BUILDING THE VISION

TRB
SHRP2
STRATEGIC HIGHWAY RESEARCH PROGRAM

THE SECOND STRATEGIC HIGHWAY RESEARCH PROGRAM

ACCELERATING SOLUTIONS FOR HIGHWAY SAFETY, RENEWAL, RELIABILITY, AND CAPACITY

2008 ANNUAL REPORT

TRANSPORTATION RESEARCH BOARD 2009 EXECUTIVE COMMITTEE

(Membership as of June 2009)

2008 ANNUAL REPORT

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Cover photograph taken by John Huseby and provided by courtesy of the California Department of Transportation.

The Strategic Highway Research Program (SHRP 2)

America's highway system is critical to meeting the mobility and economic needs of local communities, regions, and the nation. Developments in research and technology—such as advanced materials, communications technology, new data collection technologies, and human factors science—offer a new opportunity to improve the safety and reliability of the nation's highway system. Breakthrough resolution of some significant transportation problems requires concentrated resources. The second Strategic Highway Research Program (SHRP 2) has an intense, large-scale focus, integrates multiple fields of research and technology, and is fundamentally different from the broad, mission-oriented, discipline-based research programs that have been the mainstay of highway research for half a century.

The need for SHRP 2 was identified in *TRB Special Report 260: Strategic Highway Research: Saving Lives, Reducing Congestion, Improving Quality of Life*, published in 2001 and based on a study sponsored by Congress through the Transportation Equity Act for the 21st Century (TEA-21). SHRP 2, modeled after the first Strategic Highway Research Program, is a focused, time-constrained, management-driven program designed to complement existing highway research programs. SHRP 2 focuses on applied research in four focus areas, which were selected on the basis of their importance to the nation's economy and quality of life, and because strategically targeted research in these areas promises to yield high payoffs. The focus areas are: Safety, to prevent or reduce the severity of highway crashes by understanding driver behavior; Renewal, to address the aging infrastructure through rapid design and construction methods that cause minimal disruptions and produce lasting facilities; Reliability, to reduce congestion through incident reduction, management, response, and mitigation; and Capacity, to integrate mobility, economic, environmental, and community needs in the planning and designing of new transportation capacity.

SHRP 2 was authorized in August 2005 as part of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The program is managed by the Transportation Research Board (TRB) on behalf of the National Research Council (NRC). SHRP 2 is conducted under a memorandum of understanding among the American Association of State Highway and Transportation Officials (AASHTO), the Federal Highway Administration (FHWA), and the National Academy of Sciences, parent organization of TRB and NRC. The program provides for competitive, merit-based selection of research contractors; independent research project oversight; and dissemination of research results.

SHRP 2 takes a customer-oriented view of highway needs, addressing them from a system perspective, is open to research in nontraditional highway-related areas, and explicitly acknowledges the interdependence of highway research and technology programs. Special emphasis is placed on disseminating SHRP 2 results to the intended end-users of the research, and many SHRP 2 products may be adapted as standards, guides, and practices at the local, state, or federal level.

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

The **National Academy of Sciences** is a private, nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. On the authority of the charter granted to it by the Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters. Dr. Ralph J. Cicerone is president of the National Academy of Sciences.

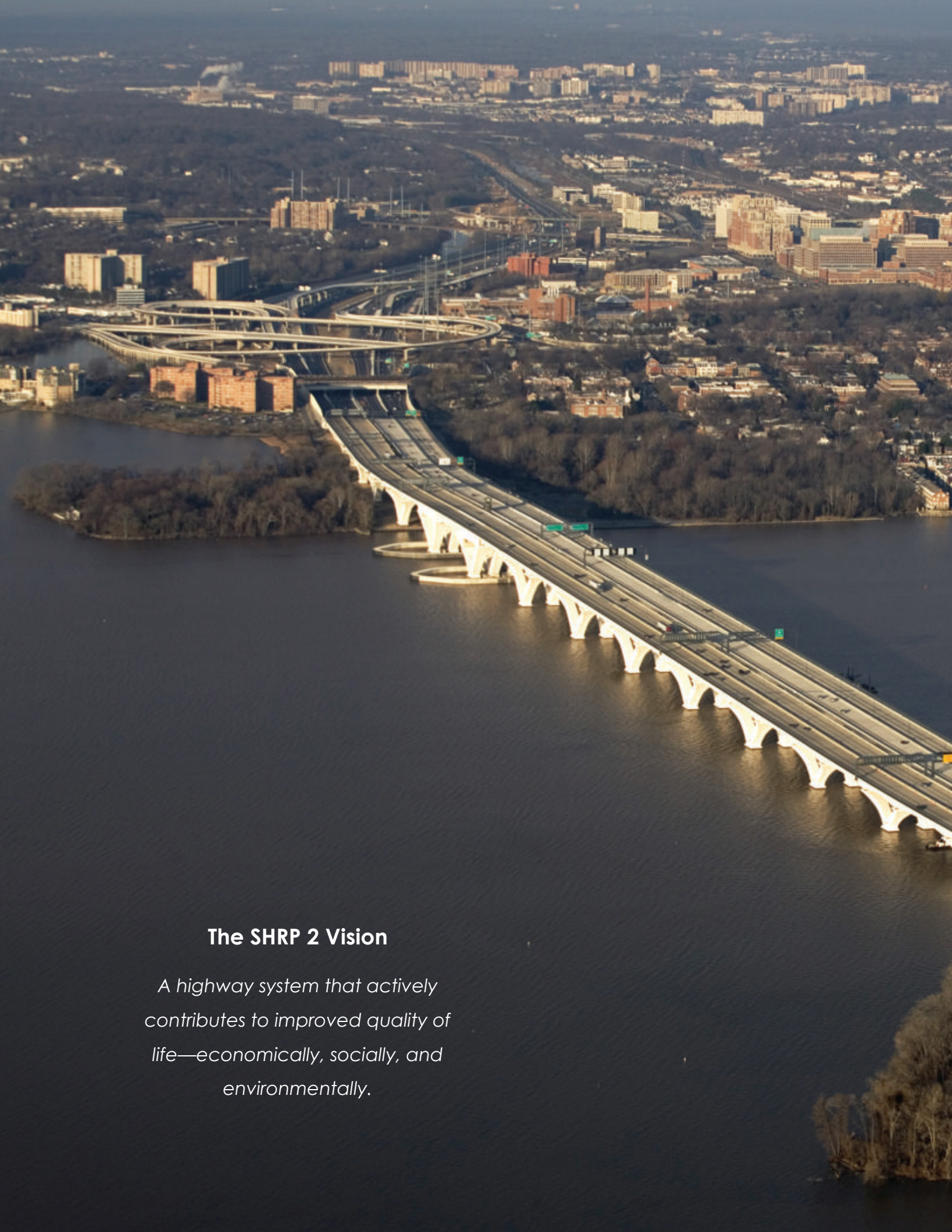
The **National Academy of Engineering** was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encourages education and research, and recognizes the superior achievements of engineers. Dr. Charles M. Vest is president of the National Academy of Engineering.

The **Institute of Medicine** was established in 1970 by the National Academy of Sciences to secure the services of eminent members of appropriate professions in the examination of policy matters pertaining to the health of the public. The Institute acts under the responsibility given to the National Academy of Sciences by its congressional charter to be an adviser to the federal government and, on its own initiative, to identify issues of medical care, research, and education. Dr. Harvey V.Fineberg is president of the Institute of Medicine.

The **National Research Council** was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both the Academies and the Institute of Medicine. Dr. Ralph J. Cicerone and Dr. Charles M. Vest are chair and vice chair, respectively, of the National Research Council.

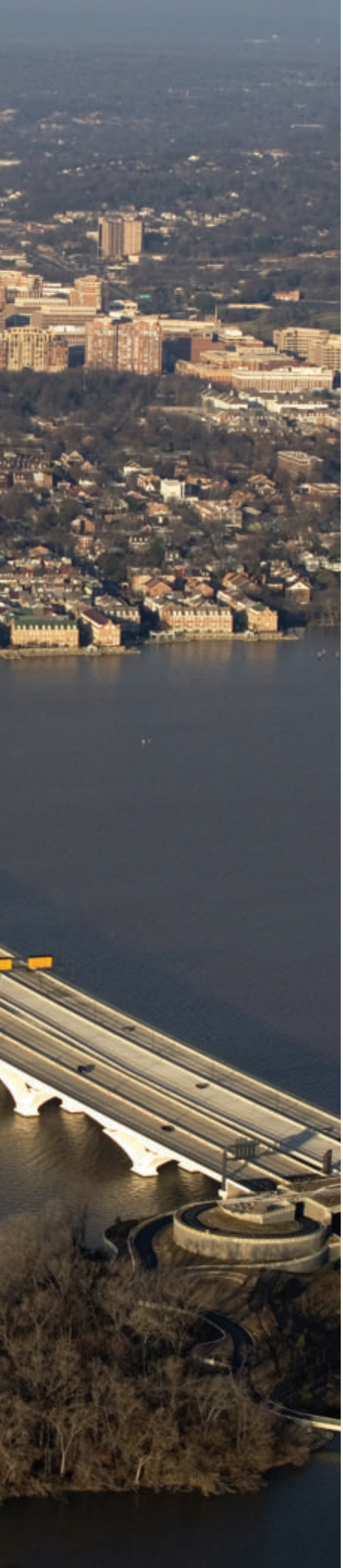
The **Transportation Research Board** is one of six major divisions of the National Research Council. The mission of the Transportation Research Board is to provide leadership in transportation innovation and progress through research and information exchange, conducted within a setting that is objective, interdisciplinary, and multimodal. The Board's varied activities 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. **www.TRB.org**

www.national-academies.org



The SHRP 2 Vision

A highway system that actively contributes to improved quality of life—economically, socially, and environmentally.



BUILDING THE VISION

The Wilson Bridge Project, one of the nation's largest public works projects, replaces a Potomac River drawbridge that was a costly bottleneck on Interstate 95. The mega-project is an award-winning example of innovation in both construction materials and management. But to the residents and highway users who accommodated construction over the last 8 years, it may have seemed that benefits were a long time coming.

Anyone awaiting results from the nation's investment in strategic highway research may have a similar sense of anticipation. Now at the end of its third year, the Second Strategic Highway Research Project (SHRP 2) can be compared to a construction project. Some time has passed since the excitement of the ceremonial groundbreaking and it will be a while yet until the structure is evident, but a great deal of work is being done daily. There have also been some change orders along the way, and as with construction projects, they created both more work and more opportunities.

Constructing frameworks—both figurative and literal—was the focus of SHRP 2 activities in 2008. The overall framework for the program, the SHRP 2 research plan, was expanded; a new framework was put in place for cementing partnerships—with transportation agencies, other research programs, and other countries. At the project level, frameworks are being constructed to house an array of research products that will be integrated to create sophisticated new tools for practitioners and, looking ahead, a framework for implementing these tools was begun.

This report summarizes progress made over the days of 2008 in building the framework and platforms needed to fulfill the SHRP 2 vision: a highway system that actively contributes to improved quality of life for all Americans by providing safe, efficient mobility in an economically, socially, and environmentally responsible manner.

(left) The new 10-lane Woodrow Wilson Bridge in December 2008, looking west to the US Route 1 interchange in Alexandria, Virginia. *Photograph by Trevor Wrayton, provided by courtesy of Virginia DOT.*

Adapting the SHRP 2 Framework

The four focus areas for SHRP 2 research were developed through almost 3 years of research and consultation with many stakeholders during a study completed in 2001. The core objectives set then have remained constant, but adjustments of scale have been required to accommodate changing levels of funding since the program began in 2006. This was true again in 2008 when the SHRP 2 Oversight Committee requested that the four Technical Coordinating Committees determine how they would reconfigure the research plans for their focus areas should additional funding become available as a result of a technical corrections act by Congress.

Working within the constrained schedule of a short-term program, the committees and staff developed prioritized recommendations for Oversight Committee approval. The projects selected underscore a commitment to robust research and to products that support changing perspectives on traditional processes. The expanded program framework now includes additional field tests and demonstration projects that will provide real-world experience to support implementation, consideration of greenhouse gases in projects that address congestion, and projects to fill knowledge gaps identified by the research done to date. Each focus area also includes a list of other meritorious projects that can be advanced in the future should opportunities arise.

5 completed projects,
33 active projects,
and 11 pending contracts.
18 RFPs released in 2008

New Framework for Partnerships

With Transportation Agencies

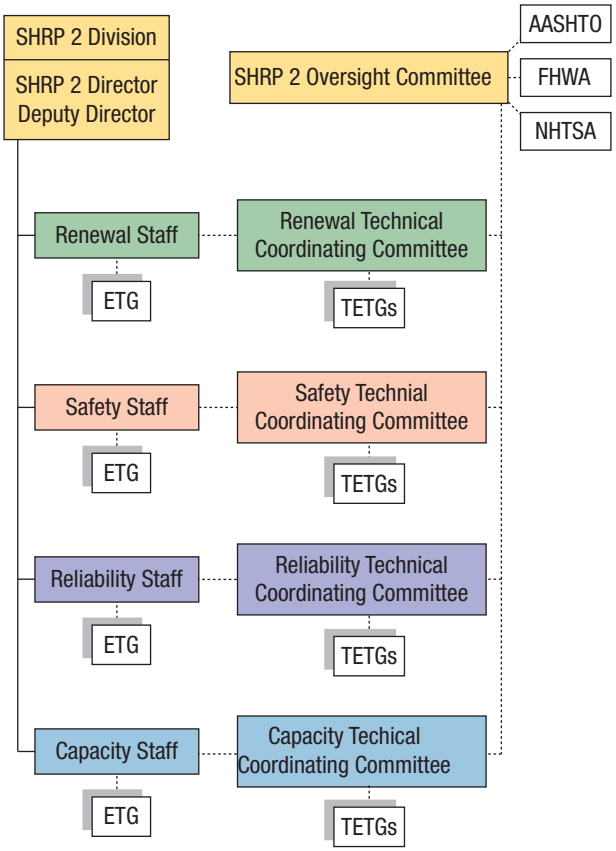
Transportation agencies will be the primary users of most products from SHRP 2 research, making their ongoing participation vital to the program's success. All SHRP 2 committees benefit from perspectives shared by their members who represent departments of transportation, metropolitan planning organizations, and other agency types. These collaborations can be expanded when individual research projects provide other opportunities to work together.

In 2008, the framework was laid for six such opportunities. The nationwide need to upgrade bridges and renew highway facilities has been widely publicized of late and new federal funding to address these needs makes this a good time to learn improved methods and new efficiencies. Two Renewal projects invite agency partners to help develop and test guidelines, one for a risk management manual for rapid contracting strategies and another for achieving long life when using existing pavement in place. Another project seeks highway renewal projects for a 2010 demonstration of performance specifications and strategies to equitably manage and minimize short- and long-term risk in rapid highway renewal projects.

State transportation agencies in regions across the United States have participated in workshops conducted by researchers in the Capacity focus area to vet more collaborative approaches to planning, programming, environmental review, and permitting processes. Another Capacity project will provide funding for a state or an MPO to complete development of and put into action an integrated, advanced travel-demand model that will provide better answers to policy and investment questions and establish the basis for widespread implementation.

THE SECOND STRATEGIC HIGHWAY RESEARCH PROGRAM

Organizational Chart and Governance/Volunteer Structure for SHRP 2



AASHTO American Association of State Highway and Transportation Officials

FHWA Federal Highway Administration

NHTSA National Highway Traffic Safety Administration

ETG Expert Task Group

TETG Technical Expert Task Groups

With the International Community

Collaboration extends beyond national borders. This year Canada loaned a second visiting professional to work with SHRP 2 staff and the Netherlands also stepped forward to lend a visiting professional. These people serve both SHRP 2 and their home agencies as they immerse themselves in the program and become uniquely able to identify ways to combine efforts and advance other channels of collaboration. Memoranda of understanding are now in place with counterpart organizations in Sweden, South Korea, the Netherlands, and China. These agreements provide for exchanging information and sharing expertise. The network of communication extends across the globe with participation in activities of the European highway research laboratories and through international outreach.

At the Project Level

Collaborating across the focus areas of SHRP 2 research was always part of the program design, but the framework was strengthened in the expanded research plan. For example, to enable strategies for travel time reliability to be included in planning for new highway capacity projects, the Reliability focus area allocated funding to the Capacity project that will integrate SHRP 2 products into the Collaborative Decision-Making Framework, the foundational product of Capacity research in SHRP 2. In another example, a Reliability project may benefit from data collected during the naturalistic study of driver behavior to explore how drivers cause and respond to nonrecurring congestion.

THE FOCUS AREAS

Safety Research in SHRP 2

"The SHRP 2 Safety effort will, for the first time ever, allow us to record and study the driving behaviors of a large sample of drivers in their personal vehicles--a naturalistic study. We will be able to learn more about how the driver interacts with the roadway, the vehicle, the weather and other factors, and how these interactions increase or decrease the risk of a crash. The beauty of this effort is that it will provide not only answers based on real-world data within the next 3 to 4 years, it will also produce an incredible data base for even more advanced analyses for at least a decade after the current study ends. The knowledge it will yield is critically needed."

—Forrest Council, Senior Research Scientist
Highway Safety Research Center, University of North Carolina and Chair, SHRP 2 Safety Technical Coordinating Committee

Accident statistics are no longer collected by the highway safety community and interested others; they now collect 'crash data.' The name change implies the driver's role in affecting the outcome of roadway conflicts. That role is the focus of safety research in SHRP 2 because understanding driver behavior is a missing link in understanding how to reduce crash risk.

The research plan for Safety takes a systems approach by examining how the driver interacts with the roadway, vehicle, and environmental factors. The study will instrument the vehicles of about 3,000 volunteer drivers to collect data on their driving behavior and their vehicles' characteristics and performance. Driver characteristics to be studied include attention, perception, situation assessment, speed, acceleration, lanekeeping, and motor control.

Data on road type, geometry, shoulders, safety furniture, signage, pavement markings, and more will be collected for the roads used by the volunteer drivers during the study. Through global positioning systems, driver behavior at various locations will be correlated with roadway and roadside features at those locations. In addition, data on environmental variables such as traffic, lighting, and

weather conditions will be collected to the extent feasible, either through the in-vehicle data systems or other means. This research—known as the SHRP 2 naturalistic driving study—represents by far the largest study of its type ever undertaken and will be a resource for improving highway safety for decades to come.

The Safety research plan also includes a project to advance development of the technology needed to conduct site-based research. This approach involves instrumenting roadway segments or intersections with overhead cameras and automating vehicle trajectory tracking to study interactions among vehicles in complex driving scenarios. The goal is to create a robust tool that can be easily deployed to study different types of highway locations.

Progress in 2008

8 active projects,
5 projects completed in 2008,
3rd Symposium held,
Rodeo to qualify
roadway data collection vendors

In the past year, details of exactly how to carry out the various elements of this complex study have been clarified and the groundwork laid for initiating the data collection. The specific research questions to be addressed, data types that will provide answers, and requirements for collecting, analyzing, storing, and accessing those data are all being finalized as findings of the early projects become available to support the field study of driver behavior.

Advanced technologies make it possible to collect vast amounts of driver behavior data in ways that are inconspicuous to the driver, but these data will yield nothing useful without a well-thought out analysis plan and appropriate analytical techniques. A clear set of research questions and objectives is necessary to guide the data collection process and provide a framework for analytical methods. This work is well under way. In an early project, five research teams independently developed data analysis methods. The resulting methods themselves will be analyzed and integrated to establish a viable plan for analyzing data from the field study. More than 400 proposed research questions have been grouped into more than 20 global research questions and these will be evaluated by stakeholders to identify gaps and establish priorities. The data analysis is expected to provide the basis for countermeasures that reduce crash risk because they derive from an understanding of causal factors.

A rodeo to qualify roadway data collection vendors took place in September. Participants made at least three passes in both directions over two survey routes, a 41-mile loop in northern Virginia near Leesburg, and an 11-mile loop through Arlington.

While the data analysis methods are being refined, data collection techniques and sites are also being finalized. Data collection sites and qualified contractors to manage them have been identified in 11 states: Florida, Indiana, Iowa, Maryland, Michigan, Montana, New York, North Carolina, Pennsylvania, Texas, and Washington. From these 11, approximately 6 sites will be selected in June 2009. Site selection will seek a balanced mix of characteristics including rural/urban areas; geographic areas, both by area of the country and by terrain; roadway features such as functional type, vehicle miles traveled, and speed limit; socioeconomic and cultural features such as income, education, and ethnicity; and weather conditions: temperature, rain, snow and ice. The site selection process included input from the safety community, many of whose members attend SHRP 2 Safety symposia held each July in Washington, DC.

Data collection site contractors will be responsible for recruiting drivers and conducting intake testing, screening vehicles and installing the data acquisition system in the owner's vehicle, collecting data, addressing both human and equipment problems encountered during the study, investigating crashes, securely processing and transmitting data, carrying out quality control procedures, and preparing periodic reports documenting the field study activities. The combined goal is to collect about 4,200 vehicle-years of data in a 30-month period. A pilot study was conducted in 2008 to develop and test mechanisms for carrying out all of these activities, as each site contractor will be required to follow established procedures.

Technical specifications and manufacturing requirements are being defined for the data acquisition system that will record nearly 20 types of driving data. About 2,500 of these units will be needed; each will be installed in vehicles for one- to two-year periods.

Behind the wheel, drivers process or interact with an array of roadway characteristics such as signs, curves, striping, and surface type. About 25 categories of such roadway elements likely to be required for analyzing the field study data and the specifications for measuring and reporting each of them were developed in 2008. A rodeo of sorts was held as a means to qualify equipment vendors to collect roadway data at the various sites. Ten vendors participated in this equipment evaluation, which required mapping two survey routes over a variety of terrain, cover, and road types, as well as urban canyon and rural characteristics. Vendor selection will take place in 2009.

Renewal Research in SHRP 2

"As the results of the SHRP 2 research program are deployed, we will see more 'rapid renewal' tools developed for owners of the transportation system. The tools will lead to a fundamental change in how we approach rehabilitating our transportation system. We will be able to develop projects that are completed quickly, with minimal disruption to communities, and to produce facilities that are long-lasting."

—Randell Iwasaki, Director, California Department of Transportation (CALTRANS) and Chair, Renewal TCC

The system of highways that connects America is so essential to our mobility and economy that highway facilities must often be renewed while they are still in service. This situation introduces significant safety, environmental, financial, management, and technological challenges. On a nationwide scale, these challenges require an entirely new way of approaching highway renewal.

Renewal research in SHRP 2 addresses three needs: to complete renewal work quickly, to do so with minimal disruption to the community, and to produce facilities that are long-lasting. The phrase 'rapid renewal' refers to these objectives, which have been met only in high-profile highway projects under special circumstances. SHRP 2 research aims to institute a new way of thinking about highway renewal so that the benefits of rapid renewal can be achieved consistently and systematically. The new way of doing business relies on more collaborative relationships and decision making; better integration of management, planning, design, construction, and maintenance; and more synergistic use of technologies and methods to optimize innovations.

Photo by Flexi-Arch Construction

An example of rapid construction techniques, precast arch bridges use an articulated block system that ships flat but rotates into the desired arch shape when lifted and placed against simple footings. Once the footings are in place, superstructure erection is completed in a day for a typical short- to medium-span bridge.

Projects in SHRP 2 Renewal fall into two general categories: technology and project delivery. Many of the technology projects relate to the road infrastructure itself, pavement technologies for example, and technologies to extend the lives of bridge structures and their various components. The category of project delivery addresses barriers to rapid renewal that are often institutionalized in the management and business processes of highway agencies and other stakeholders.

Progress in 2008

14 active projects, 7 new RFPs,
international symposium,
3 completed reports.
Research on 11 other Renewal projects
began in 2008

The goals of rapid renewal are often thwarted at the earliest stages of projects because technologies for locating and identifying underground utilities in the right of way are still immature and because priorities for highway agencies and utility companies often clash. Two research projects were completed in 2008 that address these issues. One of these identified and prioritized the most promising technologies for locating and characterizing subsurface utilities and developed the basis for research and development to advance these tools to meet industry needs.[1] The second project identified barriers to integrating priorities of utility companies and highway agencies and developed strategies for overcoming those barriers.[2] A follow-on project will develop methods for resolving interagency conflicts that create risk and cause delay for all parties involved.

A third completed project addressed the need for rapid and non-destructive testing (NDT) procedures for evaluating project design and inspecting construction. The research identified seven NDT procedures that could quickly be advanced to the implementation stage with focused development. Seven projects will begin in 2009 to follow through on the findings with expectations that better tools will be available soon.

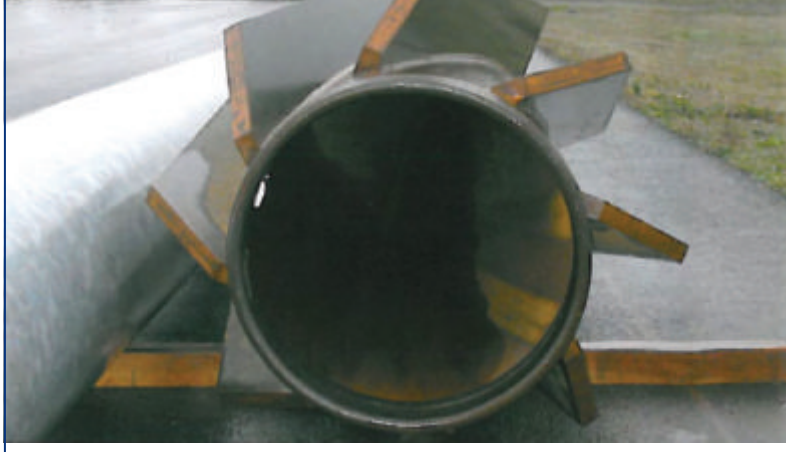
Research on 11 other Renewal projects began in 2008. Three investigate ways to reduce and manage risk and eliminate barriers to innovation in delivering highway projects. For example, project R07

[1] Sterling, R.L., J. Anspach, E. Allouche, J. Simicevic, et al. Encouraging Innovation in Locating and Characterizing Underground Utilities. S2-R01-RW. Transportation Research Board, Washington, DC. 2009. (forthcoming)

[2] Ellis, R., M. Venner, C. Paulsen, et al. Integrating the Priorities of Transportation Agencies and Utility Companies. S2-R15-RW. Transportation Research Board, Washington, D C. 2009. Available on line at: http://onlinepubs.trb.org/onlinepubs/shrp2/shrp2_S2-R15-RW.

is developing performance specifications for strategies used in rapid renewal projects. Implementing these specifications will encourage innovation and reduce project completion time because contracts specify not how the job must be done, but how the highway facility must perform, balancing risk between owners and builders. Four of the projects will advance pavement technologies so that pavements can be placed faster and last longer, which both result in less delay and disruption on the roadways. Three projects focus on how bridges and their component parts can last longer and incorporate design innovations that improve service.

The remaining project supports rapid renewal techniques through advances in geotechnical pavement and structure solutions. The research plan for Renewal reflects the knowledge that outstanding performance is a function of excellence at each step of a process.

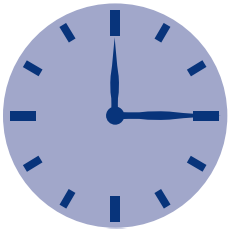


Spin Fin piles install quickly and enhance pile uplift capacity. Compression pile lengths have been shortened by as much as 50% in soft soils.

Reliability Research in SHRP 2

"Traffic congestion is extremely frustrating to motorists. An inability to reliably estimate their travel times adds to that frustration. The SHRP 2 Reliability Research program is bringing together the institutions and developing the tools and processes needed to provide a more reliable highway system. Results from this research will improve system performance through a better understanding of the effectiveness of various reliability improvement measures, structured reliability system planning and budgeting and advanced techniques for field implementation."

—John F. Conrad, Director
Highway/Bridge Market Segment
Transportation Business Group
CH2M HILL and Chair, Reliability TCC



Traffic congestion is a complex phenomenon that generally takes two forms: *recurring*, or everyday rush-hour congestion, and *non-recurring*, or the congestion that occurs at unexpected times or places. Nonrecurring congestion is what makes the highway system seem "unreliable" to highway users.

Research in SHRP 2 addresses travel time reliability, an operational characteristic of highway systems that is related to nonrecurring congestion. From the highway user's perspective, travel time reliability means the extent to which one can depend on completing a trip within a consistent, predictable length of time. More specifically, travel time reliability is the probability or percent of time that a person or goods shipment will arrive on time (or within a time window) for a particular type of trip, departure time, origin and destination, and environmental setting.

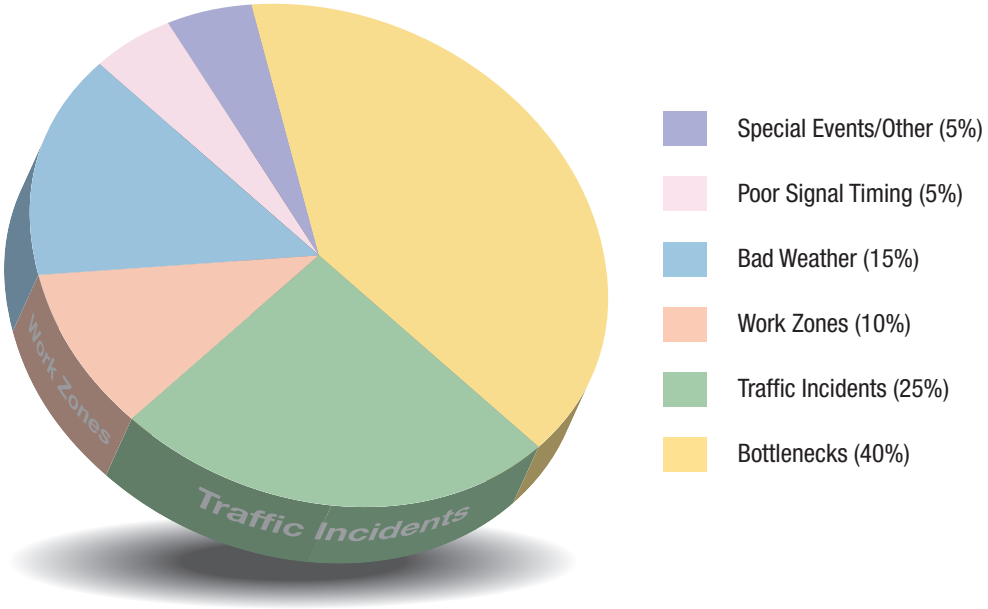
The relatively unpredictable events that cause nonrecurring congestion include: traffic incidents; work zones; weather, environmental, and emergency impacts; and special events. Managing events to reduce their impact on travel times requires a multifaceted approach. SHRP 2 is conducting research in four areas that could make a significant contribution to more reliable travel times:

- Data, metrics, analysis, and decision support
- Institutional change, human behavior, and resource needs
- Incorporating reliability into planning, programming, and design
- Future needs and opportunities

Progress in 2008

7 active projects, 3 contracts pending

A foundational project in the Reliability focus area is developing a set of models and procedures that can predict travel time reliability on a highway facility *and* predict the change in reliability associated with operational or physical improvements. Several preliminary analyses have been completed to support the models, including characterizing demand, calculating secondary crash rates, estimating delay for each of the sources of congestion, and characterizing major bottlenecks.



The Sources of Congestion *National Summary in* Traffic Congestion and Reliability: Trends and Advanced Strategies for Congestion Mitigation. Federal Highway Administration, September 2005

These relationships between improvement techniques and the change in travel time reliability are being built in conjunction with three projects in the SHRP 2 Capacity area and will provide the basis for further work in at least eight other SHRP 2 projects.

Even the best improvement strategies may fail if they are not integrated into an agency's business model. One Reliability project is developing case studies that illustrate how to integrate processes that improve reliability across the seven causes of congestion; another is developing an institutional framework that defines the roles and relationships that support such institutional integration. Using the framework will lead to progressively more mature capabilities in operating and managing highways. Alternative models for performing operations functions are also being developed, including transferring certain functions to the private sector.

Designing for reliable travel times is also being explored in a project that will identify roadway design features used to improve travel time reliability, assess their costs, operational effectiveness, and safety, and provide recommendations for their use and eventual incorporation into appropriate design guides.

Responder role playing is an effective technique for understanding the big picture at highway incident scenes.

Highway incidents may require services from an array of responders, including law enforcement, fire and emergency medical services, towing and recovery, and others. Managing the incident scene to coordinate these essential tasks can reduce risk to responders and clear the scene faster, which reduces risk to drivers. Collaborations are ongoing with key responder groups to develop a training curriculum based on the core competencies required for each responder role at an incident scene. A certification plan is being considered.

A system for archiving and disseminating the data acquired in SHRP 2 Reliability research is also being developed; the concept anticipates future demands for accessibility and will have attributes of an electronic library rather than a more traditional database.

Capacity Research in SHRP 2

"Elected officials and the public are demanding that highway projects be delivered both faster and in a more environmentally responsible manner. If we are going to meet both expectations, our profession will need to change the way we develop projects. The SHRP 2 Capacity program is developing a collaborative decision-making process that is based on sound research and will serve as the new way of doing business in highway project development in the 21st century."

—Neil J. Pedersen, Administrator, Maryland State Highway Administration and Co-Chair, Capacity TCC

"Collaborative decision making is a holistic approach to decision making that brings everyone to the table to generate a consensus on transportation issues. Collaborative decision making brings the right people to the table at the right time to discuss issues and decide what is in the overall best interest to advance."

—Mary Lynn Tischer, Director Multimodal Transportation Planning Office, Virginia DOT and Co-Chair, Capacity TCC

Roadway congestion that regularly accrues at predictable places is addressed in SHRP 2 Capacity research. The focus is effective strategies for including economic, environmental, and social goals when planning new physical capacity to deal with recurring congestion. The outcome of the research plan will be a reinvention of the transportation decision-making process.

In fact there is not one process but many key decision points of practice whose value has been demonstrated over the last 15 to 20 years: providing for interactive public involvement and for consultation among affected agencies; incorporating more environmental work into planning and successfully navigating the National Environmental Policy Act and permitting processes; introducing an environmental stewardship culture into transportation agencies; embracing an ecological approach to the environment; seriously considering improved highway efficiency through operations, telematics, and pricing; communicating the economic benefits of highways in a more compelling and transparent way; and dealing with public-private partnerships.

Wildlife overpasses prevent potentially deadly conflicts between humans and animals.

Photo by Kari Gunnson, Banff Wildlife Crossings Project

SHRP 2 Capacity research will integrate these key decision points in a web-based framework that identifies who needs to be involved at which points and what information they will need to reach sustainable decisions that advance planning projects. Results of other Capacity research projects will be integrated into the framework to support and inform the decision-making process. Practitioners will be able to enter the framework at any point in their planning project and follow a topic of interest through all of the available information, with examples, illustrations, and links to full-text source material. Rather than a process, the framework will be a tool for reaching collaborative decisions at any point in a state's existing process.

Progress in 2008

7 Active projects,
1 contract pending

In 2008, the necessary background and developmental work was completed in a number of projects; for example, more than 60 case studies were conducted and documented to illustrate successful practices at various points in the planning process. To help define success at each step of the process, a framework of performance measures was developed as a linked, web-based tool, which will also help in considering individual projects in a systems context. The ability to analyze the impacts of proposed transportation projects on economic systems and land use decisions is another tool for building projects that enhance the human and natural environments. The first phase of a study to develop a method for such analyses was completed in 2008.

In another project, researchers are developing mathematical descriptions of the full range of responses by highway users to congestion, travel time reliability, and pricing. The descriptions can be incorporated into various travel demand modeling systems to help planners predict what congestion relief will result by adding pricing to a roadway.

Work is also advancing on a project investigating how to measure the regional and network level capacity value of management strategies—alone and in combination—so they can be evaluated side-by-side with adding lanes to increase capacity.

The results of these projects will be integrated into the collaborative decision-making framework, the ultimate product of Capacity research in SHRP 2. Many of these projects also address aspects of larger problems that are the focus of research by other agencies and other divisions of TRB; they are being conducted in close coordination with other researchers to avoid duplication and to leverage new knowledge.

Idaho fish weir

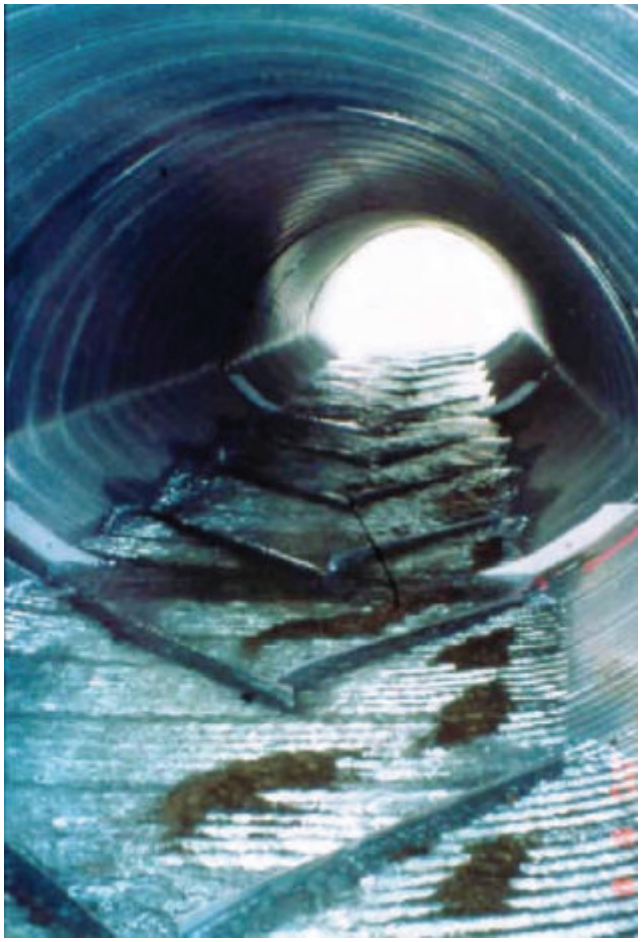


Photo by Z. Funkhouser, Idaho Transportation Department

FRAMING THE FUTURE

In the legislation that established SHRP 2, Congress required TRB to "complete a report on the strategies and administrative structure to be used for implementation of the results" of SHRP 2 no later than February 1, 2009. To meet this requirement, TRB convened a committee of leaders from the highway community, appointed by the National Research Council, who in 2008 conducted a study and produced a report of their findings and recommendations to Congress. The report, *Implementing the Results of the Second Strategic Highway Research Program, Saving Lives, Reducing Congestion, Improving Quality of Life,* identifies the expected products of SHRP 2 research and those who will use and benefit from them, discusses successful implementation strategies, and makes five recommendations:

1. an implementation program should be established;
2. the principal implementation agent should be the Federal Highway Administration in partnership with AASHTO, the National Highway Traffic Safety Administration, and TRB;
3. stable and predictable funding should be provided over several years;
4. a formal stakeholder advisory structure should be established; and
5. detailed implementation plans should be developed as soon as possible.

The full report is available on the TRB website at: http://onlinepubs.trb.org/Onlinepubs/sr/sr296.pdf

Financial Framework

The table below shows the funding provided by Congress and the Federal Highway Administration to support the SHRP 2 research.

SHRP 2 SIMPLIFIED FINANCIAL REPORT

	Through 2008	Through 2013 (est.)
Total Funds Available	$ 170,794,479	$ 170,794,479
Funds Obligated to Research	-$ 90,476,835[1]	-$ 131,426,835[1]
Research Reports	-$ 10,386	-$ 2,450,386
SHRP 2 Administrative Expenditures	-$ 9,955,716[2]	-$ 34,885,287[2]
Balance	$ 70,351,542	$ 2,031,971[3]

Notes:
1. Includes 5% general and administrative indirect charge
2. Staff labor, committee travel and support, other direct costs.
3. Unobligated Contingency to be programmed at a later date.

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