface transportation programs face increasing shortfalls in year-to-year revenues over the next decade. CBO estimated in August 2012 that, to maintain current spending levels from 2012 to 2022, the Highway Trust Fund would require an additional \$110 billion over what it is expected to take in during that period...These shortfalls are expected to increase as passenger vehicle fuel economy improves and the amount of revenue generated per mile traveled decreases."

In January 2008, the National Surface Transportation Policy and Revenue Study Commission issued its report on the needs of surface transportation in the United States. The bipartisan commission held hearings across the country and ultimately released a divided opinion, but the majority of members signed on to the following conclusion:

"The scenario analyses developed by this Commission also explored the impact that higher levels of funding could have on highway system performance, focusing on two particular levels: "Medium" investment levels intended to at least maintain specific separate measures of highway conditions and performance, and "High" investment levels targeted at the maximum level of potentially cost-beneficial investment (where such determinations could be made). ...these analyses produced ranges of average annual capital investment from \$130 billion to \$240 billion (stated in constant 2006 dollars) for the 15-year period from 2005 to 2020."

The FHWA released its Strategic Plan in July 2012. It contained the following statement regarding the nation's highway system outlook:

"A comparison between road conditions in 1990 and 2008 indicates that while Interstates and other higher order systems have improved, conditions on lower-order systems have generally stayed the same or declined, particularly in urban areas. In 2009, more than 11.7 percent of the Nation's bridges were structurally deficient and 14.2 percent were functionally obsolete. If relatively similar levels of capital investment continue, road conditions will worsen by about 3 percent by

2028. At similar levels of investment, there would still be a \$107.6 billion backlog of bridge improvements by 2028."

Perhaps the most exhaustive examination of U.S. transportation infrastructure needs was conducted by the American Society of Civil Engineers in its 2011 report titled *Failure to Act*. The report concludes:

"Investment of roughly \$220 billion annually (2010) is needed from 2010 to 2040, based on unit costs, minimum tolerable conditions, and data sources consistent with current application of federal highway, bridge and transit investment models. This breaks down to an average investment of \$196 billion for per year of highway pavements and bridges, including \$161 billion for congestion mitigation and \$35 billion for preservation of existing facilities. In addition, \$25 billion per year in transit capital infrastructure investment (including rolling stock as well as trackage, terminals, and roadways for access) is needed.

"Approximately 37% of this highway and bridge investment and 25% of this transit investment will be needed simply to resolve existing deficiencies of almost \$74 billion that are already affecting the U.S. economy."

"The United States carries a backlog of...\$2.2 trillion for highways and bridges and \$86 billion in unfunded transit capital infrastructure needs. ...Approximately 15% of transit revenue miles occurring in 2010 are on vehicles with a state of good repair of "fair" or "poor. In addition, 31% of passenger car vehicle miles of travel occurred on roadways with less than minimum tolerable pavement conditions and 18% of passenger car trips occurred on congested roads."

In February 2008, the American Public Transit Association released *The Optimal Supply and Demand for Urban Transit in the United States* report conducted by HDR|HLB Decision Economics. Its estimate of funding needed by transit operators in the United States was "total government outlays to make up the difference between transit operating costs and revenue from passenger fares would be an estimated \$65.0 billion by 2017."

The difference in condition between urban and rural systems is measurable as well. The American Association of State Highway and Transportation Officials found in its *Urban Roads Most Traveled* report, "The condition of the nation's major urban roadways is of particular concern to the nation's motorists because these roads and highways are the most heavily traveled in the nation. In 2007, 66 percent of the nation's vehicle travel was carried by its urban roads and highways." As the FHWA Strategic Plan noted, conditions of lower volume roads, both urban and rural, were declining faster. Don Hunt said CDOT was having a difficult time maintaining rural roads in Colorado given the limited resources he has. Kevin Keith said MoDOT had created a two-tier system, with a higher level of acceptable condition and design targeted for approximately 5,500 miles (out of

33,000 miles) of the state system that carries roughly 75% of Missouri's volume of traffic.

The only conclusion that can be made from the abundance of studies over the past five years is that the current transportation system is unsustainable in both condition and performance with current revenues. Had states not leveraged substantial amounts of future revenues to support their transportation systems, the current condition and performance of their systems would be much worse today. The effect of this has been to conceal the funding gap between actual needs and revenue streams. Debt as a funding mechanism is not sustainable.

## **Changing Product and Service Mix of the DOT**

Changing public expectations and a lack of resources are forcing state departments of transportation to change their historical product and service mix.

### **Public Transportation**

As urban areas continue to grow, public transportation demands have grown. The absence of resources has compelled many state DOTs to significantly diminish their construction/reconstruction programs and to focus on operations and maintenance of their systems.

As an example of changing demands on a DOT, Don Hunt of CDOT said, "It is apparent that Coloradans highly value transit as a means to reduce congestion and do not favor highway expansion as a solution" in urban areas. Hunt cited CDOT's co-investment with the Regional Transportation District in the "hugely successful" TREX project in Denver as a turning point for the department. The project has opened the door for future cooperation between the agencies.

All six of the CEOs discussed their departments' greater involvement in public transportation.

### **Freight Movement**

State departments of transportation have added more capabilities and services regarding freight movements, collecting travel times and focusing on interconnectivity between freight modes. This is recent because traditionally freight movement has been perceived as a private-sector activity that did not involve the DOT. The Florida DOT undertook the construction of the \$607 million Port of Miami project to improve access to the facility used heavily by heavy trucks.

### **Bike and Pedestrian**

DOTs have increased their engagement with bicycle and pedestrian organizations. According to Smart Growth America, by the end of 2012, 27 states and the District of Columbia had adopted or committed to the concept of "Complete Streets" to accommodate bicyclists and pedestrians on all roadway facilities.

### **Finance**

As DOTs have moved into assembling financing for larger projects from many sources, both public and private, as opposed to funding them entirely from within their own resources, departments have had to add more sophisticated financial capabilities to their organizations. At an FHWA forum on public-private partnership (P3s), Allan Rutter (formerly of the North Texas Tollway Authority) said, "To start, a rudimentary

understanding of project finance is needed. For example, many people in transportation agencies are clueless when it comes to what a bond is or how to do project finance. They don't have to become experts, but they do need to understand the terms and know the risk factors. Agencies need to come up with a team [of experts] who know what they're doing, who understand the owner's perspective, and who can negotiate such that both sides can get something out of it."

## **Communications and Customer Services**

An area that DOTs have significantly increased services is communications. A large majority of state DOTs have greatly expanded their public information efforts and community involvement. The use of press releases as the typical means of communicating with the public has been replaced with sophisticated multi-channel communication strategies. Twitter®, Facebook®, e-mail subscriptions, YouTube® videos, and web-based public meetings are all being used to reach and connect to much larger audiences.

The way services are being provided is changing as well. State DOTs are utilizing the Internet extensively to expand services to the general public. As an example, MoDOT has totally automated overweight permits to allow permits and routing to be done online at one time. Several DOTs use the Internet to allow the driving public to report potholes and track the progress in filling them. All 50 states have websites, but not all have the same degree of availability to information or access to department services.

## Transportation's Role in the Everyday Economy

The National Surface Transportation Policy and Revenue Study Commission declared: "The American economy works, in large measure, because shippers, manufacturers, and service providers have a transportation system that provides many ways to access labor and move raw materials and finished products. Individuals are able to travel to work places, shopping, educational institutions, recreation, medical care, and other locations critical to their quality of life." In sum, the modern American economy could not function without its transportation infrastructure.

The American Association of State Highway Transportation detailed in its 2009 *Rough Roads Ahead* report the expansive reach of highways and how they are essential to everyday life:

- Nearly 24 million children—55 percent of the country's kindergarten through high school population—ride 450,000 school buses 180 days per year.
- Every year, 50,000 ambulances make 60 million trips—an average of 164,000 trips per day.
- A fire department responds in one or more vehicles to a fire alarm in the United States every 20 seconds.
- Trucks in the United States carry 32 million tons of goods valued at \$25 billion every day.  
The country's 240 million registered vehicles travel more than 2.9 trillion miles annually.

The American Road and Transportation Builders Association reported that in 2010, according to the FHWA, more than \$16.0 trillion of freight was shipped in the U.S. including \$13.0 trillion of domestic shipments and \$3.0 trillion of exports and imports. Two-thirds of the total, or \$10.8 trillion, was shipped by truck on the nation's highways. Another 17 percent, or \$2.7 trillion, involved multiple modes including trucks, which means trucks were involved in 82 percent of all freight shipped in the U.S. in 2010. Rail, air, water, and pipelines accounted for the remaining 18 percent of freight shipments (Freight Facts and Figures 2011).

Our highways are so important to our economy that poorly performing systems have real and considerable impacts on the nation's economy. According to the Texas Transportation Institute *2012 Urban Mobility Report*, and reported in the *AASHTO Journal*, "congestion on our nation's transportation infrastructure costs each commuter about \$818 per year; that adds up to \$121 billion per year nationally."

Bill Eisele, co-author of the report, said, "As bad as traffic jams are, it's even more frustrating that you can't depend on traffic jams being consistent from day-to-day. This unreliable travel is costly for commuters and truck drivers moving goods."

Other findings by TTI regarding the effects of congestion include:

- 5.5 billion hours of total time wasted due to congestion
- The average commuter spent 38 extra hours traveling in 2011
- 22 percent of the delay cost comes from the effect of congestion on truck operations (not including value for the goods transported in those trucks)

There is also data to support the direct benefit of transportation investments on the U.S. economy. The Congressional Budget Office stated in its November 2010 report, *Public Spending on Transportation and Water Infrastructure*: "Evidence suggests that spending for carefully selected infrastructure projects can contribute to long-term economic growth by increasing the capital stock and raising productivity."

Further, the U.S. Chamber of Commerce determined an underperforming transportation system is costing the U.S. economy a sizeable amount of dollars. In its 2010 performance report on transportation, the Chamber concluded that "allowing the nation's overall transportation performance to lag behind the average index of the top five states leaves about \$1 trillion of potential GDP on the table. This amount would be additive to the economic value of direct infrastructure investment. If investments are made that improve performance, the real long-term impact on the economy could be one-third higher than what most other economic impact studies estimate."

There are several means by which researchers calculate transportation's share of the U.S. economy. A 2010 report titled *Measuring Transportation's Share of GDP Including Household Transportation Expenditures*, sponsored by the National Stone, Sand and Gravel Association, found "In essence, transportation final demand measures the size of transportation function in relation to GDP. Many experts regard it as the most accurate measure of the importance and size of transportation in the economy. In 2006, total transportation-related final demand amounted to roughly \$1,114 billion in 2000 dollars, which was 9.8% of GDP..."

## Evolving Organizational Practices

### Changing Perspective on Operational Performance

State DOTs' emphasis on operations has increased significantly. All six cited a lack of resources as a reason they were attempting to get more out of their existing system through improved operations and the use of maintenance and preservation to extend the life of aging roads and bridges. The days of "build highways, and when your system is insufficient, build some more" as one CEO put it, have passed for a number of reasons, not the least of which are environmental and financial constraints. Five of the six said expansion of their roadways was reduced to critical projects.

Matt Garrett, director of the Oregon Department of Transportation, said ODOT has amended its policies to focus the bulk of its resources on preservation and maintenance and to "surgically target capacity improvements to those that support economic development."

Malcolm Dougherty said that while there was a great deal of transportation construction in California today because of statewide bond sales and "self-help" county funds, there is a fiscal cliff once this construction program is complete. Even by prioritizing certain activities to better serve the traveling public, it doesn't mean they can be delivered. "While operations *and* preservation have been prioritized, once preservation and emergencies have been funded, there are practically no resources left to improve operations," he said.

"Colorado DOT," Don Hunt said, "has recently created a 'systems operations division' to live in the 24/7 of real-world and real-time transportation operations." The division is charged with responding to system-wide demands as they occur.

Missouri DOT has reorganized to place Interstates 70 and 44 into their own respective management units to ensure consistency in their operation and maintenance, rather than the previous arrangement in which the routes crossed as many as four district boundaries, each with its own assessment of the road's priority.

The use of traffic management centers is an area in which DOTs have invested their resources. TMCs have greatly increased the DOTs' ability to actively manage their systems. TMCs allow them to react faster to incidents and even to be proactive in addressing imminent congestion. At least 45 states and the District of Columbia operate or support TMCs (states without a TMC are Alaska, Montana, North Dakota, South Dakota, and Vermont). Relying on Intelligent Transportation Systems (ITS), TMCs typically provide traffic reports to media and in some cases to individual smart phones directly with apps like Trumppit® or through services like Twitter®, as well as online access to their system-wide traffic cameras; variable message signs provide travel times and incident warnings to motorists. Many have the ability to control surface

intersection signals to aid in the flow of traffic. Several states use TMCs to control reversible lanes or open hard shoulders to traffic during peak travel times.

Another area of investment has been motorist-assist services. As of 2008, 40 states and the District of Columbia utilize motorist-assist crews in urban areas to help get stranded vehicles moving and minimize the delay to other vehicles.

DOTs have also shifted the times their maintenance and construction activities are conducted to avoid peak travel times. Many charge hourly lane rentals to incentivize third-party contractors to stay out of travel lanes, thereby minimizing their impact on traffic.

DOTs have shifted their approach from snow and ice removal to snow and ice prevention through the administration of anti-icing salt and chemicals prior to a storm. The Missouri DOT uses this approach, pre-positioning snowplows and staff in advance of forecast storms and utilizing environmentally friendly beet juice (when it's available) instead of more conventional substances.

### **Increasing Role of the Private Sector**

For the last 100 years in the United States, the public sector rather than the private sector has typically provided funding for transportation. However, these lines are blurring as state DOTs are seeking alternative ways to fund transportation projects.

Among the six CEOs interviewed, five either are utilizing public-private partnerships or expressed a desire to do so. California, Colorado, Florida, Massachusetts, and Oregon have legislative authority to enter into P3 agreements. Their interests are heightened by a lack of resources and in one instance, a large reduction in DOT staff. In all, 33 states have legislative authority to utilize some form of P3 in transportation.

While "design-build-operate-maintain" contracts garner the greatest media attention, they also have the biggest hurdle to overcome due to public resistance to tolls and concerns about "foreign ownership." DOTs have, however, moved in substantial ways to the private sector. Many people are unaware that there was a time when the DOTs actually constructed highways rather than contract them out to the private sector as occurs today. Colorado DOT's "construction is wholly outsourced for any project exceeding \$150,000," Don Hunt said.

Over the past 20 years, many services that were exclusively the domain of the public transportation agency are now being done by the private sector. Kevin Keith of MoDOT predicts that "in the short-term we will see more contract maintenance of the system. Over the longer-term, a DOT will contract out all maintenance just like we do construction today".

Davey and Dougherty do not see significant contract maintenance in the future of their organization, but at least one DOT is well down that path today. Ananth Prasad says the

Florida DOT already contracts out approximately 90% of its maintenance. In this case, the DOT is a manager of private maintenance contracts rather than the provider of the service. Prasad explained that 40% of the contracts are "fence to fence" performance-based agreements and 50% are FDOT-aggregated arrangements in which the department chooses the suppliers "a la carte."

State DOTs are also relying on the private sector to manage programs that interface with the public such as interstate logo programs, 511 services, and litter control and pick-up. Rest areas and roadway striping are also common areas for private sector services.

### **Organizing and Staffing for Success**

State DOTs have responded to changing demands by altering their organizational structure around the periphery of their standard pyramid-shaped reporting structure. They have added bureaus, divisions, and positions to be responsible for new duties.

Three of the six CEOs interviewed said they desired a flatter organization. A different approach was Ananth Prasad, who explained, "Florida DOT's goal is to have a diamond-shaped organization rather than the traditional pyramid shape. This means one that is lean at the top and bottom, where delivery is being performed by the private sector and managed by the mid-level" wider section of the diamond.

Matt Garrett said "the DOT of the future will be structurally different. It will be fully integrated into the environmental and economic construct of the state. It will be vertically integrated for the delivery of services, reducing the lost efficiencies created by state-county-city overlapping responsibilities."

All six CEOs said the current staffing is not well positioned for the DOT of the future. Kevin Keith said, "The emerging DOT is going to drive a need for a more diverse workforce with significantly different skill sets. Who's going to run a contracting management organization? Strategy, funding, and economic investment are all going to be of greater importance. DOTs today are still managed around a design/build/maintain competence. This will have to change."

Don Hunt said, "With its strong engineering culture, Colorado DOT is only partially prepared for this new model of delivery. The department must add staff with a focus on business-process-oriented capabilities if it is to ensure that it can fully represent the interests of the taxpayer."

The Oregon DOT is in a transition to evolve its staffing to operate in the new environment. "Finding an engineer that can communicate, plan, has business acumen and is well versed in the hard sciences is very difficult to find," Matt Garrett said. "The state personnel selection procedures are probably 25 years behind what is needed to hire the right person. What is needed is a broader, multi-dimensional approach. Compensation for the type of skills desired put ODOT at a disadvantage."

Ananth Prasad said, "As FDOTs operations change, it expects to have fewer 30-year DOT employees that will start and end their careers at FDOT." He anticipates there will be more "in and out and back again" employees as people leave for other experiences and return with greater skills.

While the CEOs are concerned about the employee of the future, all expressed a critical need for a succession management plan. Three said they face disruptive skills shortages when older workers retire, and there are no readily apparent replacements within their organization.

## Conclusion

The expectations of state departments of transportation continue to expand, some might say unrealistically. Economic development, multimodal facilities, and intermodal coordination are all of greater importance. A resurgence in demand for rapid rail and commuter rail as a transportation alternative adds to the competition for limited funds.

Users of the transportation system are expressing greater dissatisfaction as the system ages and exceeds its design life. Transit systems built after World War II in the major metropolitan areas of the day are no longer examples of a modern system.

Transportation is crucial to the American economy. More than 10% of the U.S. gross domestic product is associated with transportation, and \$16 trillion in freight value is moved each year. Nearly every sector of the economy—manufacturing, education, health care, and retail—is dependent of an efficient transportation system.

As important as transportation is to our economy, it is ironic that such widespread underfunding is reported by all 50 state DOTs. All six CEOs interviewed were greatly concerned about their department's ability to maintain their state's system in the future with current resources. Twenty-five states are actively and publically seeking additional resources to invest in their systems.

As state DOTs attempt to maintain their systems while living with a shortage of funds to perform essential work, they are changing their approach in managing their networks. Operations, maintenance, and preservation have all been elevated in importance. System expansion has been reduced and in some cases limited to only projects that directly support economic development.

State DOTs are having to partner with others, both in the public and private sectors, to assemble funding for the growing number of large construction and reconstruction projects that exceed their organizations' ability to fund. It is not unusual to utilize financing along with contributions from local governments and the business community that benefits from the project to achieve a viable plan.

The role of the private sector in public transportation is growing but at an overall slow pace. As DOTs address funding gaps, private investment in large projects is desirable but faces hurdles in public acceptance of tolls and questions about who owns the facility. The private sector has made great strides in other areas of DOT operations, such as contracted maintenance of roadways, roadway striping, interstate logo programs, and rest area maintenance.

DOTs have been slow to change their organizational structure from the design-build-maintain model of the previous 70 years. Most have added management units or positions to their organization to reflect new duties but have kept the traditional pyramid

model. At least two of the CEOs interviewed believed this basic model needed to change for the DOT of the future.

The changing role and mission of the state DOT needs to attract employees with skill sets that are different from today's typical staff member. Those interviewed described the skills needed as "people with a focus on business-process-oriented capabilities" and "an engineer that can communicate, plan, has business acumen." DOTs are also worried about succession planning for their organizations, fearing disruptive skills shortages when older, more experienced workers retire.