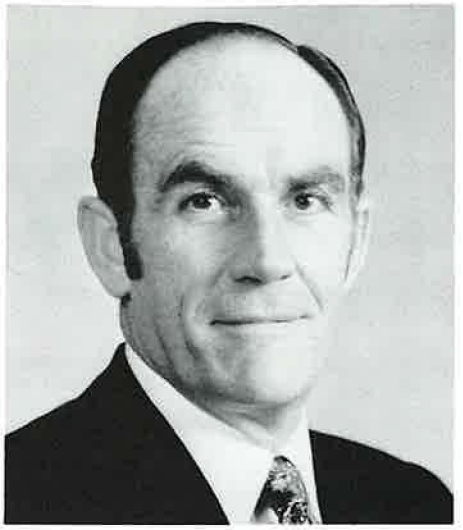

Thomas Larson, PennDOT Secretary, Focuses on TRB During Congressional Hearings on the Role of the National Academies in Science Policy

EDITOR'S NOTE: *On May 6–8, the U.S. House of Representatives Task Force on Science Policy conducted hearings on the role of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine, and their operating arm, the National Research Council, in setting science policy in the past and in establishing and implementing future science policy in the United States. The House Task Force on Science Policy, chaired by Rep. Don Fuqua of Florida, was established by the Committee on Science and Technology to conduct a comprehensive review of science policy and make recommendations on the future role of the federal government in supporting basic and applied research.*

Testifying at the hearings were Frank Press, president of the National Academy of Sciences and chairman of the National Research Council; Robert M. White, president of the National Academy of Engineering and vice chairman of the National Research Council; and Samuel O. Thier, president of the Institute of Medicine. Among others presenting testimony were James B. Wyngaarden, director of the National Institutes of Health; George A. Keyworth, former presidential science adviser; and Thomas D. Larson, secretary of the Pennsylvania Department of Transportation and a former chairman of TRB's Executive Committee. Following are Larson's remarks concerning the role of the Transportation Research Board.

Chairman Fuqua and other distinguished members of the Task Force on Science Policy, I am Thomas D. Larson, Secretary of Transportation for the Commonwealth of Pennsylvania and member of the National Academy of Engineering. I am pleased to respond to your invitation to share my views on the future role of the National Academies of Sciences and Engineering in providing scientific, technical, and policy advice.

Being from the transportation community, I will focus my testimony on the National Research Council (NRC) and the Transportation Research Board (TRB), a unit of the NRC that addresses transportation issues. Your invitation to testify posed 12 specific questions for consideration. I have reviewed the questions and my statement will respond to those with which I can most directly relate. Those questions are

1. How have the National Academies fulfilled their congressional mandate?
2. Are they effective in meeting the needs of government agencies and in addressing policy concerns?
3. Is the project–study approach best?
4. Should they have support for self-initiated studies?
5. Should they have additional functions?
6. How are they perceived by citizens?

How Have the National Academies Fulfilled Their Congressional Mandate?

Clearly, the charge to "whenever called upon by any department of the government, investigate, examine, experiment, and report upon any subject of science or art. . ." is a tall order. In my experience, TRB has responded in exemplary fashion to this formidable challenge. I will cite specific examples later, but first I have several general observations that give perspective to the valuable role TRB plays in shaping the way we conduct this country's transportation business.

On more than one occasion, I have been puzzled by the misunderstanding that surrounds the scientific aspects of the transportation industry. After all, we have been building roads and bridges for many years, and some would believe that almost all of the technological possibilities would have been thoroughly explored by now. Nothing could be further from the truth. Advances in the transportation field, from new and better materials and procedures to creative financing mechanisms, revolutions in information processing, and improved management techniques, are evolving at such a rapid rate that I suspect we have scarcely scratched the surface.

And these advances I speak of are not just nice to have. In today's world it is essential that we innovate, and innovate with great zeal, with a passion. For unless we innovate and dramatically improve productivity and increase our ability to do more with less, we face the dire prospect of withering and dying in the world marketplace.

The monumental scope of the transportation challenge can be put in focus by considering that the United States has millions of miles of air routes, roads, railroads, waterways, and transit systems serving virtually every place where people live, work, shop, or visit. Moreover, the provision of these transportation facilities and services must be coordinated with literally thousands of independent political units and interest groups; the facilities and services must not only be adequately designed and constructed, but must be safe, efficient, cost-effective, and environmentally acceptable.

It is in this complex atmosphere of technological advances and of challenges to effectively apply new technology to better serve the transportation needs of America's citizens that the expertise provided by TRB is so critical. I want to briefly cover two aspects of TRB's activities that are particularly important in helping us put improved technology to work to meet changing public and political expectations.

In the complex atmosphere of technological advances and of challenges to effectively apply new technology to better serve the transportation needs of America's citizens, the expertise provided by TRB is critical.

Cooperative Research Projects

TRB conducts an extensive cooperative research effort. Each of the 50 states, plus the District of Columbia and Puerto Rico, voluntarily contributes funds to the cooperative research programs each year to provide a pool of resources to address common problems faced by all. Candidate projects are solicited from highway organizations, and once each year state officials meet to select the top-priority projects to be worked on. Typically, approximately 20 topics are selected; TRB's volunteer panels then select the best-qualified research organization to work on each. TRB manages the research contractors, makes sure that the projects stay on track and produce results that are directly applicable to federal, state, and local transportation programs, and distributes these results extensively among practicing agencies.

For example, one recent cooperative research project developed modern, technologically up-to-date specifications for elastomeric bearings in bridges. Most of us drive over bridges without realizing that they even contain such a part; yet these rubber pads facilitate movement at the ends of bridge girders, which, in turn, avoids structural distress and concrete cracking problems. The TRB study explored alternative designs and recommended appropriate standards for different types of facilities. The new specifications for elastomeric bearings were quickly applied in practice through the widely used design specifications adopted by the American Association of State Highway and Transportation Officials (AASHTO).

Similarly, TRB's cooperative research program has been valuable in cutting transit operating costs. For example, many of the nation's transit systems use small buses for part or all of their operations. The products available in this size are highly diverse, just as are the types of services that use them. Transit operators, faced with only having the bus manufacturers' specifications and performance claims on which to base purchasing decisions, were experiencing great difficulty in selecting equipment that was most appropriate and economical for their particular application. To help alleviate this widespread difficulty, a TRB cooperative research project examined transit systems using different types of equipment, and collected extensive data on the performance of each type of equipment in various applications. These data were then used to formulate a process for estimating the life-cycle costs of alternative equipment in different applications, which would allow transit agencies to tailor cost-effective solutions to their own particular equipment requirements. The industry's response was immediate and widespread. Hundreds of transit agencies requested information on the performance-based life-cycle-cost procedures, and many agencies are now making more economical equipment investment decisions as a result.

TRB has also been a leader in com-

piling and publishing reference materials to facilitate the many engineering decisions that must be made about the design and construction of transportation facilities. One of the most widely used of these is the *Highway Capacity Manual,* which provides analysis procedures for highway design and operational features. Use of these procedures enables transportation agencies to benefit from past research and experience and helps ensure that the facilities we build are safe, durable, and cost-effective. Many of these procedures have subsequently been adopted as standards by AASHTO and the Federal Highway Administration. Given the many diverse agencies responsible for building and maintaining transportation facilities, guides such as the *Highway Capacity Manual* are invaluable in bringing a degree of uniformity into the transportation business.

We have all heard the statistics that one worker in six in the United States is employed in transportation, and that some 15 to 20 percent of the GNP comes from transportation. These are enormous stakes. Just as important, though, is the role of transportation in preventing accidental death and injury, in maintaining a clean environment, and in shaping urban and regional development. Each of us, within recent memory, has seen dramatic changes in our transportation system; every aspect of this vast system has advanced, a step at a time, through progress made by individual states, through public and private sector developmental efforts, and through research programs. Indeed, the products of TRB's cooperative research programs have been one of the keys to this sustained progress, and I know that the widespread use of these products in Pennsylvania, and throughout the nation, has not only saved hundreds of millions of dollars, but has also helped to make transportation more convenient, safer, and more supportive of environmental, social, and economic objectives.

Technology Transfer

The creation of innovative methods and products is crucial, but knowing they are available and knowing how to use them are just as important. In this highly decentralized industry, those of us working in any one transportation agency see only a small part of the total system. We often innovate and experiment extensively within our own domains, but even so, we cannot possibly be involved in all that is going on in other agencies and programs. We use TRB as our window on the world to overcome this limitation. TRB's various programs promote the development of new concepts, processes, and materials. TRB has been around since the nation's highway program was preoccupied with digging the farmer out of the mud—we've done that and much more. TRB has been such a positive force for progress that it would be difficult to find any major advance within our vast transportation system that TRB has not helped to nurture and encourage.

To keep the decentralized transportation industry coordinated and current on all the safety, environmental, technical, legal, and administrative developments bearing on its work, TRB maintains some 170 standing committees on virtually every aspect of transportation, ranging from airport operations to traffic signal systems. The membership of these committees is drawn from some 3,000 professionals in all parts of the transportation industry, who volunteer their time and expertise. I strongly encourage my professional staff to participate actively in these committees. It helps keep us current on what is new, what works, and what does not.

The widespread use of the products of TRB's cooperative research programs—in Pennsylvania and throughout the nation—has not only saved hundreds of millions of dollars, but has also helped to make transportation more convenient, safer, and more supportive of environmental, social, and economic objectives.

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Also, by maintaining volunteer committees with expertise in a wide range of technical specialties, TRB is poised to apply its technical expertise very quickly when conditions require. For example, during the process of designing the 1990 census, TRB was asked to

review the proposed transportation components. TRB quickly convened a group of knowledgeable professionals to examine needs, costs, and trade-offs. A report describing their findings was prepared that will directly influence the design and usefulness of the next census.

Another very useful technology-sharing tool provided by TRB is the Transportation Research Information Services, a computer-based catalog of ongoing and completed research on thousands of specialized transportation topics. The system enables transportation professionals to readily identify published material that can help them continue to innovate and advance. I encourage my staff to use the system to find information that will assist us in avoiding the mistakes others have made, avoiding duplicate research, and learning from the successes of others.

TRB publications reach every major transportation agency in the United States, more than 225 libraries, and approximately 8,000 practicing professionals.

Perhaps the most direct example of TRB's commitment to technology transfer is the annual TRB meeting held each January in Washington, D.C. More than 4,500 professionals from throughout the country and from numerous foreign nations gather to spend four days in concentrated technical sessions on topics ranging from statewide rail systems' planning techniques to routing shipments of hazardous materials. More than 900 technical papers and presentations are offered. Each year I send nearly 100 professionals from my staff to the TRB annual meeting. I cannot think of a better opportunity for them to share Pennsylvania's experiences, to hear the latest transportation developments, and, just as important, to interact and exchange ideas with their peers. I am convinced that this sort of exposure stimulates meaningful research and fosters innovation. My colleagues in other states obviously agree; the annual TRB meeting is a major event on our transportation calendars.

TRB's cooperative research programs and its technology transfer activities are practical and effective mechanisms for bringing technical advice to bear on transportation decision making.

Many of the technical presentations given at the annual meeting are also made available through TRB's extensive publications programs. TRB publications reach every major transportation agency in the United States, more than 225 libraries, and approximately 8,000 practicing professionals. In recent years, TRB has expanded the media through which it makes technical information available to include teleconferencing, video cassettes, and tape recordings.

Overall, TRB's cooperative research programs and its technology transfer activities are practical and effective mechanisms for bringing technical advice to bear on transportation decision making. This advice is detailed and reliable. I do not know where else transportation agencies get more for their money than by working together through TRB. Clearly, TRB has fulfilled the mandate of Congress to the National Academies in a very responsible manner.

Are They Effective in Meeting the Needs of Government Agencies and in Addressing Policy Concerns?

Increasingly, the process of building and operating our complex transportation systems involves both technical and policy considerations. Indeed, I believe that the key issues facing the transportation industry today cannot be resolved with technical solutions alone. We must fine-tune technical solutions within their political contexts. A distinguishing characteristic of TRB is that it provides the expertise and the forum necessary to present technical knowledge so that it can be understood and assessed within a highly charged political environment. Three recent instances can be cited.

First, in the Surface Transportation Assistance Act of 1982, Congress asked the NRC to assess the consequences of the national 55-mph speed limit. Bringing together safety specialists, statisticians, medical experts, traffic engineers, and other professionals, TRB conducted the most detailed assessment ever done to evaluate the safety and energy conservation benefits of the 55-mph speed limit, as well as what it has cost in additional driving time. Hundreds of analyses that had been done on the subject were reviewed, and the ramifications of different actions being considered by Congress were evaluated in detail. Although a specific policy was not recommended, Congress was provided the necessary facts and figures to deal with this politically sensitive issue.

Bringing together safety specialists, statisticians, medical experts, traffic engineers, and other professionals, TRB conducted the most detailed assessment ever done to evaluate the safety and energy conservation benefits of the 55-mph speed limit.

Second, at the request of Congress, TRB recently reviewed the future professional staffing needs in government transportation agencies. This request stemmed from a concern that the surge in hiring of transportation professionals following World War II would soon result in exceptionally high rates of retirement and possible shortages of experienced professionals. TRB collected and analyzed profile data on professionals in federal, state, and local transportation agencies. The results showed that although national shortages were unlikely, some state and local agencies could face severe problems. For example, in some states it was found that more than 40 percent of the professional work force would be eligible to retire within 5 years. TRB has drawn industry attention to this potential crisis and has provided agencies with valuable information for putting their professional staffing needs in context and for convincing their oversight bodies that exceptional anticipatory steps are required. As a result of the findings of this study, numerous agencies have become more sensitive to future staffing needs and are training, hiring, and restructuring to meet those needs.

The Federal Aviation Administration turned to TRB to develop guidelines for measuring landside capacity so that it can be consistent in any decisions it makes regarding airport capacity.

Third, in recent years, as air traffic has increased and localities surrounding airports have become alarmed at the prospect of airport expansion, some have argued that airport terminal and landside facilities have exceeded capacity. At the same time, the Federal Aviation Administration anticipates a near doubling of air traffic over the next two decades and must assure that adequate airport and airway capacity is available when and where it is needed. The Federal Aviation Administration turned to TRB to develop guidelines for measuring landside capacity so that it can be consistent in any decisions it makes regarding airport capacity. I think that it was wise to call on TRB's technical resources, institutional credibility, and close communications with all levels of government to begin a dialogue on constructive solutions to airport landside capacity constraints.

The evolution of the Strategic Highway Research Program (SHRP) is an example of the project–study approach applied by TRB to keep transportation agencies forward-looking and technically prepared.

These are but three examples of how TRB effectively brings scientific and technical information to bear on policy issues. Other organizations, public or private, would inevitably have some particular self-interest in a given issue and could not muster the independence, objectivity, and reliability that TRB provides.

Is the Project–Study Approach Best?

The project–study approach has proven extremely valuable in bringing diverse perspectives together around a common base of technical knowledge. TRB has applied this approach, as well as others, to keep transportation agencies forward-looking and technically prepared. I would cite the evolution of the Strategic Highway Research Program (SHRP) as a case in point.

The nation's transportation research programs are frugal in comparison with those of most other industries. In the case of highways, less than one-quarter of one percent of total expenditures is for research, far below what virtually every other industry spends. This current level of highway research is inadequate in many respects.

Faced with widespread concern over the deteriorating condition of the nation's transportation infrastructure, leading highway officials recognized a few years ago that we do not have all of the technological know-how we need. Through TRB, they assembled highway professionals, industry researchers, and academicians to review the situation. This group concluded that a number of critical problem areas were apparent that were too costly to be taken on by any of the existing organizations. Yet the potential was identified to save hundreds of millions of dollars through technical innovations in these areas. The experts assembled through TRB pinpointed the problem areas, sketched a possible solution, and helped AASHTO and the Federal Highway Administration move toward implementation of SHRP.

I have been personally involved in the SHRP effort, which holds enormous potential to improve the performance and efficiency of the nation's highways. It is anticipated that SHRP will be a 5-year program of about $30 million per year concentrating in six areas—asphalt, concrete, bridge decks, snow and ice control, effective maintenance techniques, and a long-term pavement testing program. SHRP is now under the management of a board of directors appointed by the National Academy of Sciences. All that remains is for Congress to act on the funding; and there is every reason to be confident that action will occur to provide one-quarter of one percent of federal-aid highway program funds for this national research effort, and that we will breathe new life into the quest for innovation in the highway business.

The project–study approach is a valuable and unique one, but it is not the only way by which the National Academies are providing technical input. For instance, two TRB activities that I men-

tioned earlier, cooperative research programs and technology transfer, do not fit the project–study mold. These programs diverge from the project–study approach because of unique features of the nation's transportation agencies and the historical circumstances that have accompanied their evolution. In particular, because TRB grew up beside a highly professional federal agency, the Federal Highway Administration, and a strong forum of state officials, AASHTO, it has evolved over the decades into a unique technical resource. It has become an organization that pushes the frontiers of technical capability, quickly gets improved techniques into practice, brings its expertise objectively into public decision making, and yet remains flexible enough to reshape itself in response to changing needs. To my observation, TRB emphasizes step-by-step technical advances rather than quantum leaps in technology. Such activities are not always the project–study ones that typify many NRC programs. But, through its painstaking attention to incremental advances, TRB is poised with the technical and organizational expertise to effectively address key issues involving fundamental public choices as they arise.

TRB has become an organization that pushes the frontiers of technical capability, quickly gets improved techniques into practice, brings its expertise objectively into public decision making, and yet remains flexible enough to reshape itself in response to changing needs.

Should They Have Support for Self-Initiated Studies?

The NRC and TRB certainly need to have the capacity to conduct self-initiated studies. In the long run, the objectivity and independence of these organizations will be enhanced if their expertise can be focused on the concerns of knowledgeable technical experts, regardless of whether government agencies are willing or able to finance activities to deal with these concerns. Some temporary corporate financial assistance for self-initiated studies has been gained during recent years, a portion of which has been directed to a visionary study of the changes that needed to be made in our transportation systems to assure the safety and mobility of older citizens. The study was undertaken with the recognition that the nation must plan now for the rapid growth in the population of older Americans that is anticipated over the next quarter century. This study could not have been launched without self-initiation capability, and I expect that the results of this effort will be an important catalyst in bringing together public and private interests to begin planning now for the changing transportation needs of tomorrow's population.

In a similar vein, I am a firm supporter of the National Academy of Engineering's (NAE) Technological Leadership Program, which was begun recently to enable the NAE to perform more self-initiated studies. The program holds great potential to advance the nation's industrial competitiveness, economic growth, and overall welfare by focusing on a spectrum of crucial issues, including engineering education and international technical exchange and cooperation. I endorse the NAE's decision to seek corporate financial support for this venture.

Should They Have Additional Functions?

The NRC and TRB have consistently exhibited the insight to add, delete, and modify programs in response to changing requirements and have done so in close coordination with the agencies that rely on their support. The current functions of the organizations have evolved in concert with technological change, and I have no doubt that they will continue to do so. The Strategic Highway Research Program, which I described earlier, is a prime example. In this case, the NRC's mechanisms for independence, objectivity, and quality are being applied to a large-scale, carefully focused project. The energy required to accommodate such a project, the disruptions it might cause to other ongoing programs, and the risks inherent in a project such as this understandably might have discouraged any agency asked to house the program. Not so in this case. The NRC worked directly with the federal and state program sponsors to craft the best solution for organizing and managing the project. I am certain that, as in the case of the Strategic Highway Research Program, the NRC and TRB will react responsibly to changing transportation needs and conditions that emerge in the future and will have the flexibility and the vision to add those functions that best serve the public interest.

How Are They Perceived by Citizens?

TRB enjoys the unparalleled respect of the public and especially of those of us working in the transportation field who rely on its trustworthy expertise. Its reputation for excellence is literally known around the world. When I have had occasion to visit with transportation leaders from other nations, I am always impressed by the extent to which they depend on TRB for guidance, and I appreciate the confidence in American technological know-how that this relationship builds. More often than not, the libraries of foreign transportation agencies consist largely of TRB publi-

cations. Clearly, this evidence of confidence and respect establishes beyond a doubt the effectiveness of the organization and its importance to the transportation industry. It is inconceivable that the leadership of this industry would want to proceed without the technical expertise that TRB provides.

Continued public financial support of TRB is definitely in the nation's best interest, as the apparent public desire for technological innovation and the need for an unbiased organization to address citizens' transportation concerns would indicate. The prestige of TRB activities and accomplishments should strongly influence government's use of and support for this organization. In an age in which rigid organizational structures sometimes make innovation difficult, transportation agencies have forged a uniquely effective partnership with TRB. We all benefit from the fruits of this partnership: innovation accelerates, productivity increases, quality improves, good ideas spread, and problems get solved. TRB is an important key to making all of this happen in today's transportation business.

In an age in which rigid organizational structures sometimes make innovation difficult, transportation agencies have forged a uniquely effective partnership with TRB.

This concludes my testimony, Mr. Chairman. I assure you of my full support to work with this task force and with the NRC and TRB to further the objectives of the National Academies. It has been a pleasure to be here today to speak in support of these important national efforts. I would be pleased to respond to any questions you may have.

Information on Visual Aids Procedures for the 1987 TRB Annual Meeting

TRB's 66th Annual Meeting will be held January 12–15, 1987 (see details in May–June 1986 issue of *TRNews*). Authors/speakers who have participated in previous TRB Annual Meetings are most likely aware of the TRB visual aid approval process. Those who are not acquainted with the process should become familiar with it because there are significant penalties for those who fail to submit visual aids for review and approval, or for those who submit them later than the December 1 deadline. The rules are explained in the *1986 Information for Authors and Speakers* brochure. Copies are available from TRB on request. The same brochure also gives the readability requirements for overhead transparencies, which are being permitted in Annual Meeting sessions for the first time in 1987.

To ease the burden for TRB staff in checking visual aids (which typically number about 15,000) late in the year, and particularly to ease the burden for authors, TRB has instituted a procedure by which visual aids of all authors submitting papers from a single institution can be reviewed by an individual in that institution appointed to conduct the review. This enables authors to submit their visual aids later than the December 1 deadline without having to pay late fees. TRB invites inquiries from any institution having interest in providing this service for its authors. Inquiries should be addressed to Jewelene Gaskins, Visual Aids Coordinator, Transportation Research Board, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.