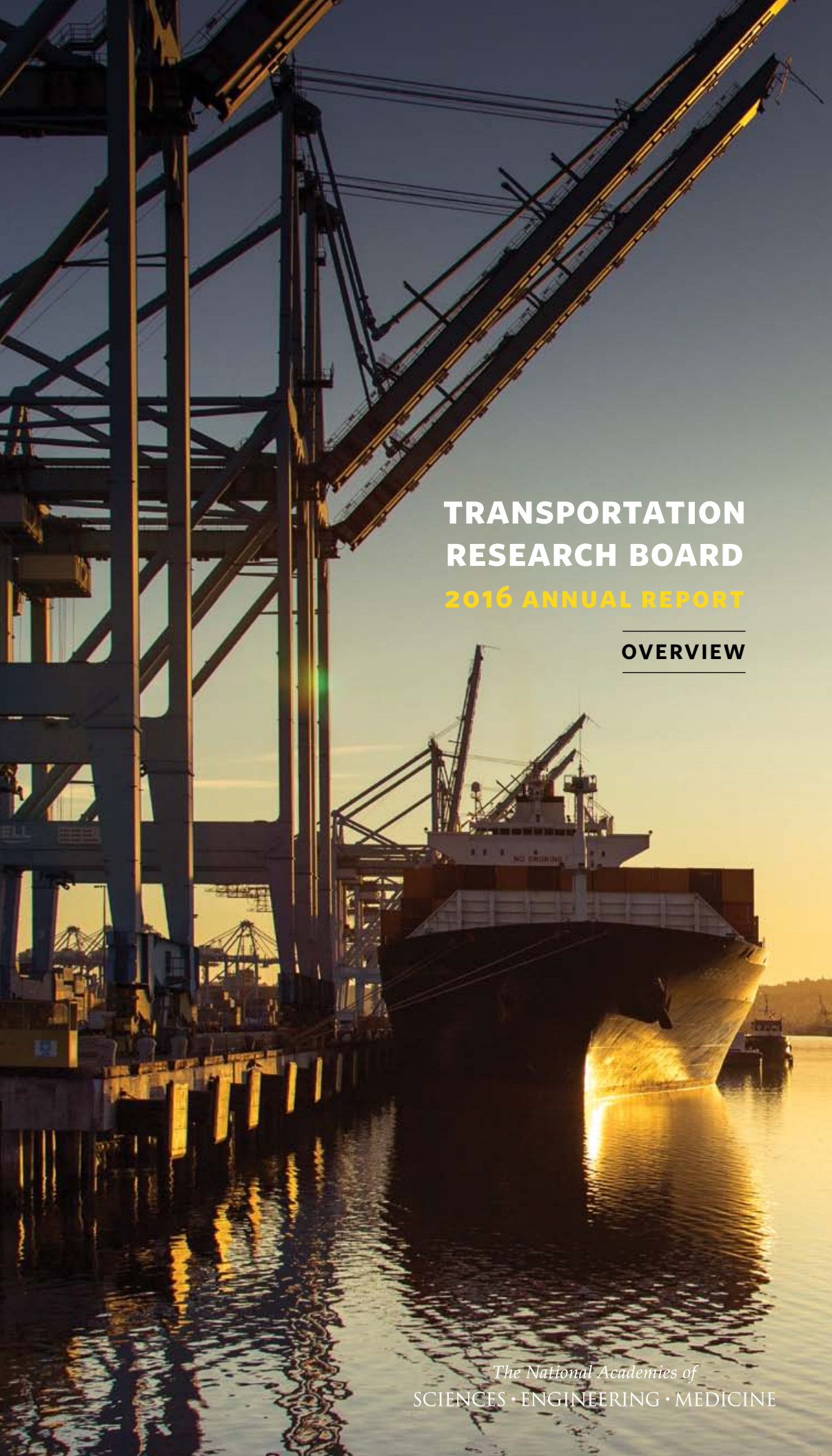


The National Academies of
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of Sciences, Engineering, and Medicine for
independent, objective advice on issues that
affect people's lives worldwide.

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**TRANSPORTATION
RESEARCH BOARD**
2016 ANNUAL REPORT

OVERVIEW



The **National Academy of Sciences** was established in 1863 by an Act of Congress, signed by President Lincoln, as a private, nongovernmental institution to advise the nation on issues related to science and technology. Members are elected by their peers for outstanding contributions to research. Dr. Marcia McNutt is president.

The **National Academy of Engineering** was established in 1964 under the charter of the National Academy of Sciences to bring the practices of engineering to advising the nation. Members are elected by their peers for extraordinary contributions to engineering. Dr. C. D. Mote, Jr., is president.

The **National Academy of Medicine** (formerly the Institute of Medicine) was established in 1970 under the charter of the National Academy of Sciences to advise the nation on medical and health issues. Members are elected by their peers for distinguished contributions to medicine and health. Dr. Victor J. Dzau is president.

The three Academies work together as the National Academies of Sciences, Engineering, and Medicine to provide independent, objective analysis and advice to the nation and conduct other activities to solve complex problems and inform public policy decisions. The Academies also encourage education and research, recognize outstanding contributions to knowledge, and increase public understanding in matters of science, engineering, and medicine.

Learn more about the National Academies of Sciences, Engineering, and Medicine at **www.national-academies.org**.

The **Transportation Research Board** is one of seven major programs of the National Academies of Sciences, Engineering, and Medicine. The mission of the Transportation Research Board is to increase the benefits that transportation contributes to society by providing leadership in transportation innovation and progress through research and information exchange, conducted within a setting that is objective, interdisciplinary, and multimodal. The Board's varied committees, task forces, and panels annually engage about 7,000 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest. The program is supported by state transportation departments, federal agencies including the component administrations of the U.S. Department of Transportation, and other organizations and individuals interested in the development of transportation.

Learn more about the Transportation Research Board at **www.TRB.org**.



MAKING PROGRESS FOR TRB's STAKEHOLDERS | INITIATIVES AND IMPACTS

A MAJOR PROGRAM DIVISION of the National Academies of Sciences, Engineering, and Medicine, the Transportation Research Board (TRB) is recognized as one of the world's leading transportation research organizations. TRB is perhaps best known for its Annual Meeting held each January in Washington, D.C.; the 2016 meeting—TRB's 95th—attracted a record 12,500 attendees. TRB also is known for its other convening activities, such as workshops,



Through meetings, publications, policy studies, and more, the Transportation Research Board serves its mission to convene, research, and advise. (Photo: Risdon Photography)

conferences, symposia, webinars, and committee meetings.

In addition, TRB supports the conduct of research through its Cooperative Research Programs; the publication of research through the *Transportation Research Record: Journal of the Transportation Research Board* and other publications; presentation of research results through its convening activities; and the cataloguing of research through the Transportation Research Information Documentation—or TRID—database, which contains more than 1.1 million entries of published transportation research. TRB also produces highly respected and influential policy studies, which provide advice to the nation on important and complex policy issues.

ORGANIZATION

The National Academies of Sciences, Engineering, and Medicine honor the foremost scientists, engineers, and medical professionals in the nation; members of the National Academies are called on to provide evidence-based policy advice on issues related to science, engineering, and medicine. Known for its standards of objectivity, the expertise it is able to assemble, and the rigorous review process for its reports and recommendations, TRB's parent institution provides advice to Congress, the Administration, and other policy makers for the development of legislation, regulations, and implementation plans.

As one of seven program divisions, TRB benefits tremendously from the Academies' expertise and credibility. TRB's collaborations with other parts of the Academies continue to increase.



Neil Pedersen, TRB Executive Director (left), and James Crites, 2016 Executive Committee Chair (right). (Photo: Risdon Photography)



The 2016 Technical Activities Council guides the work of TRB's more than 200 standing committees. (Photo: Risdon Photography)

TRB relies on the knowledge and service of volunteers who are experts in all subjects related to transportation. More than 7,000 volunteers participate on TRB committees and research panels. The TRB Executive Committee, with 26 appointed members and 20 ex officio members, provides strategic direction and oversight for the Board's activities. Executive Committee members come from organizations representing government, academia, and private-sector companies and all modes of transportation.

TRB's more than 200 standing committees cover all modes and related subject areas. The Technical Activities Council provides oversight for these committees; the Council consists of the chairs of the 11 topical groups of committees. Each committee comprises approximately 30 to 35 members, with additional volunteers on its friends list. The committees organize Annual Meeting and conference sessions, review approximately 6,000 papers submitted for presentation at the annual meeting and for publication in the journal, develop research problem statements for consideration by the Cooperative Research Programs and other research organizations, and serve as communities of practice for experts in their respective subject areas. TRB's Technical Activities Division staff supports the work of the standing committees.

TRB's policy studies assemble the foremost experts in the topics to be addressed. Policy study

committees are constituted to balance expertise and perspectives, to ensure objectivity, and to avoid conflicts of interest. The hard work, dedication, commitment, and expertise of its volunteers have enabled TRB to produce key policy studies. TRB's Studies and Special Programs Division provides staff support.

Almost 2,000 volunteers serve on panels for TRB's Cooperative Research Programs. Each program manages contracted research to develop products useful to practitioners who manage and operate transportation systems. Each program has an oversight committee that selects projects, and each project has a panel of experts who provide direction, oversight, and review of the contracted research. TRB's Cooperative Research Programs Division supplies staff support for these activities.

TRB's Executive Office provides strategic direction and oversight of staff, as well as a variety of administrative, publication, communications, and information technology functions.

TRB's 2016 budget was \$88 million. With the number of volunteers involved in TRB, the logistics required to support convening activities, the amount of contracted research undertaken, the number of sponsors providing financial support, and the number of special studies, the management of TRB's finances is a complex task. TRB's Administration and Finance Division handles these assignments.

For a summary of key accomplishments by each of these organizational units in 2016 and for detailed reports, see the full version of the TRB 2016 Annual Report.



Senior program officer Ed Harrigan (right) leads a panel discussion for a National Cooperative Highway Research Program project on guidelines for solid-state roadway lighting.



The South Carolina Army National Guard helps local law enforcement work a traffic control point in Myrtle Beach during a statewide response to Hurricane Matthew in early October. Increasing numbers of severe weather events cause new challenges for transportation networks. (Photo: Jorge Intriago, U.S. Air National Guard)

STRATEGIC INITIATIVES

In June 2014, the TRB Executive Committee adopted a five-year strategic plan to guide TRB volunteers and staff on several initiatives. To ensure a focus on the most important current and future issues, the Executive Committee identified three strategic areas for TRB programs and activities in the next few years. These emerging topics affect all modes and sectors of transportation. The oversight committees of each TRB division are charged with identifying ways to advance the state of knowledge and the state of practice in the three strategic areas.

Transformational Technologies

Advances in technology have the potential to change fundamentally the way that transportation services are provided and to improve safety, mobility, and sustainability significantly. TRB continues to convene experts and to manage research in the areas of connected and automated vehicles, which have the potential to reduce significantly the number of crashes caused by human error and to improve system efficiency.

Technology-enabled mobility services are altering the way that people travel, particularly in metropolitan areas; with automated vehicles, these services may change the automobile ownership model in the United States and worldwide. Unmanned aerial systems can change freight delivery. These services and the capture, processing,

and availability of data from sensors throughout the transportation system can change the use of real-time information to inform travel decisions and to manage the system efficiently.

Smart transportation, as part of the concept of smart cities, can significantly improve the quality of transportation services and the quality of life. TRB is at the forefront of sharing state-of-the-practice information and managing research on issues associated with these transformational technologies.

Resilience

The transportation system increasingly faces disruptions from natural or man-made disasters. Severe weather events have become more frequent and have closed down or adversely affected the operation of the transportation system. Terrorists have targeted physical and cyber elements of the system and have severely disrupted the mobility of passengers and freight.

Planning for natural and man-made disruptions, identifying ways to manage during the disruptions, and recovering from the disruptions as quickly as possible have become priorities for transportation system owners and operators. TRB is convening meetings and conducting research activities related to resilience. An Executive Committee task force has identified a strategic plan for addressing these issues in a coordinated manner.

Public Health and Transportation

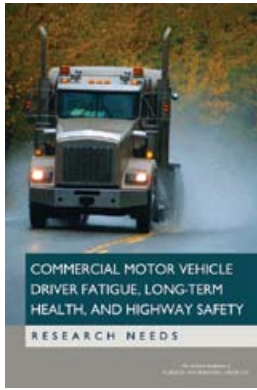
Public health is an important societal goal that transportation can and should help support. Some of the many ways that transportation can



In response to the TRB strategic plan, the Executive Committee Task Force on Transformational Technologies in Transportation developed E-Circular 208, *Transformational Technologies in Transportation: State of the Activities*. For more information, visit www.trb.org/Publications/Blurbs/174370.aspx.



Leslie Meehan, Tennessee Department of Health, briefs the TRB Executive Committee at a session on advancing public health through transportation. (Photo: Risdon Photography)



TRB collaborated with the Division of Behavioral and Social Sciences and Education, the Committee on National Statistics, and the Board on Human-Systems Integration on a study examining *Commercial Motor Vehicle Driver Fatigue, Long-Term Health, and Highway Safety: Research Needs*.

contribute to improving public health include reducing fatalities and injuries from traffic crashes, improving access to health care facilities, reducing the health-related impacts of transportation from air and noise pollution, reducing the role of transportation in the spread of communicable diseases, addressing the mobility needs of the elderly and disabled, and improving health by encouraging active transportation—such as walking and bicycling.

At the Forefront

Executive Committee task forces have developed plans for placing TRB at the forefront in addressing these strategic issues. TRB standing committees are identifying ways to address each issue from their perspectives. The Cooperative Research Programs are developing research roadmaps for each of these areas. Policy studies continue to examine the issues affecting these areas.

TRB is leading the way in other strategic topics as well. The Executive Committee has identified goods movement as an area of interest. A variety of TRB activities taking a strategic approach related to freight are under way; as a result, freight stakeholders are more engaged in TRB activities and programs and are more aware of TRB's work in this area.

REVIEW OF LEGACY PROGRAMS

Each of TRB's oversight committees regularly reviews TRB's legacy programs to identify opportunities to address feedback received from sponsors and stakeholders and to identify improvements in processes and in the timeliness and quality of the products and services delivered. TRB's strategic plan identified several areas for focus.

Transportation Research Record

A group of experts from peer journals reviewed the TRB editorial and production processes for articles after acceptance to the *Transportation Research Record* by TRB's standing committees. Applying recommendations from this peer review, TRB has developed an implementation plan to enable earlier online availability of journal articles. In addition, the earlier assignment of digital object identifiers for articles should help increase the citation impact factor for TRB's journal. A special task force is examining the entire peer

review process—from the initial calls for papers through submission, review, and acceptance—to identify efficiencies and to ensure that only high-quality articles are accepted for publication.

Cooperative Research Programs

At the request of sponsors and stakeholders, the Cooperative Research Programs have set a priority to reduce the time from the initial submission of problem statements to the availability of research results and reports. The programs' oversight committees and staff have undertaken process reviews and have identified opportunities to perform steps in parallel instead of in linear sequence, particularly during project selection and contracting. Also identified were ways to undertake more high-priority research through open-ended task order contracts, reducing the time required for procurement.

Several Cooperative Research Programs projects are making reports available online after acceptance by peer review, before the final editing; this makes research results and products available three to six months before the publication of the final edited report.

The Cooperative Research Programs are developing research road maps for select priority areas. This will ensure a more strategic approach to identify priority research and to address important areas that may not surface through the more traditional problem statements.

A major focus is the implementation of research results. This includes the pilot testing of usable products and increased dissemination activities to promote stakeholder awareness and understanding of the research products' benefits.

STRENGTHENING FINANCES

TRB improved its financial outlook significantly in 2016. To draw down the reserves for core programs from levels that were higher than targeted, TRB had operated under a budget deficit for the past several years, but this was not sustainable. At the same time, TRB had faced uncertainty about its long-term revenues without long-term authorization legislation for surface transportation.

The five-year Fixing America's Surface Transportation (FAST) Act, passed in December 2015, offers greater certainty about revenues from federal sources and enables long-term financial planning. The largest share of revenues for TRB's Technical Activities and Cooperative Re-



Christopher Poe, Texas A&M Transportation Institute, addresses the 2016 Automated Vehicles Symposium, cosponsored by TRB and the Association for Unmanned Vehicle Systems International. (Photo: Texas A&M Transportation Institute)

search Programs comes from state departments of transportation (DOTs) through contributions from each state's Statewide Planning and Research funds. With modest increases in these funds projected through FY 2021, the state DOT contributions to TRB will increase proportionally, helping TRB to remain on a sounder financial footing through the end of the FAST Act.

At the same time, however, significant earmarking of Federal Highway Administration (FHWA) research, development, and technology funds has reduced FHWA's contribution to TRB's Technical Activities. This will be offset in part through contributions from new sponsors: the Department of Energy, the Environmental Protection Agency, and the California Air Resources

Board. TRB also relies on annual meeting registration fees, exhibits, and patrons as a source of revenue, and these continue to increase each year.

TRB is looking for opportunities to diversify and increase its revenue sources. The TRB Executive Committee's New Revenues Task Force is exploring opportunities to attract new support from the public and private sectors. TRB launched a planned giving program in 2016 that enables individuals to support TRB activities through bequests or other contributions.

TRB's 2016 financial statement is shown on pages 8–9.

DIVERSIFYING PARTICIPATION

The more than 7,000 volunteer participants on TRB committees and panels represent a diverse array of transportation community sectors and disciplines. It is critical that TRB reflect changes as the transportation community evolves and diversifies. TRB therefore has focused on expanding participation from underrepresented sectors, particularly among new technology firms; diversifying participation by gender, race, and young professionals; pursuing a more strategic approach to international activities; and partnering with other transportation professional organizations.

Technology innovations are disrupting the way that transportation services are provided, and TRB has recognized that transportation is attracting the involvement of many new actors from the technology sector. TRB proactively has sought to



Victor Mendez, Deputy Secretary of Transportation, welcomes Minority Fellows and their faculty advisers to the 2016 Annual Meeting. (Photo: Risdon Photography)



TRB's new communications materials include a brochure describing its mission.

involve participants from technology firms in activities, as well as to identify research needs. For example, attendance at TRB's automated vehicles conference has grown to more than 1,200, and many of the participants had no previous involvement in TRB activities. A TRB symposium in fall 2016 identified research needs across the range of transformational technologies. TRB is partnering with other organizations interested in transformational technologies in transportation.

During 2016, TRB developed and adopted a management plan for diversity and inclusion, identifying strategies to engage a diverse, inclusive pool of stakeholders representative of the community that TRB serves. TRB is continuing its focus on increasing the gender, racial, and age diversity of its committees and panels. Staff have partnered with leaders at organizations that serve female, minority, and young transportation professionals, to engage their members in TRB activities. In 2016, the TRB Minority Fellows Program nearly doubled the number of students who received financial assistance to attend the TRB Annual Meeting from historically minority-serving colleges and universities.

An Executive Committee task force reviewed TRB's international activities and recommended an approach to increase international participation related to strategic initiatives. For example, a joint symposium with the European Union and U.S. DOT addressed the subject of climate

change adaptation, part of TRB's strategic focus on resilience. Similarly, a new memorandum of understanding will improve the sharing of information and resources between the World Road Association and TRB.

TRB is actively working to partner with other transportation organizations to identify areas of common interest and potential joint activities. These partnerships can increase the participation by members of these organizations in TRB.

MEASURING THE IMPACTS

The TRB strategic plan called for more systematic approaches to identify and track the impacts of TRB activities. In 2016, the National Cooperative Highway Research Program (NCHRP) established the staff position of Implementation Coordinator, and the Airport Cooperative Research Program (ACRP) has hired a contractor to track the impacts of research products. NCHRP, ACRP, and the Transit Cooperative Research Program have conducted periodic surveys to collect information on the use of their research. Committees receiving a regular allocation of Cooperative Research Programs funds now must report annually on the benefits from previously funded projects.

Working with the National Academies, TRB is employing new tools and databases for tracking the impacts of products. Information about who is using the products, about how the products are being used, and the comments about the products are more readily available than ever before. In the

past year, TRB started tracking references to TRB products in federal and state legislation, regulations, and standards, and in testimony delivered before Congress.

The information is providing a better understanding of TRB's regional, national, and global influence and demonstrates the value of the products to stakeholders. The feedback will help TRB to enhance the value and quality of its services and products continuously.

COMMUNICATING ABOUT PROGRAMS AND ACTIVITIES

Current and potential stakeholders are not always well acquainted with the extent of TRB's diverse portfolio of products and services. TRB therefore adopted a communications and marketing plan to guide efforts to increase awareness and knowledge of TRB products and services within the transportation professional community.

The first step was the development and distribution of a new brochure, a video, and a PowerPoint presentation. TRB staff and volunteers have used these communications materials at outreach events, including conferences and the annual meetings of partner organizations. TRB collected feedback from readers about its e-newsletter, and work began on redesigning the TRB.org homepage.

TRB's popular webinar series has continued to grow and has proved an effective means of increasing stakeholder awareness of TRB reports and current issues in transportation. TRB has started webcasting selected conferences, enabling those who cannot attend in person to participate remotely.

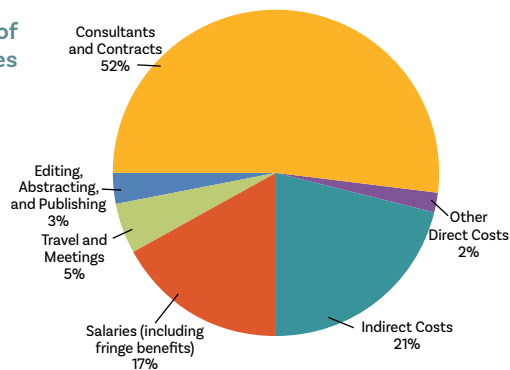
TRB is committed to meeting the needs of its stakeholders. Feedback and suggestions are welcome—go to the TRB Message Center online: www.trb.org/Contact/GeneralQuestions.aspx, or call 202-334-2934.

STATEMENT OF ACTIVITIES

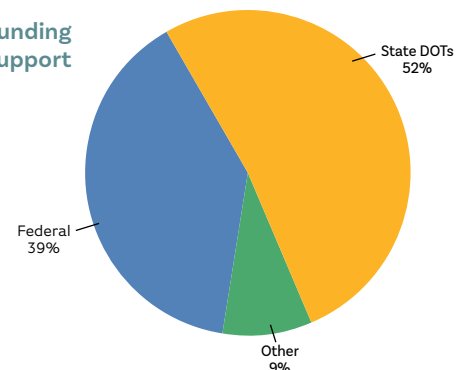
FUNDING SUPPORT BY PROGRAM AND EXPENDITURES, CALENDAR YEARS 2015 AND 2016

	2015 (Actual)	2016 (Projected)*
Core Technical Activities		
State Highway and Transportation Departments (State DOTs)	\$6,973,000	\$7,140,000
Federal Government		
Federal Highway Administration (FHWA)	1,900,000	1,675,000
Office of the Assistant Secretary of Transportation for Research and Technology (OST-R)	300,000	300,000
Federal Transit Administration (FTA)	250,000	250,000
National Highway Traffic Safety Administration	208,000	212,000
Bureau of Indian Affairs, Department of the Interior	80,000	85,000
Federal Motor Carrier Safety Administration (FMCSA)	75,000	75,000
Department of Energy (DOE)	0	65,000
Federal Aviation Administration (FAA)	65,000	65,000
Federal Railroad Administration (FRA)	65,000	65,000
U.S. Air Force Civil Engineer Center	65,000	65,000
U.S. Army Corps of Engineers	75,000	75,000
Subtotal, Federal Government	\$3,083,000	\$2,932,000
Other		
American Public Transportation Association	65,000	65,000
Association of American Railroads	65,000	65,000
South Coast Air Quality Management District, California Fees and Sales	5,730,000	5,943,000
Subtotal, Other	\$5,925,000	\$6,138,000
Total, Core Technical Activities	\$15,981,000	\$16,210,000
Marine Board Core Program		
U.S. Coast Guard	75,000	75,000
U.S. Army Corps of Engineers	75,000	75,000
National Oceanic and Atmospheric Administration	40,000	40,000
Bureau of Safety and Environmental Enforcement	30,000	30,000
Maritime Administration	19,000	19,000
U.S. Navy	12,000	12,000
Total, Marine Board Core Program	\$251,000	\$251,000
Cooperative Research Programs (CRP)		
National Cooperative Highway Research Program (State DOTs)	34,479,000	34,066,000
Airport Cooperative Research Program (FAA)	15,865,000	13,320,000
Transit Cooperative Research Program (FTA)	4,179,000	4,409,000
National Cooperative Freight Research Program (OST-R)	1,558,000	391,000
National Cooperative Rail Research Program (FRA)	1,529,000	438,000
Hazardous Materials Cooperative Research Program (Pipeline and Hazardous Materials Safety Administration)	258,000	86,000
Total, Cooperative Research Programs	\$57,868,000	\$52,710,000

Distribution of TRB Expenditures



TRB Funding Support



	2015 (Actual)	2016 (Projected)*
Strategic Highway Research Program 2 (SHRP 2)	\$4,413,000	\$0
SHRP 2 Safety Data Phase 1	\$3,358,000	\$5,407,000
Continuing Programs		
Innovations Deserving Exploratory Analysis (IDEA)		
NCHRP IDEA (State DOTs)	1,391,000	1,315,000
Transit IDEA (FTA)	517,000	366,000
Safety IDEA (FRA)	273,000	241,000
Subtotal, IDEA Programs	\$2,181,000	\$1,922,000
Synthesis Programs		
NCHRP Synthesis (State DOTs)	1,868,000	2,051,000
ACRP Synthesis (FAA)	1,276,000	1,033,000
TCRP Synthesis (FTA)	570,000	729,000
Subtotal, Synthesis Programs	\$3,714,000	\$3,813,000
Legal Programs		
NCHRP Legal (State DOTs)	453,000	293,000
TCRP Legal (FTA)	106,000	188,000
ACRP Legal (FAA)	6,000	4,000
Subtotal, Legal Programs	\$565,000	\$485,000
Total, Continuing Programs	\$6,460,000	\$6,220,000
Policy Studies	\$3,577,000	\$4,033,000
Conferences and Workshops	\$2,165,000	\$2,314,000
TRB TOTAL	\$94,073,000	\$87,386,000
Sources of Funds		
Federal	41,007,000	33,977,000
State DOTs	45,164,000	45,106,000
Other	7,902,000	8,303,000
	\$94,073,000	\$87,386,000
Expenditures by Major Cost Category		
Salaries (including fringe benefits)	14,289,000	14,926,000
Travel and Meetings	5,057,000	4,787,000
Editing, Abstracting, Publishing	2,854,000	2,299,000
Consultants and Contracts	51,857,000	45,546,000
Other Direct Costs	2,200,000	1,913,000
Indirect Costs	18,845,000	18,263,000
Total Expenditures	\$95,102,000	\$87,734,000

TRB Reserve Fund

Fund balance, end of previous fiscal year	\$17,763,000	\$16,734,000
Plus (minus) current fiscal year income over (under) expenditures	(1,029,000)	(666,000)
Balance, current fiscal year	\$16,734,000	\$16,068,000

In 1965, the TRB Executive Committee approved a reserve fund to provide for orderly adjustments in the event of a temporary shortfall in anticipated revenues for TRB Technical activities. This fund, built up over the years from surplus income in excess of expenditures from nonfederal sources for any one fiscal year, is reserved for expenditures in excess of income for any later fiscal year under a fixed budget approved triennially by the TRB Executive Committee.

*Calendar Year 2016 comprises actual data through October and estimates for the rest of the year.