AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

AASHTO

THE VOICE OF TRANSPORTATION

TESTIMONY OF

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ON BEHALF OF

THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

REGARDING

The Research and Development Portfolio to Support the Priorities of the Department of Transportation

BEFORE THE

COMMITTEE ON SCIENCE AND TECHNOLOGY
SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION
U.S. HOUSE OF REPRESENTATIVES

NOVEMBER 19, 2009

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Introduction

Mr. Chairman and distinguished members of the Committee, my name is Neil Pedersen and I am the Administrator for the Maryland State Highway Administration. I am also the Vice Chair of the Standing Committee on Highways of the American Association of State Highway and Transportation Officials (AASHTO), and I am a registered Professional Engineer in the State of Virginia. On behalf of AASHTO, I want to express my appreciation for your focus on transportation research needs in the United States.

Overview of the Current Transportation Research Program in the US

State transportation agencies share a mission to deliver safe, long-lasting highways and bridges, as well as rail, transit, and maritime facilities, for passengers and freight customers alike. To accomplish this mission, especially in today's fiscally challenging circumstances, state DOTs turn to research for solutions to their toughest problems.

However, by any measure – across industries or countries – the U.S. transportation community invests very modest resources in research and innovation. Nevertheless, we have gained tremendous benefits in terms of lives saved, more durable infrastructure, and improved operations. But we are continually challenged by growing passenger and freight vehicle-miles of travel (VMT), changing demographics of system users, shifting economies, and the anticipated effects of global climate change. Meeting these challenges will require new and better ways of doing business. It will also require many resources: financial, political, and human. One of our best investments is in research and technology.

As you are likely aware, there are several components to our national transportation research effort that are supported with federal surface transportation funds.

1. The most obvious component is the federal research carried out directly by US DOT, including research directed by the Policy Office, as well as by agencies such as the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), National Highway Traffic Safety Administration (NHTSA), Federal Motor Carrier Safety Administration (FMCSA), Federal Railroad Administration (FRA), and the Research and Innovative Technology Administration (RITA).

2. The second component is research conducted by each State DOT, managed by the individual members of AASHTO's Research Advisory Committee and coordinated with national research programs. The majority of this funding comes from the federally-sponsored State Planning and Research (SPR) program, which will be discussed in more detail later.

3. The third component consists of the various cooperative research programs managed by the Transportation Research Board (TRB), such as the National Highway Cooperative Research Program (NCHRP), Transit Cooperative Research Program (TCRP), the Freight Cooperative Research Program (FCRP), and the Hazmat Cooperative Research Program.

Most of these programs determine their research agenda on an annual basis. The largest of these programs – NCHRP – is funded through an annual voluntary contribution of state SPR funds and has been carried out since the early 1960s.

4. A fourth component is policy research carried out by TRB.

5. A fifth component consists of special research authorized by Congress, such as the Strategic Highway Research Program 2 (SHRP2), which is focusing on four critical issues in transportation – safety, infrastructure renewal, travel-time reliability, and capacity needs.

6. A sixth component is the research carried out by the 70 or so University Transportation Research Centers housed in individual universities, or in consortia of universities, across the country.

Each of these components plays a vital role in the overall research effort and, while the efforts are independent, there is considerable collaboration and communication that exists between these research programs to ensure the development of cohesive, complementary, and significant research.

Each program, in its own way, can and will make contributions to the four goals outlined by the Secretary. However, I believe that the research carried out by the federal modal agencies and the US DOT Policy Office would be the logical place to address the four priority areas of safety, environmental sustainability, livable communities, and economic competitiveness, since the research could be conducted under the direction of the Secretary. In addition, research such as this that is more strategic in nature – and on a more national scale – is typically more expensive than can be accomplished by the states on their own; thus, federal leadership is needed.

The Federal Research Program

Throughout its history, a core element of US DOT's mission has been to promote innovation and improvement in American's transportation system. Over the course of the last few decades, this critical mission element has developed into a broad array of research and technology activities covering the spectrum of advanced research, applied research, technology transfer, and implementation. To maximize the effectiveness of these research and technology (R&T) activities, US DOT also carries out or funds a host of activities necessary to support a vibrant R&T program, including research administration, communication, coordination, conferences, and partnerships with other national and international organizations.

Over the course of the last few authorization cycles, FHWA's R&T funding has been increasingly earmarked and designated until, under SAFETEA-LU, not a single discretionary R&T dollar was left to the agency. Because Congress authorized all the funds for R&T to be spent on particular projects or research areas (often earmarking the funds to particular universities), US DOT was unable to fund a number of mission-related activities that the states depend upon. For example, there was no funding available for policy research, including

infrastructure condition assessment; for updates to the Manual of Uniform Traffic Control Devices; for TRB core support; and for a host of other "orphaned programs."

In addition, the lack of flexibility prevents US DOT from responding to changing national needs and crises – for example, the increased need for transportation security since September 11, 2001.

US DOT needs to have the resources to carry out appropriate research to achieve their mission – including the four priority areas of safety, livability, sustainability and economic competitiveness – and the flexibility to carry it out in a responsive manner. The states and others can complement US DOT's research program through the research we are conducting in our ongoing programs.

The States' Research Program

As I mentioned earlier, one of our best investments has been and continues to be in research and technology. The relatively few dollars we spend on research leverage the rest of the highway program by providing us with solutions that improve the quality and efficiency of diverse agency activities.

For decades, federal-aid funding has been a key resource for research, with the states and federal government jointly investing in innovation. Each state receives federal-aid funding through the State Planning and Research (SPR) program to address the transportation needs that they deem the most critical, including, among others: engineering and economic surveys; planning and financing of future highway programs; studies on the economy, safety, and convenience of surface transportation systems; and research, development, and technology transfer activities. The variety of activities carried out and products produced by this program is crucial to the advancement of the transportation system in our country.

SPR funds are made available to the states by formula and consist of two percent (2%) of each state's federal apportionment for the six core highway programs. Since this program is dependent upon the organization of the core programs for its funding, any changes to the current structure could have a tremendous effect on the states' research programs and, subsequently, what can be accomplished.

States are required to expend at least one-fourth of the total SPR funding specifically on research, development, and technology transfer activities, including training. This research component of SPR can include highways, public transportation, and intermodal transportation systems; infrastructure renewal (including pavement, structures and asset management); activities relating to safety, operations and maintenance; environmental and real estate planning; and management, policy analysis, and systems monitoring.

The states' transportation needs and critical issues are unique and constantly changing, and the SPR program affords states the opportunity and flexibility to address those research and technology needs that are most vital to maintaining and improving their transportation systems, including emerging transportation research needs. States give high priority to applied research to

address state and regional challenges, to the transfer of technology from researcher to user, and to research that supports the development of standards and specifications.

The State DOTs also collaborate on research projects with other federal, state, regional, and local transportation agencies, academic institutions, foundations, and private firms through the Transportation Pooled Fund program. The Federal Highway Administration administers this program and approves the projects that are selected. The program allows groups to combine resources to support the project, which may consist of research, planning, and/or technology transfer activities.

In addition, states co-fund the National Cooperative Highway Research Program through the Transportation Research Board of the National Academy of Sciences. Support for this program is voluntary and funds are drawn from the states' SPR funds. Projects are selected annually by the AASHTO Standing Committee on Research, and the funds can be spent only for research projects approved by at least two-thirds of the states. Each state's allocation amounts to 5½ percent of its SPR apportionment.

As noted above, the States' research efforts are decentralized, with priorities determined by experts in their fields, i.e., the stakeholder and user groups who deal directly with transportation issues day-in and day-out. Its flexibility allows the states to deal with new and emerging needs that bubble up from those on the front lines of the transportation industry. Research can be conducted by a single state, pooled among several states with a common need or concern, or conducted through a national program such as NCHRP.

Frequently, key research efforts start in one or more states – through the SPR program – and other states and/or US DOT expand upon that research and it becomes more national in perspective. Advanced searchable databases such as the Transportation Research Information Service (TRIS) and the Research in Progress (RIP) database help to ensure that overlap and redundancy do not occur by allowing researchers to determine what has been accomplished thus far and what may be underway related to their topic of interest. This decentralized organization of research programs has been working well for many years and should be continued in its present form to ensure that ongoing research continues and that the flexibility exists to meet new demands.

Technology Transfer and Implementation

The final, and possibly most important, steps in the research process consist of technology transfer and implementation. Technology transfer and implementation can be explained best by a fishing analogy: *technology transfer* provides the information on what pole to buy and where to find the lures; *implementation* involves showing someone how to fish.

Research is useless if it sits on a shelf. Thus, the need for effective and continual technology transfer and implementation cannot be overemphasized. For most people, and by extension most agencies, change is difficult. New ideas may get nods of approval but may not get implemented without assistance, such as champions to get the ball rolling, presentations and webinars to get

the message out, and pilot projects to show practitioners how the new ideas can be incorporated into the current business model.

Programs such as the Local Technical Assistance Program, which provides information and training to local governments and agencies across the country; the National Highway Institute and National Transit Institute, which provide training, education, and information clearinghouse services; and the National Transportation Library, which maintains a robust transportation knowledge base for researchers and practitioners; provide critical assistance in ensuring that research becomes reality.

Research Needs within US DOT's Four Priority Areas

It is important to note that the potential scope of the research that could be done in each of the four priority areas is immense. To be effective, US DOT needs to coordinate efforts with the transportation community to ensure that their research agenda is focused on the facets of these four goals that they consider the most urgent priorities, and that the various research programs complement, as opposed to overlap, each other.

Safety

For safety, we know what the goal is – reducing deaths and injuries on our nation's transportation system – but we do not necessarily know how effective we have been in achieving that goal because we don't have much-needed data to tell us what works and what doesn't. Data is an extremely important part of the research effort that is often overlooked, but research is only as good as the data it is based upon. Some individual states, such as Iowa, have extensive safety databases, but to address key national challenges, we need more national-level data beyond what is currently available.

Key safety research needs are focused on developing a better understanding of the factors contributing to crashes, developing new strategies for addressing highway safety, and evaluating the effectiveness of strategies currently in use. Examples include the following:

- **Understanding Crash Causation.** Human factors play a part in the occurrence of crashes and need to be better understood in order to develop appropriate countermeasures. Two specific contributing factors for which additional research is needed are distracted driving and drugged driving. While distracted driving has received significant attention recently and is a growing highway safety concern, some of the details are not clear. In the instance of cell phone use, for example, it has not been shown that there is less risk associated with hands-free use than with hands-on use. Also, drunk driving has been studied extensively, but additional information is needed on driving under the influence of drugs. A recent NHTSA report showed that 16 percent of nighttime drivers in a roadside survey tested positive for one of a variety of legal or illegal drugs. Since drugs are absorbed by and act on the body differently from alcohol, additional research is needed to determine which drugs impair driving, and the dosage levels that are associated with impaired driving and a higher crash risk.

- **Countermeasure Development.** New and promising strategies are needed to address highway safety from the engineering, enforcement, education, and emergency medical response perspectives. Reducing roadway departure and vehicle collisions, improving the effectiveness of enforcement activities, strengthening public information campaigns, and reducing emergency response times will contribute to the reduction of highway fatalities. New countermeasures could include infrastructure improvements related to better signing and marking, work zone safety improvements, and median barrier improvements; vehicle technologies such as crash avoidance, rollover avoidance, and occupant protection; and communication technologies that allow vehicle-to-vehicle and vehicle-to-infrastructure communication as well automated communication of crashes to emergency responders.

- **Evaluation.** State, local, and federal agencies with responsibilities for addressing highway safety are continuously implementing strategies and programs, but additional information on the effectiveness of these countermeasures is needed to enable highway agencies to better direct their limited funds. The National Cooperative Highway Research Program (NCHRP) has published a series of over 20 guides that provide detailed information on a wide range of highway safety strategies, but the effectiveness of many of these infrastructure and driver behavioral strategies in unknown. The effectiveness of behavioral programs, such as public information and education campaigns, is especially difficult to evaluate, and methodologies for performing these evaluations need to be developed. Legislation, such as hand-held cell phone bans and ignition interlock requirements for first time drunk/drugged driving offenders, need to be evaluated for effectiveness in changing the behaviors – in the short and long term – that are contributing to serious crashes.

- **Data and Data Collection Technologies.** Without comprehensive and high quality data, it is difficult to determine the nature of our highway safety problems, where the problems are, how to best to treat the problems, and how successful treatments have been. Extensive roadway networks, interaction of and communication between the various highway agencies with jurisdiction in the states, and limited resources for collecting data are the main challenges related to obtaining data for highway safety analyses. With the increased focus on new highway safety analysis tools and on the need for measuring performance, data are constantly becoming more of a limitation and data improvements are becoming more of a crucial need. Technologies are needed that automate data collection on all public roads, including lesser traveled and rural roads, and to significantly reduce the time needed to transfer data to a database and make it available to users.

Environmentally Sustainable Transportation / Sustainability

Sustainability means different things to different people. One State DOT defines sustainable transportation as "the provision of safe, effective, and efficient access and mobility into the future while considering the economic, social, and environmental needs of society." The

transportation network must meet the needs of a growing population and an expanding economy while simultaneously reducing the environmental footprint of the system.

Sustainability has also been defined as:

- An overarching conceptual framework that describes a desirable, healthy, and dynamic balance between human and natural systems.
- A system of policies, beliefs, and best practices that will protect the diversity and richness of the planet's ecosystems, foster economic vitality and opportunity, and create a high quality of life for people.
- A vision describing a future that anyone would want to inhabit.

Central to these definitions is sustainability's applicability to three elements of life: economic and/or financial considerations, environmental protection and stewardship, and community and individual human well-being — the "triple bottom line" of sustainability. This means improving the economic and social quality of life while limiting impacts on the environment. In this framework, ideal solutions to any type of challenge will generate long-term benefits in all three areas.

Today, the transportation sector's mission goes beyond ensuring mobility to achieving the larger societal goal of economic, social, and environmental sustainability. Approaches such as context sensitive solutions and integrated planning provide transportation agencies with the tools to consider economic, social, and environmental factors as they develop transportation solutions. A few examples of research that will help us achieve the goal of a sustainable transportation system include the following:

- **Life Cycle Cost Analysis Techniques.** New and enhanced economic tools hold the promise of helping transportation agencies choose the most cost-effective project alternatives and communicate the value of those choices to the public. These agencies could benefit from the identification, development and enhancement of life cycle cost methods to estimate and evaluate the full costs of transportation investments over a long period of time such as 80 to 100 years.

- **Long Term Environmental Impacts and Benefits.** Related to life cycle cost analyses, evaluation of transportation alternatives could be enhanced with additional information and research regarding long term impacts (beyond 20 years) and benefits of various transportation investments and strategies.

- **Transportation Pricing.** Proponents promise that pricing can deliver smarter use of existing capacity, reduce congestion, and avoid costly expansion needs while expanding the menu of options for raising money to pay for system preservation and capacity improvements. Research is needed to objectively evaluate the case for economic, environmental, and social sustainability benefits of road pricing – in other words, what level of fees would be required to alter driver behavior and generate substantive benefits from an environmental, economic, and social context.

- **New Structural Systems.** The use of "greener" structural systems to meet environmental stewardship objectives is an intriguing possibility. Materials such as recycled steel, or concrete with recycled aggregated and other recycled materials to replace the cement, could be used to meet the objectives of using recycled materials and reducing carbon emissions. In addition, using composite structural components (such as concrete filled tubes or walls) to replace traditional structural steel or reinforced concrete components greatly reduces the labor and material needed, thereby meeting the objective of accelerated bridge construction that is so important in today's marketplace. A research program investigating the use of these components in highway construction would require experimental testing of the material, components, and connections. The experimental results could be used to develop robust design methods, and analytical modeling would be required to develop engineering expressions appropriate for bridge designers. Finally, a complementary life-cycle assessment would be required.

- **Management Tools.** Many existing tools might also be applied to help determine or enhance the "sustainability" of a project or program. For example, life-cycle analysis could be used as a tool to assess long-term sustainability; optimization could be used to assess and balance trade-offs for maximizing sustainability; and infrastructure preservation and asset management strategies could be applied to promote longer-life facilities, which is an important aspect of sustainable transportation.

- **Climate Change and Adaptation.** The threats that climate change may pose to transportation systems, including for example, flooding, changes in average temperatures, and extreme weather events, are well documented. The impacts on transportation systems may include, for example, accelerated pavement deterioration; flooded roadways; bridge damage; increased maintenance; and increased storm water and drainage issues. Research to assist state transportation agencies in planning for adaptation and to assist in the states' developing guidelines for design, construction and maintenance is necessary.

Livable Communities / Livability

Livability is another term that means different things to different people. For AASHTO, the notion of livable communities consists of more than development patterns and promoting non-motorized transportation – it is a broader idea that includes providing mobility and access to opportunities and social services. Livability can be thought of as the "social" aspect of AASHTO's definition of "sustainability."

In addition, there appears to be a strong correlation between the idea of fostering a "livable community" and the transportation project development process known as Context Sensitive Solutions, or CSS. CSS is a process for developing transportation solutions *by* and *for* communities, where the community itself defines what is needed to solve its transportation challenges. Individual communities define what is a "livable community" to them by developing a vision and goals for their future, and then the community-defined vision and goals drive the appropriate transportation solutions.

Washington State DOT is one transportation agency that has developed a Livable Communities Policy. Their model suggests that a balance of the three key societal goals leads to livability: a vibrant community, a vital economy, and a sustainable environment. The two desirable outcomes from the Washington State Transportation Plan that they feel will indicate that they are contributing to the goal of fostering livable communities are "effective community-based design" and "collaborative decision making."

States such as Oregon, Maryland, and Florida have also incorporated "livability" into their transportation policies. Their general "livability" policy themes include: (1) encouraging balanced transportation systems to assure mobility through a mixture of modal choices, especially at the community and neighborhood level; (2) facilitating locally driven community-based and partnership-based projects; and (3) identifying funding sources that transportation partners can use to enhance livable communities.

As indicated by the local involvement promoted within these examples, it is clear that a single livability solution does not fit all situations. The differences between rural, urban, and suburban needs, as well as differences between neighborhoods, need to be accounted for individually. Research in this area needs to acknowledge that what constitutes a "livable community" in one part of the country – for example, a high-density northeastern urban area – may be very different from what is considered "livable" in another area – such as a rural southwestern community. Any definition of livable communities that is developed needs to be broad enough to encompass the variety of desires within our nation's communities, and also needs to acknowledge the roles and responsibilities of the local community in making land use decisions, which contribute to the livability of the community and the transportation needs that emerge from those decisions.

Thus, research in the area of livable communities as it relates to the transportation system could cover a wide spectrum of topics, including:

- **Public Policy Studies.** Land use and transportation are inextricably tied together in the discussion on livable communities, which adds to the complexity of achieving success. Multiple levels of government with competing objectives can conspire to undo the good that each has accomplished, such as when a municipality allows unrestricted access along an arterial facility meant to move traffic, thus necessitating the construction of another facility to achieve the initial objective. Research can help determine such things as: how to encourage infill development in downtowns and inner suburbs (which would also lead to reduced congestion and increased capacity); what is the appropriate use of mixed-use, transit-oriented development; and what modal shifts can be achieved through the use of parking design, policy, and pricing.

- **Human Behavioral Research.** How people respond when given a multitude of options is an area of continual evolution and transformation. The American Dream for most of the country is still the single-family house with the two-car garage. Additional research is needed to investigate the values people hold near-and-dear to their hearts and determine how they make decisions regarding where they live and how they travel.

- **Hard-side Engineering Research.** In addition to public policy and behavioral research, engineers need tools to help ensure that the reality lives up to expectation and that the infrastructure they design and construct produces the intended results. Turning abstract thoughts into a reality is a tremendous challenge, and some of the tools planners and engineers will need include: guidance on street and transit designs that contribute to biking, walking, and the success of transit service; model policies for land use and transportation interactions that encourage local trips to be made on local streets, thus preserving capacity on arterials for longer-distance trips; and best practices for incorporating community-based design into the transportation planning and design process.

Economic Competitiveness

One important thing to note is that these priority areas are not mutually exclusive. There are research needs specifically related to economic competitiveness, but there are others that are directly connected with the priority areas of sustainability, livability, and safety.

The range of projects underway as part of the National Cooperative Freight Research Program (NCFRP) at the Transportation Research Board demonstrates the interrelation between these areas. NCFRP was established through SAFETEA-LU to develop a "national research agenda addressing freight transportation and for implementation of a multi-year strategic plan to achieve it." Projects currently underway that relate to the other priority areas include:

- *Representing Freight in Air Quality and Greenhouse Gas Models* (Sustainability)
- *Promoting Environmental Goals in Freight Transportation through Industry Benchmarking* (Sustainability)
- *Separation of Vehicles – CMV Only Lanes* (Safety)
- *Understanding Urban Goods Movements* (Livability)
- *Truck Idling Scoping Study* (Livability)

Projects focused more specifically on Economic Competitiveness include:

- *Freight-Demand Modeling to Support Public-Sector Decision Making*
- *Identifying and Using Low-Cost and Quickly Implementable Ways to Address Freight-System Mobility Constraints*
- *Framework and Tools for Estimating Benefits of Specific Freight Network Investment Needs*

AASHTO has developed recommendations for the next surface transportation authorization that support continuation and increased funding for the NCFRP. These AASHTO proposals also include freight policy and program recommendations that need additional research as a foundation for effective implementation. AASHTO's proposals are consistent with those made by the Freight Stakeholders Coalition, which is comprised of the national associations representing the major elements of the freight transportation industry, including both carriers and shippers.

The following are several research priorities related to AASHTO's authorization recommendations that are important for transportation's contribution to economic competitiveness:

- **Defining the National Freight Transportation System.** There is consensus, but not unanimity, on the importance of investing in the national freight transportation system in support of economic competitiveness. Unfortunately, there is not consensus on a definition or description of that system as a guide for productive investment. We must have a firm foundation of research and analysis to guide a freight investment program that is intended to generate economic competitiveness benefits for the nation.

- **Freight Chokepoints.** We know the freight chokepoints on the interstate system that are the most costly. However, we do not know how to translate that into a program of improvements that results in improved system performance that is feasible and cost effective.

- **Calculating Public Benefits**. It is important to justify all public investments made in transportation in terms of public benefits. It is especially important for freight transportation investments where there may be private profit on the same balance sheet and where we want to document regional and national benefits, as well as local. Currently there is no standard, widely-accepted approach for doing this.

- **Measuring Performance.** Knowing where to invest and whether or not the investment has been productive requires performance measurement. What you can't measure, you can't manage. AASHTO has invested considerable effort to advance this objective, but more analysis is required to know not only what the appropriate measures are, but how to apply them for policy, program, and project purposes.

- **Financing.** At present we do not have the funding necessary to simply maintain our core freight transportation systems. We will not get that funding from the traditional sources. We need to figure out how to generate new revenues for this purpose – directly or indirectly – from the beneficiaries of freight improvements that do not have adverse consequences for specific industries, modes, or regions.

- **Multi-State Planning and Investment.** Freight moves across state lines, but for the most part our processes for planning and financing do not. There are projects important for economic competitiveness for which benefits are widespread but costs are concentrated. These projects cannot be realized, without immense effort, because our institutions or planning and financing are not organized for this purpose. We need to know how to build on the strength of our existing institutions to develop mechanisms for doing these projects.

Without research in these areas, we cannot hope to have a transportation program that meets the nation's economic competitiveness needs.

There is another important category of research that often gets lost in the high-level policy, sometimes abstract, discussions related economic competitiveness. This research is related to simply making sure that the condition, performance, and capacity of the basic transportation systems are adequate to meet the need. Virtually all freight moves on systems that are shared with passengers —road, rail, and water. Continuing research that addresses basic elements of these systems is essential

And, even more specifically. there are many operational objectives for State DOTs that are important for economic competitiveness for which we do not currently have well-grounded standard practices. These include:

- Incorporating freight factors into the project selection process
- Assessing the adequacy of secondary freight routes for large truck traffic
- Experience with highway improvements to support intermodal terminals
- Guidelines for adequacy of connector roads to seaports
- Translating highway engineering and construction experience into the rail arena
- Engineering issues related to truck-only lanes
- Procedures for managing a rail-crossing program to maximize efficiency on rail and road
- Standardizing bridge analysis among the states relative to vehicle weight

Summary of Recommendations

As you know, the focus of US DOT's programs shifts over time as administrations change and new secretaries take charge. This shift in focus is necessary and advantageous as the agency realigns itself with the emerging challenges in the transportation arena.

Thus, to pursue the four additional priority areas that the Secretary has proposed, AASHTO recommends that the Secretary first align US DOT's research program to focus in these areas. The States can then help US DOT achieve its vision by determining where there are opportunities within our research programs to complement these focus areas. For example, an existing research effort that could contribute to the sustainability focus area is the climate change mitigation and adaptation research that is ongoing.

We also recommend expanding the total funding for research so that additional complementary research can be accomplished. As discussed in AASHTO's Authorization Recommendations, US DOT must have sufficient, flexible funding to carry out its core program in support of its national mission in research and technology. If Congress chooses to authorize additional research programs of a national priority, these should be funded over and above the core funding for the R&T program, which we recommend at $200 million per year for FHWA. Strategic national R&T programs, such as SHRP 2 and cooperative research programs, should also be funded over and above the core R&T program.

Within that funding, the full range of R&T activities comprising the innovation cycle need to be eligible, including advanced research, applied research, technology transfer, research administration, communication and coordination, international outreach, and other R&T support

activities. The support of ongoing training, data, and knowledge-related activities, such as the Bureau of Transportation Statistics, the National Highway Institute, the Local Technical Assistance Program, the National Transportation Library, and others, increases the overall effectiveness of core R&T activities.

A critical part of the research equation that is sometimes overlooked is the transfer of information to transportation planners, engineers, designers, and contractors who can actually implement the results. AASHTO recommends that US DOT be provided with needed funding to invest in the further development and increased use of web-based technologies, such as webinars, interactive web pages, online training, and discussion forums, to ensure that information and education on new research ideas gets out to practitioners in the field where it can be deployed more quickly than with traditional technology transfer methods, such as brochures and presentations.

Finally, we strongly recommend against earmarking existing research funding, such as SPR, specifically to the four priority areas, as this will shortchange our ongoing research efforts in areas such as structures, pavements, planning, environment, policy, operations, safety, and research and innovation support.

Conclusion

Ultimately, AASHTO cannot stress enough the importance of research implementation, transfer of research into practice, and technology transfer. Multiple and varied efforts are underway to move research into practice, and the variety of methods to do this are dependent on the actual results and specific solutions.

To use a potentially overused phrase, “it takes a village” to accomplish all of the research objectives within transportation, including developing the data, establishing the needs, conducting the research, sharing the results, and implementing the best ideas. And through coordination and collaboration, leveraging time and money, utilizing the combined knowledge and expertise, our village is making significant contributions to the advancement of our nation’s transportation system.