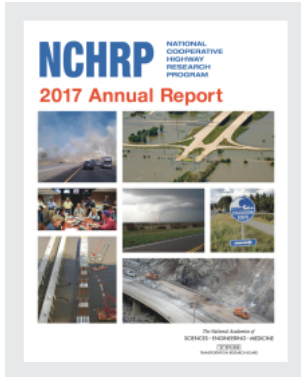


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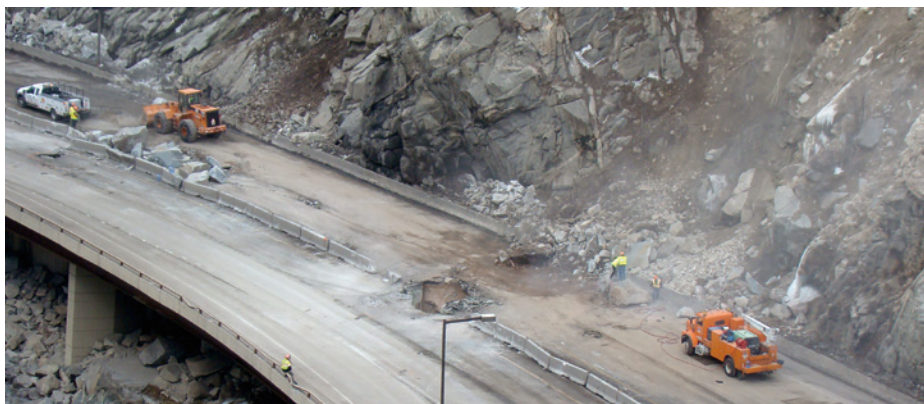
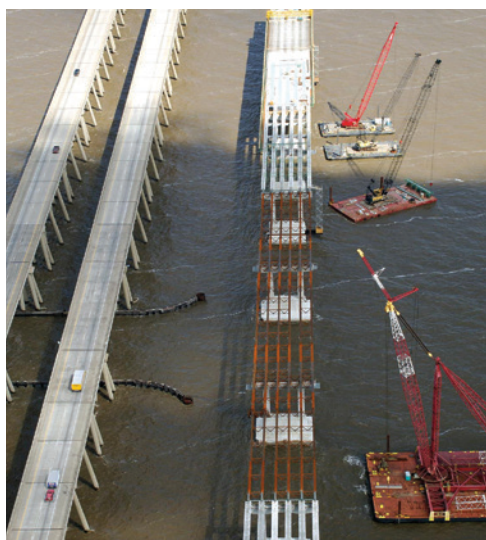
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NCHRP

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2017 Annual Report

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2017

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

Systematic, well-designed research is the most effective way to solve many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation results in increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

Recognizing this need, the leadership of the American Association of State Highway and Transportation Officials (AASHTO) in 1962 initiated an objective national highway research program using modern scientific techniques—the National Cooperative Highway Research Program (NCHRP). NCHRP is supported on a continuing basis by funds from participating member states of AASHTO and receives the full cooperation and support of the Federal Highway Administration (FHWA), United States Department of Transportation.

The Transportation Research Board (TRB), part of the National Academies of Sciences, Engineering, and Medicine, was requested by AASHTO to administer the research program because of TRB's recognized objectivity and understanding of modern research practices. TRB is uniquely suited for this purpose for many reasons: TRB maintains an extensive committee structure from which authorities on any highway transportation subject may be drawn; TRB possesses avenues of communications and cooperation with federal, state, and local governmental agencies, universities, and industry; TRB's relationship to the National Academies is an insurance of objectivity; and TRB maintains a full-time staff of specialists in highway transportation matters to bring the findings of research directly to those in a position to use them.

The program is developed on the basis of research needs identified by chief administrators and other staff of the highway and transportation departments, by committees of AASHTO, and by FHWA. Topics of the highest merit are selected by the AASHTO Special Committee on Research and Innovation (R&I), and each year R&I's recommendations are proposed to the AASHTO Board of Directors and the National Academies. Research projects to address these topics are defined by NCHRP, and qualified research agencies are selected from submitted proposals. Administration and surveillance of research contracts are the responsibilities of the National Academies and TRB.

The needs for highway research are many, and NCHRP can make significant contributions to solving highway transportation problems of mutual concern to many responsible groups. The program, however, is intended to complement, rather than to substitute for or duplicate, other highway research programs.

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The National Academies of
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The **National Academy of Sciences** was established in 1863 by an Act of Congress, signed by President Lincoln, as a private, non-governmental 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 National 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 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.

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

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

ANNUAL REPORT

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December 312017
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INTRODUCTION

The National Cooperative Highway Research Program—NCHRP—has provided research-based solutions to challenges faced by state transportation agencies since 1962. The Board of Directors of the American Association of State Highway and Transportation Officials (AASHTO) sets the direction and focus of research conducted by NCHRP. The Transportation Research Board (TRB) and the U.S. Federal Highway Administration (FHWA) partner with the state departments of transportation (DOTs) to deliver research results in the form of new or improved specifications, standards, practices, and processes that states use every day.



During 2017, NCHRP completed 170 research projects, published 60 research products, and approved 64 new and continuation projects. This *Annual Report* provides, in Table 1, a concise list of research published in 2017 and, in Table 2, a list of all active projects, projects completed in 2017, and projects that were approved in 2017 but are not yet under contract. The *Annual Report* also presents detailed information about the operation of NCHRP through the AASHTO Special Committee on Research and Innovation (R&I).

The *NCHRP Annual Report* supersedes the *Summary of Progress*, which was published in hard copy for the last time in 2014. The *Summary of Progress* documented all NCHRP projects since the inception of the program in 1962. While it provided a useful reference, this information is now readily available on the TRB and NCHRP websites. Therefore, the new annual report series focuses on activities conducted in the current year. See the following search tips for information on how best to locate NCHRP research and publications online.

Finding information on the TRB/NCHRP websites

There are many points of entry to the TRB and NCHRP websites, depending on the kind of information you're looking for. For a general search of all TRB activities on a given topic, enter keywords related to that topic in the search box on the home page of the TRB website at www.trb.org.

To find specific projects, use the "Find a Project" option in the left-hand navigation bar at www.trb.org/NCHRP. You can restrict your search to NCHRP research by selecting NCHRP in the "Program" dropdown menu, or select "All" to include projects from our transit, aviation, freight, hazardous materials, rail, and strategic highway research programs. Enter keywords from the title, a project number, or the staff officer's name in the appropriate box. The "Research Area" dropdown menu lets you view all projects in any of 27 subject areas. If you select "All Projects" in the left-hand menu bar, you will see NCHRP projects categorized by subject area dating back to 1988 when our systems were first digitized. A summary of NCHRP projects from 1962 through 1988 is available online as *NCHRP Web Document 7* and can be accessed through a link on the NCHRP home page or by going to <http://tinyurl.com/NCHRPWebDoc7>.

If you are interested in publications in a specific series, such as NCHRP Reports or Syntheses of Practice, direct links are provided on the right-hand side of the NCHRP home page. The home page also includes links to our quick-response series of projects supporting AASHTO committees.

To search all TRB publications, you can visit the TRB Online Bookstore at www.mytrb.org/store.

Finally, the most comprehensive source of information on transportation research globally is the TRID database, available at trid.trb.org.

NCHRP

Transportation research that works

Objective national highway research since 1962
 Managed by the Transportation Research Board
 Funded cooperatively by AASHTO member departments • Project topics determined by state DOTs • Competitive selection of investigators
 Oversight by technical specialists • Wide dissemination of findings • Focus on practical results that impact practice

THE STATES' HIGHWAY RESEARCH PROGRAM

The critical role of state DOTs

The state DOTs created NCHRP in 1962 to find answers to common problems in highway planning, design, construction, operation, and maintenance. The state DOTs, through AASHTO, are the sole sponsors of NCHRP. The program is operated in cooperation with FHWA and is administered by TRB, part of the National Academies of Sciences, Engineering, and Medicine.

Fifty-five years after the program's creation, state DOTs continue to be the driving force behind NCHRP research. The members of AASHTO—the DOTs of the 50 states and the District of Columbia—come together every year to fund, select, and oversee NCHRP research projects aimed at providing research-based solutions that address the states' most critical challenges.

“When we conduct research, it must translate into results in the field that directly benefit the users of the transportation system.”

*Brian Ness,
Director, Idaho Transportation Department,
Chair, AASHTO Special Committee on
Research and Innovation*

States provide the funding for NCHRP

Each year, state DOTs voluntarily commit to NCHRP research 5.5 percent of the State Planning and Research (SPR) portion of their Federal-Aid-Highway funds. FHWA requests and pools these state contributions and, under a cooperative agreement, makes them available for research contracts and for administration of the program by TRB.

Available funds for NCHRP have remained strong during the past 20 years, rising along with increases in the Federal-Aid-Highway funds provided by Congress and the corresponding growth of SPR funds. The Intermodal Surface Transportation Efficiency Act (ISTEA) resulted in a funding level of approximately \$17 million for NCHRP for fiscal years 1992 through 1997. This was increased by more than 50 percent on average in fiscal years 1998 through 2003 by the Transportation Equity Act for the 21st Century (TEA-21), which Congress extended, resulting in \$35.4 million for FY 2004.

The last two federal highway acts—the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) and the Moving Ahead for Progress in the 21st Century Act (MAP-21)—resulted in an average of \$42 million being programmed for fiscal years 2013 through 2017. A slight increase was experienced as a result of the Fixing America's Surface Transportation (FAST) Act, signed into law on December 4, 2015. See Exhibit 1 for the past five years of budget allocations.

Exhibit 1. Budget Allocations for NCHRP, FY 2014 to FY 2018

Allocations	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
New projects and continuation projects	\$29,916,000	\$28,630,000	\$30,840,000	\$31,525,000	\$37,017,000
Administration, technical direction, panels, and publications	\$11,300,600	\$12,064,000	\$11,332,000	\$11,746,000	\$11,870,000
Total	\$41,216,600	\$40,694,000	\$42,172,000	\$43,271,000	\$48,887,000

States select NCHRP research projects

A thorough process of consultation and review by subject matter experts from the state DOTs, AASHTO, FHWA, and TRB ensures that each proposed research project is vetted prior to being considered for funding. The process is led by AASHTO R&I, which provides oversight to NCHRP. R&I is composed of 16 state DOT members (four from each of the four AASHTO regions) plus ex officio members from FHWA and other federal agencies. In addition, the R&I chair must be the CEO of one of the state DOTs, and the vice-chair is the chair of the AASHTO Research Advisory Committee (RAC), composed of research directors from all AASHTO member departments.

In July of every year, R&I invites the submission of research problem statements from three authorized sources: (1) AASHTO member transportation departments, (2) the chairs of AASHTO's committees and subcommittees, and (3) FHWA.

Research in Progress



Searching TRB databases helps submitters of problem statements avoid duplicating research.

Problem statements are due October 15 each year and should explain why the research represents an immediate need and is of interest to the majority of states. The proposed research should have a high probability of success and should not duplicate other research that is under way or completed. Submitters are asked to search the relevant literature in TRID—the world's largest bibliographic transportation database, which combines the records of TRB's Transportation Research Information Services (TRIS) and the Organization for Economic

Cooperation and Development (OECD) Joint Transport Research Centre's International Transport Research Documentation—and the Research in Progress (RiP) database to determine if similar efforts are already under way or if satisfactory answers are already available.

In December, NCHRP prepares a report of proposed continuation projects and new problem candidates. This report is sent to members of R&I and RAC as a ballot for rating each of the candidates according to need, value, and appropriateness. The ballot results are used to establish a preliminary ranking to help structure the discussion of candidates by R&I at its March meeting.

In March, based on expected funding for the next fiscal year, R&I allocates funds for new and continuation projects. Once the program is developed, R&I sends a report to the AASHTO Board of Directors (CEOs of each of the member departments) requesting final approval. A favorable vote of at least two-thirds of the member departments is required. In addition, each year's program must be approved by FHWA and accepted by the National Academies.

“Under the direction of R&I, TRB ensures that the states' investment in NCHRP research pays off by finding new and improved ways to deliver transportation products and services that meet society's needs.”

*Christopher J. Hedges,
Director, Cooperative Research Programs,
Transportation Research Board*

An average of 120 problem statements and 20 requests for continuation are received each year. Continuation projects include quick-response research for AASHTO committees; research carried out under NCHRP subprograms, such as the Synthesis series, the IDEA program, and the Domestic Scan Program; and projects from previous years that request additional funds to build on their success with additional research. In recent years, R&I has funded approximately 40 new projects each year.

A cumulative total of 1,842 research contracts have resulted from all NCHRP yearly programs through 2017. The FY 2018 program will add another 42 new contracts and 22 continuations. See Exhibit 2.

Exhibit 2. Number of Research Projects Selected by R&I, FY 2014 to FY 2018

Projects	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
Continuation projects	15	12	16	16	22
New projects	50	46	45	37	42
Total projects	65	58	61	53	64
Total project funds	\$29,916,000	\$28,630,000	\$30,840,000	\$32,275,000	\$35,317,000

Funding for the FY 2018 program is expected in early 2018, permitting execution of contracts and initiation of research. R&I will formulate the FY 2019 program in March 2018 based on proposals solicited in July 2017, the beginning of another cycle of NCHRP research.

States help guide NCHRP research projects

Each research project is assigned to a panel of subject experts who are very knowledgeable in the project area and who will provide technical guidance and counsel throughout the research and reporting phases. A broad search is made for these individuals, and TRB usually receives about four to five times as many nominees as are needed.

Panel members do not act as consultants or advisors to project investigators; they may not submit proposals for research. All members serve without compensation, and their total yearly contribution to the program adds up to thousands of staff-days. The panel members are drawn from all walks of professional life, with heavy dependence on practitioners from AASHTO member departments. See Exhibit 3.

Exhibit 3. Affiliations of Panel Members on Active Projects
(Current number of active projects = 377)

Affiliation	Panel Members*	
	Number	Percentage
State agencies	1,283	54
Federal agencies	59	2
Local, transit agencies, MPOs	109	5
Educational institutions	271	12
Industry, consultants, associations	613	26
Other	20	1
All	2,355	100

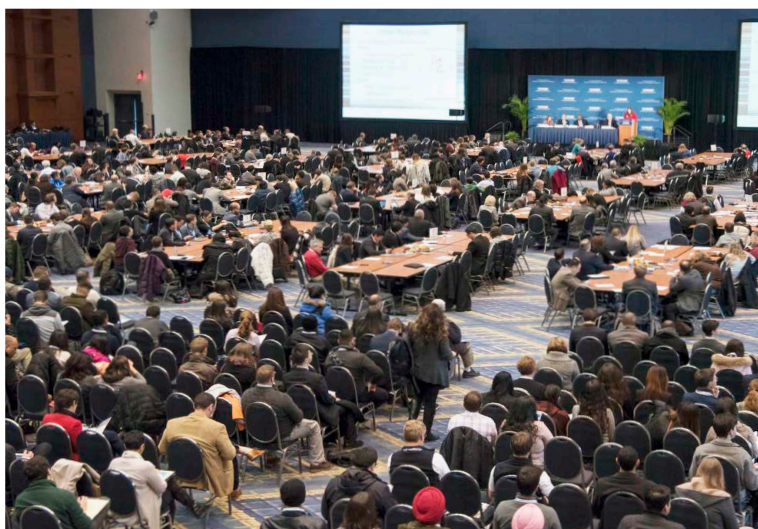
* Does not include liaison representatives.

Panel members assume a number of key responsibilities for helping ensure the quality of NCHRP research. Project panels analyze the initial problem that was submitted, develop a final project scope and objectives, and then prepare a formal request for proposals from qualified research agencies. The panels review the research proposals, recommend contract awards, and provide counsel to the NCHRP staff members responsible for management of the research contracts. Finally, the panels review final reports for acceptability and for accomplishment of the approved research plan.

WHY NCHRP WORKS

A model for cooperative research

The model developed for NCHRP not only has functioned effectively for more than 50 years but also has served as the foundation for other successful applied research programs managed by TRB. TRB manages or has managed national cooperative research programs in the fields of highways, transit, airports, hazardous materials, freight, rail transportation, and behavioral traffic safety. Many of the research programs in state departments of transportation use procedures modeled on NCHRP. From other units of the National Academies to industry associations in a variety of fields, experts approach NCHRP for advice on how best to manage cooperative research.



The TRB Annual Meeting is an opportunity for the partners involved in the guidance and implementation of NCHRP research to convene. It is held every January in Washington, D.C.

Stakeholders drive success

What makes this model so effective? Why has NCHRP been supported by voluntary contributions for more than 50 years? One of the key success factors is stakeholder involvement. Those who will ultimately benefit from the research are involved from beginning to end, starting with the identification of research ideas that might address their day-to-day problems. Once these ideas are identified, stakeholders review them and select and prioritize projects that will provide the greatest benefit. When projects are selected, stakeholders help to craft requests for proposals, and then provide technical guidance throughout the project to ensure that the research results will be practical, beneficial, and implementable.

An objective eye

Another key element in the NCHRP model is objectivity. As a part of the nonprofit National Academies, NCHRP does not own roads, make laws, or set policy. Instead, it provides a neutral forum for objective research without bias or prejudice. NCHRP conducts evidence-based research that adheres to the highest standards of integrity. NCHRP panels bring diverse stakeholder groups together with a common interest for a common objective.

Investing wisely in research

The program is not intended to be “all things to all people.” NCHRP research is effective because each project is directly targeted at a current problem.

Further, by working on shared, national problems and issues, the NCHRP model is designed to seek solutions effectively and efficiently. A comprehensive research program coordinated and funded by all the states allows every state to leverage its budget and receive far more value for the research dollars they spend. By joining forces to solve common problems, state DOTs are able to produce solutions to important problems that might otherwise be beyond the ability of any single state. By eliminating duplication of effort, the reach of every state’s research budget is significantly increased.

The NCHRP process is designed to maximize efficiency while producing the highest quality research results—results that will help state DOTs to effectively plan, design, construct, operate, and maintain the surface transportation network while keeping workers and the traveling public safe, providing or improving mobility, and contributing to the economic vitality of communities and the nation.

Competitive investigator selection

The competitive process used by NCHRP to select research contractors is another aspect of the program that contributes to its success. Each project panel develops a request for proposals that is publicly advertised. Successful proposers are selected based on the qualifications of their team members and the merit of their research approach.

“*[NCHRP Reports 754 and 813]* give DOT officials and other transportation professionals a point of departure for developing knowledge and information management programs for their organizations.”

*Leni Oman,
Knowledge Strategist, Washington State DOT*

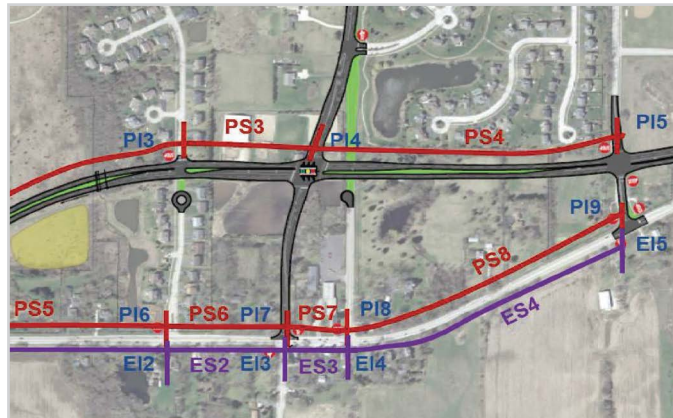
NCHRP RESEARCH AREAS

Topics across the spectrum of highway concerns

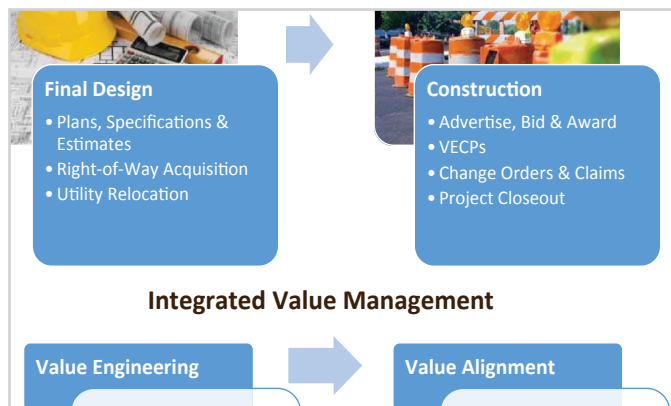
The subject matter of NCHRP projects extends across the full spectrum of concerns within the highway industry and demonstrates AASHTO’s interest in acquiring answers to the many acute problems facing DOT administrators and engineers. Problems submitted as candidates for funding each year are given a unique identification number based on the NCHRP Classification System. See Exhibit 4.

This identification number, corresponding to the specific problem area addressed, is part of the number that identifies a research project throughout its life cycle, until the project is given an NCHRP publication number when the final deliverable is published. For example, NCHRP Project 15-47 identifies a project in Area 15 (General Design). NCHRP Project 19-11 identifies a project in Area 19 (Finance). Once research was completed, final reports for these projects were published, respectively, as *NCHRP Research Report 839: A Performance-Based Highway Geometric Design Process* and *NCHRP Research Report 850: Applying Risk Analysis, Value Engineering, and Other Innovative Solutions for Project Delivery*.

Table 2 of the *Annual Report* uses this project numbering system to present information about active, completed, and pending NCHRP projects in 2017. The projects are grouped sequentially from Area 1: Design—Pavements through Area 25: Transportation Planning—Impact Analysis.



NCHRP Project 15-47 advanced a new process for highway geometric design that is more aligned with current expectations of transportation agencies and their communities and makes full use of the tools available to them. The research results are presented in *NCHRP Research Report 839: A Performance-Based Highway Geometric Design Process*.



NCHRP Project 19-11 examined the state of the art in managing project development and delivery, addressed through application of Value Engineering—a systematic process that combines creative and analytical techniques. Guidance is documented in *NCHRP Research Report 850: Applying Risk Analysis, Value Engineering, and Other Innovative Solutions for Project Delivery*.

NCHRP Classification System

Exhibit 4. *Problem Areas*

1	Pavements
2	Economics
3	Operations and Control
4	General Materials
5	Illumination and Visibility
6	Snow and Ice Control
7	Traffic Planning
8	Forecasting
9	Bituminous Materials
10	Specifications, Procedures, and Practices
11	Law
12	Bridges
13	Equipment
14	Maintenance of Way and Structures
15	General Design
16	Roadside Development
17	Safety
18	Concrete Materials
19	Finance
20	Special Projects
21	Testing and Instrumentation
22	Vehicle Barrier Systems
23	Properties
24	Mechanics and Foundations
25	Impact Analysis (Social, Environmental, Economic, Energy)



“[NCHRP Research Report 859 is a] timely report from TRB. Consequences [of delayed maintenance of highway assets] are huge. \$100,000/lane/mile for overlay. \$1.5M/lane/mile for reconstruction.”

*Scott Bennett,
Director, Arkansas DOT*

SELECTING THE BEST INVESTIGATORS

A rigorous, competitive process

NCHRP does not award grants for research. Rather, the program invites competing proposals from prospective investigators who can demonstrate relevant capability and experience in the problem area to be researched. Eligible organizations include private-sector organizations as well as academic institutions and nonprofit entities. Throughout its history, NCHRP has awarded research contracts to entities headquartered in 47 states, the District of Columbia, Canada, and England. Contractors selected to conduct NCHRP research principally fall into two categories—private sector and university/research institute. Of the 97 signed contracts using FY 2016 funds, 64 were with the private sector and 33 were with universities/research institutes.

Requests for proposals are posted on TRB's website, announced through the weekly TRB E-Newsletter, and distributed to a self-subscription listserv. Proposals must comply with the format outlined in the publication *Information and Instructions for Preparing Proposals for the Transportation Research Board's Cooperative Research Programs*.

The proposed budget total is established in advance and therefore not a factor in selecting an investigator. Because the funds available for research are announced in the project statement, proposers instead provide a research plan that is achievable with the available funds. If the proposed cost exceeds the funds available, the proposal will be rejected.

The project panels select investigating agencies after careful evaluation of all proposals and discussion of proposers' past performance on other research projects conducted by NCHRP or others. The successful proposals are retained by panel members for use in monitoring the research. Proposals, panel deliberations, and meeting notes are considered to be privileged information for use by the project panel and are not released.

NCHRP will provide a debriefing, if requested, to unsuccessful proposers to discuss the areas in which their proposals were judged to have weaknesses or deficiencies that were factors in not being selected.

“The [NCHRP domestic] scan process is very application oriented. Even as you're learning new information during the scan, you're always thinking about how you're going to use it.”

*Sharon Edgar,
Passenger Transportation Administrator, Michigan DOT*

Selection of an agency is made by the responsible project panel considering the following factors*:

- (1) the proposer's demonstrated understanding of the problem;
- (2) the merit of the proposed research approach and methodology;
- (3) experience, qualifications, and objectivity of the research team in the same or closely related problem area;
- (4) the plan for ensuring application of results;
- (5) the proposer's plan for participation by Disadvantaged Business Enterprises—small firms owned and controlled by minorities or women; and
- (6) the adequacy of the facilities and equipment.

**From Information and Instructions for
Preparing Proposals for the Transportation Research Board's Cooperative Research Programs*

“NCHRP does a good job of working [on tunnel research] with AASHTO's Committee on Bridges and Structures, both to learn what the states see as critical tunnel research needs and to keep us informed about results coming from NCHRP tunnel research.”

*Louis Ruzzi,
District Engineer,
Pennsylvania DOT*



The central role of NCHRP professionals



TRB is headquartered at the Keck Center of the National Academies, 500 Fifth St. NW, Washington, D.C.

Once research starts, administrative and technical oversight of progress is performed by NCHRP staff. In-depth oversight by project managers with wide-ranging expertise is an important factor contributing to project success.

In addition to reviewing monthly progress schedules and quarterly progress reports, the project managers maintain frequent contact with the research contractors. They monitor the conduct of the research to ensure it is consistent with the approved research plan, and they consult with project panels for technical feedback on the contractor's work. Project managers provide guidance to the research contractor's principal investigator in all technical and administrative matters.

The principal investigator is responsible for managing the project budget consistent with the approved work plan, and in no case can the costs exceed the available budget. Any major changes to account for promising new research leads or unproductive lines of study must be approved in advance by NCHRP and the project panel and are authorized through a contract amendment. Contractor invoices are checked by the staff. Finally, the NCHRP project manager and panel evaluate the final research results to determine their acceptability and suitability for publication.



Members of the panel for NCHRP Project 20-121, "State DOT Contributions to the Study, Investigation, and Interdiction of Human Trafficking." From left: Terry Little, Tyra Redus, Megan Jensen, and Kathi Grasso.

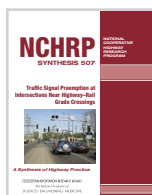
RESEARCH PRODUCTS

Disseminating research and documenting success

Dissemination of research findings to practitioners is a primary objective of the entire NCHRP research process. Publication of the final report or other deliverables is a key means of dissemination. NCHRP research findings are published in a number of series, which are listed in Table 1 of this *Annual Report*. Quantities for these series published over the past five years are shown in Exhibit 5. Some NCHRP publications produced this year are:



- *NCHRP Research Report 844: Guide for Integrating Goods and Services Movement by Commercial Vehicles in Smart Growth Environments* provides policymakers with ways to integrate the commercial movement of goods and services into community design and construction, as well as strategies to retroactively improve existing conditions. (Project 08-96)



- *NCHRP Synthesis of Highway Practice 507: Traffic Signal Preemption at Intersections Near Highway–Rail Grade Crossings* documents practices in North America for preempting traffic signals at intersections adjacent to highway–rail grade crossings. The report explores leading practices, recent research, and ongoing issues. (Project 20-05/Topic 47-15)



- *Strategies to Advance Automated and Connected Vehicles* is a briefing document that conveys the key findings of *NCHRP Research Report 845: Advancing Automated and Connected Vehicles: Policy and Planning Strategies for State and Local Transportation Agencies* and provides guidance on aligning traditional public policy interests with rapidly emerging automated and connected vehicle technologies. (Project 20-102(01))



- *NCHRP Legal Research Digest 74: Liability of State Departments of Transportation for Design Errors* examines the parameters of a DOT's liability for design errors or omissions, exploring in depth the issues of immunity and state tort claims acts. (Project 20-06/Topic 22-02)

Exhibit 5. Number of NCHRP Publications, 2013 to 2017

Publication Series	2013	2014	2015	2016	2017 (est.)
<i>NCHRP Reports</i>	25	39	20	19	28
<i>NCHRP Syntheses of Highway Practice</i>	14	14	17	17	15
<i>NCHRP Research Results Digests</i>	9	5	7	3	1
<i>NCHRP Legal Research Digests</i>	4	2	5	4	3
Web-Only Documents	8	9	8	7	13
CD-ROMs	4	9	5	2	0
Total	64	78	62	52	60

14 Publications are distributed widely by TRB, with print runs for reports ranging from 1,000 to 3,000 copies. Print copies are mailed to the CEOs of state DOTs, AASHTO staff, panel members, the contractor, and the following individuals and organizations:

- TRB members who have chosen to receive publications in the particular subject area of the report
- About 100 libraries
- TRB representatives in the state DOTs
- Numerous educational institutions
- Liaison representatives from industry and transportation organizations in other countries
- Relevant TRB panels and committees

NCHRP subprograms

Several “subprograms” are carried out within NCHRP. Results may be published in hard copy, delivered in the form of internal reports and presentations, published on the TRB website, or made available upon request.

Synthesis of Information Related to Highway Problems (Project 20-05)

Administrators, practicing engineers, and researchers continually face problems on which much information already exists, either in documented form or in terms of undocumented experience and practice. Unfortunately, this information is often fragmented and scattered, and therefore overlooked. The NCHRP Synthesis series aims to remedy this lack of awareness of existing solutions by assembling and organizing relevant information, practices, and research for particular highway problems.

Legal Problems Arising out of Highway Programs (Project 20-06)

State DOTs have an interest in evaluating the operating practices, administrative procedures, and legal issues associated with planning, design, and construction of transportation projects. Individual state legal experiences need to be compared and made available for possible wider application. This research identifies and evaluates legal options for DOTs, which facilitates the handling of both immediate and long-range needs.

Research for AASHTO and State DOT Leadership (Project 20-24)

NCHRP conducts focused research that addresses and responds to the evolving challenges facing state DOT decisionmakers. Reports from this project deliver timely information on topics including asset management, innovative financing and contracting, performance measures, and e-business, as well as emerging topics such as connected automated vehicles.

NCHRP IDEA Program (Project 20-30)

The Innovations Deserving Exploratory Analysis (IDEA) program funds research into promising but unproven innovations for highway design and construction, materials, operations, maintenance, and other areas of highway systems. A progress report that describes current and completed projects is published annually. A high percentage of products funded by the IDEA program have been successfully implemented.

International Highway Research and Technology (Project 20-36)

The NCHRP International Highway Research and Technology program provides a coordinated approach to international information sharing and technology exchange. The program's overall objective is to improve highway safety, development, maintenance, and operations through dissemination of innovative technology and successful policies and practices from around the globe.

Domestic Scan Program (Project 20-68)

The NCHRP Domestic Scan Program identifies innovative practices of high-performing transportation agencies that could be beneficially adopted by other interested agencies. The purpose of each scan and of the program as a whole is to facilitate information sharing and technology exchange among the states and other transportation agencies and to identify actionable items of common interest.

Research Support for AASHTO Committees

(Note: The AASHTO committee structure was reorganized in 2017. These committee assignments are under review.)

- **Standing Committee on Highways (Project 20-07)**

Through this project, the Standing Committee on Highways obtains guidance on an accelerated schedule through a continuing research program geared to the needs of the committee in the development of guides, standards, policies, and other AASHTO activities.

- **Standing Committee on Planning (Project 08-36)**

The objective of this project is to provide a flexible, ongoing program of quick-response research for the Standing Committee on Planning to improve analytical methods, decision support tools, procedures, and techniques employed by practitioners to support statewide and metropolitan transportation planning, programming, and development.

- **Standing Committee on the Environment (Project 25-25)**

This project provides flexible, ongoing, quick-response research to the Standing Committee on the Environment. The research is focused on environmental analysis, streamlining, stewardship, and planning to respond effectively to program delivery and project development issues.

- **Standing Committee on Public Transportation (Project 20-65)**

This project comprises quick-response research tasks to assist in the fulfillment of Standing Committee on Public Transportation responsibilities. Research is carried out on transit planning, operations, transit delivery, and related matters as state involvement in public transportation continues to grow.

The final deliverable

As an applied research program, NCHRP expects final research deliverables to be presented in language understandable to both administrators and practitioners and in a format that permits easy assimilation and application. The detailed research techniques and analyses in which a researcher would be interested are generally presented in report appendices. NCHRP specifies the style and organization of all research reports to guide the researchers.

The NCHRP project manager writes a foreword for each published report that (1) identifies the fields of specialty of those likely to be most interested in the results and (2) suggests how the results fit into present knowledge and practice. All published reports are offered for sale through TRB's Business Office. Since 2001, published reports also have been made available electronically on TRB's website.

Promoting useful results before publication

NCHRP undertakes a number of activities before formal publication of the final deliverables to increase the probability that results will be applied:

- Initial research proposals are required to state how the anticipated results can be used to improve practice.
- Panel members who are experts in the particular problem area and have a good understanding of practitioner needs define the research problem and its objectives and keep the focus of the research on producing implementable results.
- Investigators are selected because of the likelihood that the research results will be usable and readily implementable.
- NCHRP staff and panel members engage with the contractor throughout the research to ensure it is conducted according to the approved research plan.

Implementing research results

Implementation is the last step in the research process—the benefit of research cannot be realized unless it is put to use. NCHRP has developed a science-based approach called active implementation to help state DOTs put research results into practice. To ensure that the research products are viable, NCHRP considers implementation throughout the course of a project—from the development of the problem to the awarding of the research contract and beyond to the completion of the research.

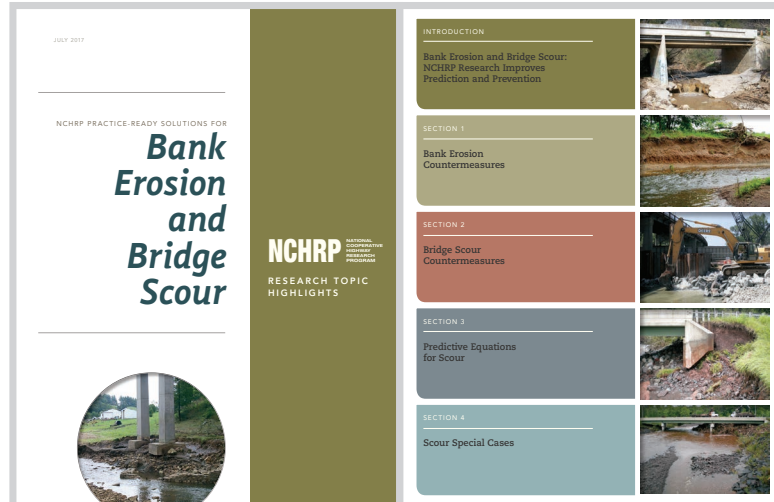
The selection of implementation strategies depends on the research product. NCHRP facilitates collaboration among stakeholders by managing communication, reinforcing technology transfer activities, measuring outcomes, and keeping all stakeholders moving toward the same goal during the active implementation process. Each research product requires a tailored approach to dissemination and, if appropriate, to supporting activities designed to help state DOTs and other agencies put the results into practice.

In 2017, NCHRP began publishing two-page *Ready Results* briefs for selected NCHRP research projects that were recently completed. These publications, which are targeted at practitioners, outline the research need, provide an overview of the research results, and, most importantly, offer guidance on immediate next steps for putting the results into practice.

Among the *Ready Results* briefs published to date, two examples are included starting on page 19:

- New Tool Supports Watershed-Based Stormwater Management
- Extending Bridge Life by Maintaining Expansion Joints

In addition, NCHRP's new *Research Topic Highlights* publication series features NCHRP research products for a single subject area in each issue. Two issues published in 2017 detail NCHRP practice-ready solutions in the areas of warm mix asphalt and bank erosion and bridge scour. NCHRP will release a third edition in early 2018 highlighting roadway tunnel research products.



Documenting success

For the past several years, NCHRP has addressed the challenge of documenting or showcasing successful research products. Several approaches are being used, and NCHRP will continue to explore new and better ways to meet this challenge.

Every four years, NCHRP surveys panel members from completed projects to identify known applications of research results. Feedback from these surveys enables NCHRP to confirm high usage and application of research results, to improve the implementation of future research results, and to identify successful applications of research.

These successful applications of NCHRP research are showcased in a series of case studies, “Impacts on Practice,” based on interviews with DOT practitioners. More than 35 of these case studies are posted on the TRB website. In addition, the interviews with DOT practitioners have identified the various ways that states implement NCHRP research results. NCHRP documents some of these implementation efforts and methods in the “Paths to Practice” series.

STAFF NEWS

New NCHRP Manager

In late 2016, TRB was pleased to announce Lori Sundstrom as the new manager of NCHRP. In this role, she is responsible for the overall operation and oversight of NCHRP. Sundstrom has been with TRB since 2007, serving as senior program officer prior to this position.

Before joining TRB, Sundstrom held management and executive positions with the Oregon DOT, the Portland (Oregon) Development Commission, and the city of Phoenix, Arizona. She holds a Master of Public Administration from Arizona State University and a Bachelor of Science in Business Administration from the University of Arizona.



READY RESULTS

Next Steps to Put NCHRP Research into Practice

NCHRP NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

FOCUS ON: NCHRP Research Report 840

August 2017

New Tool Supports Watershed-Based Stormwater Management



Image courtesy of Minnesota DOT

Where road construction sites do not allow for use of stormwater treatment methods such as the vegetated swale shown here, a watershed-wide approach to stormwater runoff can be a cost-effective and environmentally beneficial alternative.

REAL-WORLD NEED

Most DOTs manage stormwater runoff from highway facilities on a project-by-project basis. Typically, this means using stormwater best management practices (BMPs), such as vegetated swales and retention ponds, near construction sites. But many locations, particularly in urban areas, have limited space in the right-of-way, which can make constructing stormwater facilities difficult and expensive. As a cost-effective alternative to traditional stormwater BMPs, agencies are increasingly interested in using a watershed approach, which takes into account the ecosystem of an entire area drained by a single waterway. By installing stormwater facilities not just on project sites but elsewhere in the watershed, DOTs can achieve the same and sometimes better environmental benefits for the same or lower costs. However, it is not always clear which BMPs to use—or where to place them within the watershed—to achieve the maximum benefit.

RESEARCH SOLUTION

NCHRP Project 25-37 developed a Microsoft Excel-based tool, the Watershed-Based Stormwater Mitigation Toolbox, to help transportation agencies compare and select stormwater BMPs. The Toolbox takes into account the overall impact on watershed health of both runoff facilities that are on specific project sites and those elsewhere within the watershed. Agencies can customize the tool to their environmental priorities and local conditions. The Toolbox also provides scientific support for a watershed-based approach that agencies can use as they work with regulators to make stormwater management decisions.

NEXT STEPS Put It into Practice

EVALUATE

Communicate with state regulatory agencies to evaluate whether the watershed approach is a viable option in your state.

COLLABORATE

Many agencies within a state have an interest in water quality. Work with these other agencies to develop practices that align with each agency's mission, goals, and responsibilities.

REVIEW

To help determine watershed priorities, review existing planning documents from federal, state, and local entities.

NETWORK

Contact other states that have considered or implemented a watershed approach.

PARTNER

Apply for NCHRP implementation funding. See trb.org/nchrp.

About the Research

RESEARCH STRATEGY

Investigators began by identifying watershed data from national agencies that could be used to assess the baseline health of a watershed. Investigators then identified the performance measures most critical to watershed health and the relative effectiveness of various BMPs in maintaining or improving such measures. Using this information, researchers developed a methodology for evaluating and comparing BMPs. This methodology departs from a project-based approach, which generally focuses on specific pollutants. Instead, it analyzes ecosystem services, or the benefits and uses that a watershed provides to its community, such as providing a drinking water supply or a habitat for a commercial fishery. Investigators incorporated that methodology into the Watershed-Based Stormwater Mitigation Toolbox.

WHAT WE LEARNED

Four stormwater factors are critically important to watershed health: (1) total suspended solids; (2) nutrient content, which can encourage algae blooms that deplete oxygen for other aquatic species; (3) runoff volume; and (4) increased stream power, which can contribute to erosion and sediment transport. However, these factors don't affect all watersheds in the same way, and their relative importance varies with local conditions. The Toolbox allows users to prioritize the four performance measures by assigning specific weights to them. The tool then ranks stormwater BMPs based on how effective they are at improving the conditions that best support local priorities.

WHY IT MATTERS

The Toolbox provides a starting point for taking a holistic watershed approach to stormwater management and comparing on- and off-site treatment options. During the planning phase of transportation projects, agencies can use the Toolbox to help characterize watersheds and prioritize potential stormwater BMPs. Every state's regulatory environment is unique, and state regulators' ability to consider a watershed approach will vary. Consequently, the Toolbox can also provide agencies with valuable scientific support for taking a watershed approach to meet regulatory requirements.



Downstream wetland restoration is an off-site BMP that can be used as part of a watershed-scale approach to mitigating pollution impacts from construction activities.

Image courtesy of U.S. Fish and Wildlife Service

RESOURCES



NCHRP PROJECT 25-37

FINAL PRODUCTS

NCHRP Research Report 840: A Watershed Approach to Mitigating Stormwater Impacts
trb.org/Main/Blurbs/175861.aspx

Watershed-Based Stormwater Mitigation Toolbox
trb.org/Main/Blurbs/175861.aspx

NCHRP SENIOR PROGRAM OFFICER

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ADDITIONAL RESOURCES

EnviroAtlas, U.S. Environmental Protection Agency
epa.gov/enviroatlas

Web Soil Survey, Natural Resources Conservation Service
websoilsurvey.sc.egov.usda.gov

National Centers for Environmental Information weather and climate data
ncdc.noaa.gov/data-access/quick-links

The National Academies of
 SCIENCES • ENGINEERING • MEDICINE


 TRANSPORTATION RESEARCH BOARD

Image courtesy of Washington State DOT (CC BY-NC-ND 2.0)

The Transportation Research Board's National Cooperative Highway Research Program (NCHRP) produces ready-to-implement solutions to the challenges facing transportation professionals. NCHRP is sponsored by the individual state departments of transportation of the American Association of State Highway and Transportation Officials (AASHTO), in cooperation with the Federal Highway Administration (FHWA). Any opinions and conclusions expressed or implied in resulting research products are those of the individuals and organizations who performed the research and are not necessarily those of TRB; the National Academies of Sciences, Engineering, and Medicine; or NCHRP sponsors.

READY RESULTS

Next Steps to Put NCHRP Research into Practice

NCHRP NATIONAL
COOPERATIVE
HIGHWAY
RESEARCH
PROGRAM

FOCUS ON: NCHRP Project 12-100

July 2017

Extending Bridge Life by Maintaining Expansion Joints



Source: Wikipedia

Expansion joints help bridges accommodate small movements caused by temperature changes. Proper maintenance keeps the joints watertight, which prevents deicers from leaking into the bridge and causing corrosion.

REAL-WORLD NEED

Small-movement expansion joints (SMEJs) are a small part of short-span bridges, but they have a big impact on the bridge's life cycle. SMEJs let the bridge accommodate movements caused by temperature changes and rotation, while also directing water and deicing chemicals off the deck and away from the bridge. However, without proper maintenance, SMEJs can develop defects that allow deicers to leak into the bridge superstructure and substructure. These chemicals can cause serious problems that are expensive to repair, such as steel girder corrosion and embankment erosion. Improper sizing of the joint seal, poor substrate preparation, and improper application have been cited as some of the reasons for expansion joint failures. To overcome these failure mechanisms, bridge owners need clear guidelines for evaluating the performance of bridge expansion joints and maintaining them.

RESEARCH SOLUTION

Investigators used a literature review, surveys of stakeholders, and the expertise of the project panel to develop SMEJ maintenance, repair, and replacement guidelines. These guidelines cover all five common SMEJ types, providing illustrated repair and installation procedures, formulas to help select and install joints, and a method to test the watertightness of joints. Agencies can use these guidelines to improve SMEJ maintenance procedures and reduce bridge damage caused by joint defects.

NEXT STEPS Put It into Practice

REVIEW

Consult the guidelines developed through this project for guidance on small-movement expansion joint (SMEJ) installation, evaluation, and repair.

EVALUATE

Consider incorporating SMEJs into your state's existing bridge-element inspection practices.

SELECT

Use performance metrics to select replacement joint types based on a bridge's traffic levels, environmental conditions, and expected service life.

COLLABORATE

Review procedures and bridge design and inspection manuals used by other states, and share practices when appropriate.

PARTNER

Apply for NCHRP implementation funding. See trb.org/nchrp.

About the Research

RESEARCH STRATEGY

Investigators began by performing a comprehensive literature review and conducting surveys of bridge owners, bridge consultants, contractors, and SMEJ manufacturers. Using this information, the investigators determined the state of the practice in joint installation and maintenance, including the types of joints used, trends in joint usage, typical failure modes, and available maintenance guidelines. The surveys also included feedback on the effectiveness and ease of use of performance metrics for selecting replacement joints.

WHAT WE LEARNED

Strip seals are the most widely used type of SMEJ today, although asphalt plug joints, compression and bonded joints, pourable joints, and open joints are also common. Researchers compiled repair, maintenance, and replacement procedures for all five joint types. The literature review identified a life-cycle cost analysis method, but its data requirements may make it impractical for current usage. Additionally, survey respondents viewed life-cycle cost as a difficult-to-use performance measure, even if potentially valuable. Consequently, researchers proposed a flexible system for measuring performance based on joint opening, joint movement, skew, expected service life, installed cost, constructability, lead time, location, traffic, and durability.

WHY IT MATTERS

Preventing SMEJ failures will help avoid more serious damage to bridges, but doing so requires quality installation by trained crews. To help agencies maintain and replace SMEJs effectively, researchers developed a stand-alone document, *Guidelines for Maintaining Small Movement Bridge Expansion Joints*, which the AASHTO Subcommittee on Maintenance is currently reviewing for publication. In addition to illustrated repair and installation procedures, the guidelines include practices for evaluating joint condition and selecting replacement joints, formulas for calculating joint movement, a method for testing the watertightness of joints, and a simple procedure for calculating a benefit-cost ratio when comparing replacement joint options.



Step-by-step photos in the guidelines demonstrate the installation of several types of expansion joints, including this bonded joint seal.

RESOURCES



NCHRP PROJECT 12-100

FINAL PRODUCTS

Guidelines for Maintaining Small Movement Bridge Expansion Joints is under review for publication by the AASHTO Subcommittee on Maintenance.

Contractor's final report
apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3651

NCHRP SENIOR PROGRAM OFFICER

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PRINCIPAL INVESTIGATOR

Tripp Shenton | shenton@udel.edu

ADDITIONAL RESOURCES

Simplifying Bridge Expansion Joint Design and Maintenance, South Carolina DOT report
ntl.bts.gov/lib/46000/46200/46245/SPR_677.pdf

AASHTO Subcommittee on Maintenance, Bridges Technical Working Group
maintenance.transportation.org

The National Academies of
 SCIENCES • ENGINEERING • MEDICINE


 TRANSPORTATION RESEARCH BOARD

Images on this page from contractor's final report

Table 1. Publications of the National Cooperative Highway Research Program 2017

Research Reports		
No.	Proj. No.	Title, Pages
834	03-78B	Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities: A Guidebook (& WOD 222), 128 p.
836	20-07/Task 363	Guidelines for Emergency Ventilation Smoke Control in Roadway Tunnels, 80 p.
837	09-50	Performance-Related Specifications for Emulsified Asphaltic Binders Used in Preservation Surface Treatments, 116 p.
838	10-92	Guidelines for Optimizing the Risk and Cost of Materials QA Programs, 210 p.
839	15-47	A Performance-Based Highway Geometric Design Process, 278 p.
840	25-37	A Watershed Approach to Mitigating Stormwater Impacts, 124 p.
841	17-56	Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments, 164 p.
842	25-45	Mapping Heavy Vehicle Noise Source Heights for Highway Noise Analysis (& WOD 225), 92 p.
843	09-49A	Long-Term Field Performance of Warm Mix Asphalt Technologies, 124 p.
844	08-96	Guide for Integrating Goods and Services Movement by Commercial Vehicles in Smart Growth Environments, 128 p.
845	20-102(01)	Advancing Automated and Connected Vehicles: Policy and Planning Strategies for State and Local Transportation Agencies, 158 p.
845	20-102(01)	Advancing Automated and Connected Vehicles: Policy and Planning Strategies for State and Local Transportation Agencies, Briefing Document, 32 p.
846	20-97	Improving Findability and Relevance of Transportation Information, 236 p.
847	09-56	Variability of Ignition Furnace Correction Factors, 128 p.
848	14-28	Inspection Guidelines for Bridge Post-Tensioning and Stay Cable Systems Using NDE Methods, 258 p.
849	12-91	Strand Debonding for Pretensioned Girders, 120 p.
850	19-11	Applying Risk Analysis, Value Engineering, and Other Innovative Solutions for Project Delivery, 106 p.
851	12-92	Proposed AASHTO LRFD Bridge Design Specifications for Light Rail Transit Loads, 208 p.
852	08-94	Method Selection for Travel Forecasting: User Guide (& WOD 234), 276 p.
853	24-40	Guidance for Design Hydrology for Stream Restoration and Channel Stability, 78 p.
854	08-98	Guide for Identifying, Classifying, Evaluating, and Mitigating Truck Freight Bottlenecks, 126 p.
856	20-07/Task 382	Specifying and Measuring Asphalt Pavement Density to Ensure Pavement Performance, 68 p.
857	10-82A	Performance-Related Specifications for Pavement Preservation Treatments, 154 p.
859	14-20A	Consequences of Delayed Maintenance of Highway Assets, 80 p.
861	20-65/Task 56	Best Practices in Rural Regional Mobility, 182 p.
862	25-46	Guide to Deploying Clean Truck Freight Strategies, 72 p.
863	09-51	Material Properties of Cold In-Place Recycled and Full-Depth Reclamation Asphalt Concrete, 84 p.
864	12-101	Seismic Evaluation of Bridge Columns with Energy Dissipating Mechanisms, Vol. 1: Research Overview, 76 p.
864	12-101	Seismic Evaluation of Bridge Columns with Energy Dissipating Mechanisms, Vol. 2: Guidelines, 32 p.
867	20-104	Keeping What You Paid For—Retaining Essential Consultant-Developed Knowledge Within DOTs (& WOD 238), 84 p.
Syntheses of Highway Practice (Project 20-05)		
No.	Topic No.	Title, Pages
500	47-01	Control of Concrete Cracking in Bridges, 116 p.
501	47-08	Pavement Management Systems: Putting Data to Work, 88 p.
502	47-09	Practices for Establishing Contract Completion Date for Highway Projects, 72 p.
503	47-04	Leveraging Technology for Transportation Agency Workforce Development and Training, 116 p.
504	47-06	Strategic Program Delivery Methods, 110 p.
505	47-03	Current Practices and Guidelines for the Reuse of Bridge Foundations, 92 p.
506	47-14	Effective Utility Coordination: Application of Research and Current Practices, 70 p.
507	47-15	Traffic Signal Preemption at Intersections Near Highway–Rail Grade Crossings, 84 p.
508	47-05	Data Management and Governance Practices, 56 p.
509	47-16	Highway Worker Safety, 160 p.
510	47-10	Resource Allocation of Available Funding to Programs of Work, 92 p.
511	47-13	Relationship Between Chemical Makeup of Binders and Engineering Performance, 120 p.
512	47-12	Use of Fiber-Reinforced Polymers in Highway Infrastructure, 168 p.
513	47-07	Evolving Debt Finance Practices for Surface Transportation, 88 p.
514	47-17	Statewide and Megaregional Travel Forecasting Models: Freight and Passenger, 122 p.

Research Results Digests

No.	Proj. No.	Title, Pages
401	20-05	Continuing Project to Synthesize Information on Highway Problems: 2017, 28 p.
402	20-05	Continuing Project to Synthesize Information on Highway Problems: 2018 (In production)

Legal Research Digests (Project 20-06)

No.	Topic No.	Title, Pages
73	22-03	Primer on Patentability and Use of Ideas Developed by Contractors Performing Work for State and Federal Transportation and Local Planning Agencies, 60 p.
74	22-02	Liability of State Departments of Transportation for Design Errors, 60 p.
75	22-01	Legal Requirements for State Transportation Agency Participation in Conservation Plans, 36 p.

Web-Only Documents

No.	Proj. No.	Title, Pages
222	03-78B	Guidelines for the Application of Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Difficulties: Final Project Report (& Rep. 834), 350 p.
225	25-45	Appendices to NCHRP Research Report 842 (& Rep. 842), 175 p.
226	08-36/Task 128	Data Visualization Methods for Transportation Agencies, 75 p.
227	03-105	Design of Interchange Loop Ramps and Pavement/Shoulder Cross-Slope Breaks, 218 p.
229	07-19(02)	Methods and Technologies for Pedestrian and Bicycle Volume Data Collection: Phase 2, 79 p.
231	20-102(03)	Challenges to CV and AV Applications in Truck Freight Operations, 90 p.
232	20-59(52)	Communications Worker Credentialing Requirements, 41 p.
233	20-59(50)	Mainstreaming Transportation Hazards and Security Risk Management: CAPTA Update and Implementation, 50 p.
234	08-94	Developing a Method Selection Tool for Travel Forecasting (& Rep. 852), 68 p.
235	01-50	Quantifying the Influence of Geosynthetics on Pavement Performance, 841 p.
236	01-51	Incorporating Slab/Underlying Layer Interaction into the Concrete Pavement Analysis Procedures, 279 p.
238	20-104	Developing the Guide to Retaining Essential Consultant-Developed Knowledge Within DOTs (& Rep. 867), 51 p.
239	20-102(02)	Impacts of Laws and Regulations on CV and AV Technology Introduction in Transit Operations, 119 p.

Notes:

Publications in parentheses with an ampersand (&) are companion publications.

See Table 2 for project titles. Progress reports are superseded annually. See inside back cover of this document for ordering information.

TABLE 2
STATUS (AS OF 12/31/2017) OF PROJECTS ACTIVE OR PENDING DURING 2017

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
AREA ONE : DESIGN--PAVEMENTS						
01-50	Quantifying the Influence of Geosynthetics on Pavement Performance	Texas A&M Research Foundation	600,000	9/1/2011	3/31/2017	Completed---Final deliverable is available as NCHRP Web-Only Document 235
01-52	A Mechanistic-Empirical Model for Top-Down Cracking of Asphalt Pavement Layers	Texas A&M Transportation Institute	500,000	3/4/2013	1/31/2018	Research in progress
01-53	Proposed Enhancements to Pavement ME Design: Improved Consideration of the Influence of Subgrade and Unbound Layers on Pavement Performance	Texas A&M Transportation Institute	400,000	10/1/2014	6/29/2018	Research in progress
01-54	Guidelines for Limiting Damage to Flexible and Composite Pavements Due to the Presence of Water	Applied Pavement Technology	349,881	8/1/2014	12/31/2017	Research in progress; final report pending
01-55	Performance-Based Mix Design of Porous Friction Courses	Auburn University	300,000	7/31/2014	1/31/2017	Completed---Publication decision pending
01-57	Standard Definitions for Comparable Pavement Cracking Data	Iowa State University	300,000	1/4/2016	9/4/2017	Terminated---No report. Remainder of budget directed to 01-57A
01-57A	Developing Standard Definitions for Comparable Pavement Cracking Data	Oklahoma State University	249,592	10/13/2017	7/13/2019	Research in progress
01-58	Quantifying the Effects of Implements of Husbandry on Pavements	University of Pittsburgh	400,000	9/1/2017	2/28/2020	Research in progress
01-59	Including the Effects of Shrink/Swell and Frost Heave in Mechanistic-Empirical Pavement Design	----	500,000			In development
01-60	Calibration and Verification of Pavement Surface Images	----	600,000			In development
01-61	Evaluation of Bonded Concrete Overlays on Asphalt Pavements	----	500,000			In development
AREA THREE : TRAFFIC--OPERATIONS AND CONTROL						
03-62	Guidelines for Accessible Pedestrian Signals (APS)	University of North Carolina - Chapel Hill	1,070,000	10/4/2001	1/31/2018	Research in progress; interim materials summarized in NCHRP Research Results Digest 278; contractor's final report pending. Workshops completed.
03-78C	Training and Technology Transfer for Accessibility Guidelines for Roundabouts and Channelized Turn Lanes	Kittelson & Associates	250,000	1/4/2017	1/3/2019	Research in progress; interim report pending; pilot workshop in August 2017
03-108	Guidance on Quantifying Benefits of TIM Strategies	Noblis Inc.	499,985	7/10/2013	10/31/2017	Completed---Publication decision pending
03-111	Effectiveness of Work Zone Transportation Management Plan Strategies	KLS Engineering LLC	749,961	6/24/2014	7/24/2018	Research in progress; interim report under review

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
03-112	Operational and Safety Considerations in Making Lane Width Decisions on Urban and Suburban Arterials	MRIGlobal	750,000	8/4/2014	6/29/2018	Research in progress
03-113	Guidance for Traffic Signals at Diverging Diamond Interchanges and Adjacent Intersections	North Carolina State University	999,941	6/13/2014	6/12/2018	Research in progress
03-114	Planning and Evaluating Active Traffic Management Strategies	Texas A&M Transportation Institute	700,000	1/16/2014	8/15/2018	Research in progress
03-117	Traffic Control Devices and Measures for Detering Wrong-Way Movements	Texas A&M Transportation Institute	298,697	5/11/2015	1/15/2018	Research in progress; contractor's draft final report under review
03-118	Decision-Making Guide for Traffic Signal Phasing	Vanasse Hangen Brustlin, Inc.	600,000	8/13/2015	2/12/2019	Research in progress
03-119	Application of MASH Test Criteria to Breakaway Sign and Luminaire Supports and Crashworthy Work Zone Traffic Control Devices	George Mason University	599,134	9/28/2015	3/28/2018	Research in progress
03-120	Assessing Interactions Between Access Management Treatments and Multimodal Users	Kittelson & Associates	800,000	8/11/2015	2/11/2018	Research in progress
03-121	Incorporating Freight, Transit and Incident Response Stakeholders into Integrated Corridor Management (ICM): Processes and Strategies for Implementation	Cambridge Systematics	399,558	7/5/2016	7/5/2018	Research in progress; contractor's draft final report under review
03-122	Performance-Based Management of Traffic Signals	Kittelson & Associates	600,000	4/14/2016	4/13/2018	Research in progress
03-123	Proposed Practices for the Application of Dynamic Lane Use Control	Texas A&M Transportation Institute	350,000	7/1/2016	12/31/2018	Research in progress
03-124	Principles and Guidance for Presenting Drivers with Dynamic Information on Active Traffic Management	Battelle Memorial Institute	749,939	11/3/2016	5/2/2019	Research in progress
03-125	Evaluation of Change and Clearance Intervals Prior to the Flashing Yellow Arrow Permissive Left-Turn Indication	University of Wisconsin - Madison	300,000	9/21/2016	9/20/2018	Research in progress
03-126	Operational Standards for Highway Infrastructure	-----	500,000			In development
03-127	Cybersecurity of Traffic Management Systems	Southwest Research Institute	750,000	8/16/2017	8/15/2019	Research in progress
03-128	Business Intelligence for Transportation System Management and Operations and Agency Decision Making	-----	360,000			In development
03-129	Essential Communications	-----	450,000			In development
03-130	Production of Roundabouts: An Informational Guide, Third Edition	-----	750,000			In development

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
03-131	Benefits and Best Practices in Implementing Decision Support Systems for Real-time Transportation Management	----	750,000			In development
03-132	Improving the Safety and Efficiency of Temporary Traffic Control for Mobile Operations on Two-Lane Roadways	----	300,000			In development
03-133	Signal Timing Strategies for Non-Motorized Users	----	500,000			Contract pending
AREA FOUR : MATERIALS AND CONSTRUCTION--GENERAL MATERIALS						
04-39	Field Performance of Corrugated Pipe Manufactured with Recycled Polyethylene Content	TRI/Environmental, Inc.	600,000	7/11/2013	6/30/2017	Completed---To be published as NCHRP Research Report 870
04-40	Reliability-Based Geotechnical Resistance Factors for Axially-Loaded Micropiles	University of Missouri	249,998	9/1/2017	8/31/2019	Research in progress
AREA FIVE : TRAFFIC--ILLUMINATION AND VISIBILITY						
05-21	Safety and Performance Criteria for Retroreflective Pavement Markers	Texas A&M Transportation Institute	675,000	9/1/2015	6/30/2018	Research in progress
05-22	Guidelines for Solid-State Roadway Lighting	Parsons Brinckerhoff	399,993	6/1/2017	1/2/2019	Research in progress
05-23	The Unintended Consequences of LED Roadway Lighting: Effects on Road User Health and Driver Alertness	----	400,000			In development
05-24	Guidelines for the Selection and Application of Vehicle and Equipment Warning Light Configurations, Colors, and Markings	----	600,000			In development
AREA SEVEN : TRAFFIC--TRAFFIC PLANNING						
07-19(02)	Methods and Technologies for Collecting Pedestrian and Bicycle Volume Data [Follow-On]	Kittelsohn & Associates	49,982	4/13/2015	1/31/2017	Completed---Agency report available as NCHRP Web-Only Document 205
07-21	Asset Management Guidance for Traffic Control Devices, Barriers, and Lighting	Vanasse Hangen Brustlin, Inc.	550,000	4/10/2013	12/9/2018	Research in progress
07-22	Planning and Preliminary Engineering Applications Guide to the Highway Capacity Manual	Kittelsohn & Associates	566,000	6/4/2013	10/30/2017	Completed---Published as NCHRP Report 825; implementation activities continuing
07-23	Access Management in the Vicinity of Interchanges	Texas A&M Transportation Institute	575,000	6/20/2013	4/30/2018	Research in progress
07-24	Estimating the Value of Truck Travel-Time Reliability	Parsons Brinckerhoff	299,920	1/26/2017	7/26/2018	Research in progress

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
07-25	Guide for Pedestrian and Bicycle Safety at Alternative Intersections and Interchanges (All)	Kittelson & Associates	400,000	4/12/2017	2/12/2019	Research in progress
AREA EIGHT : TRANSPORTATION PLANNING--FORECASTING						
08-36	Research for the AASHTO Standing Committee on Planning	----	600,000 **	5/4/1999		Ongoing---Refer to project writeup on NCHRP website
08-36/Task 116	Development of Transportation Asset Management Plan Templates	RAND Corporation	234,718	6/12/2013	7/15/2018	Research in progress
08-36/Task 120	Snapshots of Planning Practices	Cambridge Systematics	270,000	4/22/2013	11/1/2017	Research complete; awaiting final snapshot
08-36/Task 125	Transportation Asset Management Knowledge Portal	RAND Corporation	125,000	12/13/2013	4/15/2018	Monitoring continuing; project continuation under review
08-36/Task 125A	Transportation Asset Management Knowledge Portal (Continuation)	RAND Corporation	70,000	1/10/2017	1/9/2018	Monitoring continuing; project continuation under review
08-36/Task 127	Employment Data for Planning: Do You Know What You're Getting, Who's Your Supplier, and How Good are the Goods?	Cambridge Systematics	99,975	6/18/2015	2/28/2018	Research in progress
08-36/Task 131	Transportation Data Integration to Develop Planning Performance Measures	Cambridge Systematics	100,000	9/25/2015	6/30/2017	Completed---Publication decision pending
08-36/Task 132	Understanding Changes in Youth Mobility	RAND Corporation	124,976	7/21/2015	6/1/2017	Completed---Publication decision pending
08-36/Task 134	Transportation Asset Management Research Roadmap	RAND Corporation	99,791	9/25/2015	1/31/2017	Completed---Publication decision pending
08-36/Task 135	Addressing Margins of Error in Small Areas of Data Delivered through the American Fact Finder or the Census Transportation Planning Products Program	RAND Corporation	74,997	9/25/2015	11/30/2017	Continued as Task 135A
08-36/Task 135A	Addressing Margins of Error in Small Areas of Data Delivered through the American FactFinder or the Census Transportation Planning Products Program	RAND Corporation	29,956	8/23/2017	8/22/2018	Research in progress
08-36/Task 137	Assessing the Utility and Costs of Statewide Travel Demand Models	RAND Corporation	124,697	6/21/2016	2/28/2018	Research in progress
08-36/Task 138	Support and Update of the Strategic Plan for SCOP/Subcommittees on TAM	WSP USA Inc.	80,000	7/20/2016	11/15/2017	Completed---Publication decision pending
08-36/Task 139	Planning Research Digest	RAND Corporation	124,401	6/21/2016	3/31/2018	Research in progress
08-36/Task 140	Assessing Actual Transportation Impacts of the 2005 BRAC Decisions	Parsons Brinckerhoff	124,996	7/20/2016	2/28/2018	Research in progress
08-36/Task 141	Evaluation of Walk and Bicycle Demand Modeling Practice	RAND Corporation	99,996	5/30/2017	5/29/2018	Research in progress
08-36/Task 142	Advancing Sustainability through Multi-Agency Collaborations	RAND Corporation	100,000	6/5/2017	6/4/2018	Research in progress

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
08-36/Task 143	Evolving Transportation Planning Research Needs for the 21st Century	WSP USA Inc.	124,980	6/5/2017	6/4/2018	Research in progress
08-36/Task 144	Transportation Asset Management and Effective Organizational Models for Program Implementation	Cambridge Systematics	125,000	6/5/2017	6/4/2018	Research in progress
08-94	Guidelines for Selecting Travel Forecasting Methods and Techniques	Resource Systems Group, Inc.	499,911	5/16/2014	7/31/2017	Completed---Published as NCHRP Research Report 852
08-95	Cell Phone Location Data for Travel Behavior Analysis	Cambridge Systematics	250,000	5/30/2014	8/31/2017	Completed---To be published as NCHRP Research Report 868
08-96	Integrating Goods and Services Movement by Commercial Vehicles in Smart Growth Environments	Cambridge Systematics	300,000	4/9/2014	1/31/2017	Completed---Published as NCHRP Research Report 844
08-98	Guide for Identifying, Classifying, Evaluating, and Mitigating Freight Truck Bottlenecks	Cambridge Systematics	350,000	2/24/2014	1/31/2017	Completed---Published as NCHRP Research Report 854
08-100	Environmental Justice Analyses When Considering Toll Implementation or Rate Changes	Louis Berger Group	499,915	7/29/2014	2/1/2017	Completed---To be published as NCHRP Research Report 860
08-101	Enhanced Truck Data Collection and Analysis for Emissions Modeling	Cambridge Systematics	500,000	6/22/2015	6/30/2018	Research in progress
08-102	Bicyclist Facility Preferences and Effects on Increasing Bicycle Trips	Georgia Tech Research Corporation	350,000	6/24/2015	1/31/2019	Research in progress; interim report pending
08-103	Implementing NCHRP Report 806: Guide to Cross-Asset Resource Allocation and the Impact on Transportation System Performance	Spy Pond Partners	398,300	6/1/2016	6/1/2018	Research in progress
08-104	A Guidebook for Post-Award Contract Administration for Highway Projects Delivered Using Alternative Contracting Methods	University of Colorado - Boulder	500,000	9/16/2016	9/15/2018	Research in progress; Phase II underway
08-105	Measuring the Effectiveness of Public Involvement in Transportation Planning and Project Delivery	PRR Inc.	350,000	6/6/2016	2/6/2018	Research in progress; interim report pending
08-106	Metropolitan Freight Transportation: Implementing Effective Strategies	Texas A&M Transportation Institute	375,000	5/25/2016	5/25/2018	Research in progress
08-107	A Guidebook for Emergency Contracting Procedures for Administration of a Regional Emergency	AECOM Consulting Transportation Group	249,997	12/15/2016	12/14/2018	Research in progress; interim report pending
08-108	Developing National Performance Management Data Strategies to Address Data Gaps, Standards, and Quality	Spy Pond Partners	299,956	3/9/2017	9/8/2018	Research in progress
08-109	Updating the AASHTO Transportation Asset Management Guide—A Focus on Implementation	Spy Pond Partners	100,000	3/10/2017	4/9/2018	Research in progress
08-110	Traffic Forecasting Accuracy Assessment Research	University of Kentucky Research Foundation	349,932	2/14/2017	10/13/2018	Research in progress

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
08-111	Effective Decision Making Methods for Freight-Efficient Land Use	Rensselaer Polytechnic Institute	500,000	3/20/2017	3/20/2019	Research in progress
08-112	Guidebook for Implementing Alternative Technical Concepts into All Types of Highway Project Delivery Methods	Gransberg & Associates Inc.	450,000	6/1/2017	3/1/2019	Research in progress; interim report under review
08-113	Integrating Effective Transportation Performance, Risk, and Asset Management Practices	----	540,000			In development
08-114	Guidebook for Estimating Contract Time and Evaluating Accuracy	----	500,000			In development
08-115	Framework for Designing and Managing Data and Information Workflows for Transportation Assets	----	450,000			In development
08-116	Framework for CV Pilot and Smart Cities Data Analytics for Policy Guidance	----	400,000			In development
08-117	Impact of Transformational Technologies on Land Uses	----	200,000			In development

AREA NINE : MATERIALS AND CONSTRUCTION--BITUMINOUS MATERIALS

09-40A	Field Evaluation of the Louisiana Interlayer Shear Strength Tester	Louisiana Transportation Research Council	186,407	6/1/2013	9/30/2017	Completed---Publication decision pending
09-51	Material Properties of Cold In-Place Recycled and Full Depth Reclamation Asphalt Concrete for Pavement Design	University of Maryland	499,234	6/4/2012	8/31/2017	Completed---To be published as NCHRP Research Report 863
09-52A	Short-Term Laboratory Conditioning of Asphalt Mixtures: Field Verification	Texas A&M Transportation Institute	162,000	10/18/2016	10/18/2018	Research in progress
09-54	Long-Term Aging of Asphalt Mixtures for Performance Testing and Prediction	North Carolina State University	800,000	5/21/2013	12/31/2017	Completed---Publication decision pending
09-55	Recycled Asphalt Shingles in Asphalt Mixtures with Warm Mix Asphalt Technologies	Auburn University	600,000	6/10/2013	12/31/2017	Research in progress; draft final report under review
09-56A	Identifying Influences on and Minimizing the Variability of Ignition Furnace Correction Factors - Phase II	Auburn University	250,000	5/12/2017	11/12/2018	Research in progress; interim report pending
09-57A	Experimental Design for Field Validation of Laboratory Tests to Assess Cracking Resistance of Asphalt Mixtures	----	1,000,000			In development
09-58	The Effects of Recycling Agents on Asphalt Mixtures with High RAS and RAP Binder Ratios	Texas A&M Transportation Institute	1,500,000	5/2/2014	11/30/2018	Research in progress; Phase III underway - interim reports available
09-59	Relating Asphalt Binder Fatigue Properties to Asphalt Mixture Fatigue Performance	Advanced Asphalt Technologies, LLC	1,000,000	4/20/2015	7/31/2018	Research in progress; Phase II underway

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
09-60	Addressing Impacts of Changes in Asphalt Binder Formulation and Manufacture on Pavement Performance through Changes in Asphalt Binder Specifications	Western Research Institute	1,000,000	7/6/2016	1/6/2019	Research in progress; Phase II underway
09-61	Short- and Long-Term Binder Aging Methods to Accurately Reflect Aging in Asphalt Mixtures	Advanced Asphalt Technologies, LLC	749,976	3/2/2017	9/1/2019	Research in progress; interim report under review
09-62	Rapid Tests and Specifications for Construction of Asphalt-Treated Cold Recycled Pavements	Virginia Department of Transportation	999,751	6/1/2017	6/1/2020	Research in progress; interim report pending

AREA TEN : MATERIALS AND CONSTRUCTION--SPECIFICATIONS, PROCEDURES, AND PRACTICES

10-82A	Performance-Related Specifications for Pavement Preservation Treatments	Michigan State University	343,939	2/3/2014	4/28/2017	Completed---To be published as NCHRP Research Report 857
10-86A	Software for Bidding Alternative Drainage Pipe Systems	Golder Associates Inc.	325,188	1/5/2015	8/30/2017	Completed---Publication decision pending
10-91A	Sustainable Highway Construction Practices	University of Washington	300,000	10/10/2016	10/10/2018	Research in progress; interim report pending
10-93	Measuring, Characterizing, and Reporting Pavement Roughness of Low-Speed and Urban Roads	University of Michigan	450,000	10/1/2013	1/29/2018	Research in progress
10-94	Mitigation of Weldment Cracking of Highway Steel Structures due to the Galvanizing Process	University of Kansas	499,975	7/1/2014	1/31/2018	Work stopped as of 8/25/2017; contract extension under consideration
10-95A	Toughness Requirements for Heat-Affected Zones of Welded Structural Steels for Highway Bridges	University of Kansas	425,000	9/19/2016	12/18/2018	Research in progress
10-97	Detection and Remediation of Soluble Salt Contamination Prior to Coating Steel Highway Structures	Elzly Technology Corporation	500,000	9/15/2015	7/15/2018	Research in progress; Phase II underway
10-98	Protocols for Network-Level Macrotexture Measurement	Virginia Polytechnic Institute	500,000	9/6/2016	9/5/2019	Research in progress
10-99	Guidebook for Implementing Constructability Across the Entire Project Development Process: NEPA to Final Design	----	500,000			Contract pending
10-100	Procedures and Guidelines for Validating Contractor Test Data	University of Nevada - Reno	300,000	8/1/2017	7/31/2019	Research in progress
10-101	Examining State DOT and USDOT Construction Cost Inflation Indices and Methods	----	250,000			In development

AREA TWELVE : DESIGN--BRIDGES

12-87A	Fracture-Critical System Analysis for Steel Bridges	Purdue University	260,000	9/18/2014	8/31/2017	Completed---Publication decision pending
12-90	Guidelines for Shielding Bridge Piers	Roadsafe LLC	450,000	11/20/2012	4/30/2018	Research in progress

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
12-92	Proposed LRFD Bridge Design Specifications for Light Rail Transit Loads	University of Colorado - Denver	349,754	7/26/2013	2/28/2017	Completed---Published as NCHRP Research Report 851
12-93	Contribution of Steel Casing to Single Shaft Foundation Structural Resistance	State University of New York - Buffalo	469,818	6/13/2013	10/31/2017	Completed---To be published as an NCHRP research report
12-94	LRFD Minimum Flexural Reinforcement Requirements	Iowa State University	550,000	9/30/2013	6/29/2018	Research in progress
12-96	Simplified Full-Depth Precast Concrete Deck Panel Systems	George Washington University	400,000	7/1/2013	6/30/2018	Research in progress
12-97	Guide Specification for the Design of Concrete Bridge Beams Prestressed with CFRP Systems	University of Houston	500,000	8/1/2013	2/28/2018	Research in progress
12-98	Recommended Guidelines for Prefabricated Bridge Elements and Systems Tolerances and Dynamic Effects of Bridge Moves	CME Associates Inc.	299,875	5/20/2014	12/30/2017	Completed---Publication decision pending
12-101	Seismic Design of Bridge Columns with Improved Energy Dissipating Mechanisms	Infrastructure Innovation LLC	250,000	7/7/2014	2/28/2017	Completed---Published as NCHRP Research Report 864
12-102	Recommended AASHTO Guide Specification for ABC Design and Construction	CME Associates Inc.	369,842	5/20/2014	11/15/2017	Completed---Contractor's final deliverable available on project web page; specifications to be published by AASHTO
12-103A	Bridge Superstructure Tolerance to Total and Differential Foundation Movements	Rutgers, The State University of New Jersey	162,141	6/22/2016	1/31/2018	Research in progress
12-104	Guidelines to Improve the Quality of Element-Level Bridge Inspection Data	University of Missouri	347,961	8/11/2015	6/29/2018	Research in progress
12-105	Proposed AASHTO Seismic Specifications for ABC Column Connections	University of Nevada - Reno	450,000	9/1/2015	12/31/2018	Research in progress
12-106	Proposed Guidelines for Performance-Based Seismic Bridge Design	Modjeski & Masters	299,920	9/23/2016	3/22/2019	Research in progress
12-108	Development of Guidelines for Uniform Service Life Design for Bridges	Modjeski & Masters	279,846	9/1/2016	2/28/2019	Research in progress
12-109	Use of 0.7-in. Diameter Strands in Precast Pretensioned Girders	University of Cincinnati	600,000	11/16/2016	5/15/2020	Research in progress
12-110	Proposed New AASHTO Load Rating Provisions for Implements of Husbandry	E&T Consulting Engineers	550,000	10/21/2016	10/20/2019	Research in progress
12-111	Evaluating the Effectiveness of Vibration-Mitigation Devices for Structural Supports of Signs, Luminaires, and Traffic Signals	University of Connecticut	400,000	4/3/2017	7/2/2019	Research in progress
12-112	Update of the AASHTO LRFD Movable Highway Bridge Design Specifications	Modjeski & Masters	449,927	7/28/2017	9/27/2020	Research in progress

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
12-113	Proposed Modification to AASHTO Cross-Frame Analysis and Design	University of Texas - Austin	589,670	6/1/2017	9/30/2020	Research in progress
12-114	Benchmarking Study of Software for One-Dimensional, Nonlinear Seismic Site Response Analysis with Pore Water Pressure Generation	----	750,000			In development
12-115	Improving the Guidelines for Inspection and Strength Evaluation of Suspension Bridge Cables	----	750,000			In development
AREA THIRTEEN : MAINTENANCE--EQUIPMENT						
13-04	Guide for Optimal Replacement Cycles of Highway Operations Equipment	Dye Management Group	398,059	5/1/2015	10/31/2017	Completed---Publication decision pending
13-05	Guide for Utilization Measurement and Management of Fleet Equipment	Washington State University	399,998	6/1/2015	3/30/2018	Research in progress
13-06	Guide for the Formulation of Long Range Plans for Replacement Needs and Budget of Highway Operations Equipment	----	400,000			In development
13-07	Guidelines to Calculate Total Cost of Ownership for Fleet Operations	----	300,000			In development
AREA FOURTEEN : MAINTENANCE--MAINTENANCE OF WAY AND STRUCTURES						
14-20A	Consequences of Delayed Maintenance of Highway Assets	University of Texas - El Paso	414,855	12/9/2013	4/28/2017	Completed---Published as NCHRP Research Report 859
14-30	Spot Painting to Extend Highway Bridge Coating Life	University of Kentucky	350,000	9/3/2013	1/31/2018	Research in progress
14-33	Pavement Performance Measures that Consider the Contributions of Preservation Treatments	AMEC Foster Wheeler Environ & Infrastructure Inc.	399,989	6/2/2014	4/28/2017	Completed---To be published as NCHRP Research Report 858
14-34	Guide for Performance Measures in Snow and Ice Control Operations	ICF Incorporated	299,956	4/20/2015	12/29/2017	Completed---Publication decision pending
14-35	Acceptance Criteria of Complete Joint Penetration Steel Bridge Welds Evaluated Using Enhanced Ultrasonic Methods	Purdue University	538,965	4/24/2015	4/23/2018	Research in progress
14-36	Proposed AASHTO Guide for Bridge Preservation Actions	University of Colorado - Boulder	609,887	11/13/2015	4/30/2019	Research in progress
14-37	Guide Specifications for the Construction of Chip Seals and Microsurfacing	Shuler Consultants LLC	175,000	8/15/2016	2/15/2018	Research in progress
14-38	Guide for Timing of Asphalt-Surfaced Pavement Preservation	AMEC Foster Wheeler Environ & Infrastructure Inc.	299,694	8/1/2016	8/1/2018	Research in progress
14-39	Using Vegetated Compost Blankets to Achieve Highway Runoff Volume and Pollutant Reduction	University of Maryland	499,999	4/27/2017	4/26/2021	Research in progress; interim report pending

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
14-40	Comparison of Cost, Safety, and Environmental Benefits of Routine Mowing and Managed Succession of Roadside Vegetation	Texas A&M Transportation Institute	300,000	9/5/2017	9/5/2019	Research in progress
14-41	Update Permanent Vegetation Control (Barriers) for Roadsides	-----	200,000			In development
AREA FIFTEEN : DESIGN--GENERAL DESIGN						
15-44	Guidelines for the Use of Mobile LIDAR in Transportation Applications	Oregon State University	400,348	9/14/2011	3/31/2017	Completed---Published as NCHRP Report 748; implementation activities completed
15-45A	Proposed Update of the AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities	Sprinkle Consulting, Inc.	24,454	3/22/2017	10/31/2017	Completed---Sent to AASHTO
15-48	Developing a Methodology for Designing Low and Intermediate Speed Roadways that Serve All Users	Gresham, Smith and Partners	499,900	7/22/2013	12/15/2017	Completed---Publication decision pending
15-50	Guidelines for Integrating Safety and Cost-Effectiveness into Resurfacing, Restoration, and Rehabilitation Projects	MRIGlobal	680,000	7/3/2013	3/9/2017	Completed---To be published as an NCHRP research report
15-52	Developing a Context-Sensitive Functional Classification System for More Flexibility in Geometric Design	University of Kentucky	300,001	1/15/2015	12/31/2017	Completed---To be published as NCHRP Research Report 855 (available as a prepublication draft); implementation activities continue
15-53	Roadside Design for Conflicts in Proximity to Bridge Ends and Intersecting Roadways	KLS Engineering LLC	499,767	8/25/2014	11/30/2019	Research in progress; Phase 2 underway; continuation request approved
15-54	Proposed Modifications to AASHTO Culvert Load Rating Specifications	Michael Baker, Jr., Inc.	541,524	7/7/2015	7/6/2018	Research in progress
15-55	Guidance to Predict and Mitigate Dynamic Hydroplaning on Roadways	Virginia Polytechnic Institute	499,992	6/17/2015	8/31/2018	Research in progress
15-56	Guidelines for Selecting Ramp Design Speeds	MRIGlobal	400,000	11/10/2015	11/30/2018	Research in progress
15-57	Highway Capacity Manual Methodologies for Corridors Involving Freeways and Surface Streets	University of Florida	799,999	8/18/2016	2/17/2019	Research in progress
15-59	Horizontal Sightline Offset Design Criteria, Exceptions, and Mitigation Strategies	MRIGlobal	400,000	8/10/2015	5/31/2018	Research in progress
15-60	Proposed Update of the AASHTO Guide for the Development of Bicycle Facilities	Toole Design Group	400,000	6/1/2015	12/31/2018	Research in progress
15-61	Applying Climate Change Information to Hydrologic and Hydraulic Design of Transportation Infrastructure	Kilgore Consulting and Management	750,000	9/20/2016	9/19/2018	Research in progress; Phase II under way
15-62	Design and Access Management Guidelines for Truck Routes	MRIGlobal	500,000	7/5/2016	10/5/2018	Research in progress

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
15-63	Guidance to Improve Pedestrian and Bicycle Safety at Intersections	University of North Carolina - Chapel Hill	500,000	7/19/2016	10/19/2018	Research in progress
15-64	Guidelines for the Design of Unsignalized Median Openings in Close Proximity to Signalized Intersections	Texas A&M Transportation Institute	325,000	8/22/2016	8/22/2018	Research in progress
15-65	Development of Safety Performance-Based Guidelines for the Roadside Design Guide (RDG)	Roadsafe LLC	300,000	9/1/2017	9/1/2019	Research in progress
15-66	Arterial Weaving on Conventional and Alternative Intersections	----	750,000			In development
15-67	Improved Methodology to Accurately Determine Wind Drag Coefficients for Highway Signs and Their Support Structures	----	300,000			In development
15-68	Effective Low-Noise Rumble Strips	----	700,000			In development
AREA SIXTEEN : DESIGN--ROADSIDE DEVELOPMENT						
16-05	Guidelines for Cost-Effective Safety Treatments of Roadside Ditches	Texas A&M Research Foundation	400,000	5/14/2010	7/31/2018	Research in progress; Phase 2 underway
AREA SEVENTEEN : TRAFFIC--SAFETY						
17-11(02)	Development of Clear Recovery Area Guidelines	Texas A&M University	270,000	9/7/2008	10/31/2018	Research in progress; contractor's draft final report pending
17-43	Long-Term Roadside Crash Data Collection Program	Virginia Polytechnic Institute	1,000,000	4/27/2010	12/31/2019	Research in progress; contractor's draft final report pending
17-46	Comprehensive Analysis Framework for Safety Investment Decisions	Cambridge Systematics	912,884	4/14/2010	11/30/2017	Completed---Publication decision pending
17-50	Lead States Initiative for Implementing the Highway Safety	CH2M Hill	299,000	1/11/2011	8/31/2018	Research in progress; additional peer exchanges and webinars in process; contractor's draft user guide and final report pending
17-54	Consideration of Roadside Features in the Highway Safety Manual	Roadsafe LLC	1,310,000	4/4/2011	7/31/2018	Research in progress; Phases 2 and 3 underway
17-55	Guidelines for Slope Traversability	Texas A&M Research Foundation	500,000	5/2/2012	2/28/2018	Research in progress; contractor's draft final report under review
17-57	Development of a Comprehensive Approach for Serious Traffic Crash Injury Measurement and Reporting Systems	University of Michigan	449,733	5/22/2012	11/30/2017	Completed---Publication decision pending
17-58	Safety Prediction Models for Six-Lane and One-Way Urban and Suburban Arterials	Texas A&M Transportation Institute	599,910	1/14/2013	11/30/2017	Beta testing completed; see NCHRP Project 17-71 for follow-on activity
17-59	Safety Impacts of Intersection Sight Distance	Vanasse Hangen Brustlin, Inc.	450,000	5/14/2012	3/31/2017	Completed---Publication decision pending

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
17-60	Cost-Benefit Metrics for Behavioral Highway Safety Countermeasures	HDR Engineering, Inc.	499,841	4/16/2012	11/30/2017	Research completed; contractor's draft report under review; see NCHRP project 17-71 for follow-on activity
17-61	Guidelines for the Design of Unsignalized Median Openings in Close Proximity to Signalized Intersections	Texas A&M Research Foundation	600,000	9/19/2012	6/30/2017	Completed---To be published as NCHRP Research Report 869 and Web-Only Document 240
17-62	Improved Prediction Models for Crash Types and Crash Severities	University of Connecticut	800,000	7/2/2013	12/31/2017	Research completed; contractor's draft report under review; see NCHRP Project 17-71 for follow-on activity
17-63	Guidance for the Development and Application of Crash Modification Factors	University of North Carolina - Chapel Hill	600,000	8/1/2013	9/30/2017	Completed---Publication decision pending; see NCHRP Project 17-71 for follow-on activity
17-64	Guidance for the Implementation of the Toward Zero Deaths National Strategy on Highway Safety	University of Minnesota	496,810	3/4/2016	2/4/2019	Research in progress
17-65	Improved Analysis of Two-Lane Highway Capacity and Operational Performance	University of Florida	499,213	9/22/2014	1/31/2018	Research in progress
17-66	Guidance for Selection of Appropriate Countermeasures for Opposite Direction Crashes	Texas A&M Transportation Institute	350,000	8/27/2014	5/31/2018	Research in progress; phase 2 underway
17-67	Identification of Factors Contributing to the Decline of Traffic Fatalities in the United States from 2008 to 2012	University of Michigan	299,738	9/22/2014	6/30/2017	Completed---To be published as an NCHRP research report
17-68	Intersection Crash Prediction Methods for the Highway Safety Manual	MRIGlobal	600,000	9/1/2014	10/31/2018	Research in progress; phase 2 underway
17-69	A Strategic Approach to Transforming Traffic Safety Culture to Reduce Deaths and Injuries	Montana State University	299,989	7/1/2014	6/30/2017	Terminated; no report
17-70	Development of Roundabout Crash Prediction Models and Methods	Kittelson & Associates	710,000	7/14/2014	1/31/2018	Research in progress; contractor's final report under review
17-71	Proposed AASHTO Highway Safety Manual, Second Edition	Kittelson & Associates	800,000	10/12/2015	4/12/2019	Research in progress
17-72	Update of Crash Modification Factors for the Highway Safety Manual	University of North Carolina - Chapel Hill	400,000	8/31/2015	11/30/2018	Research in progress; phase 2 underway
17-73	Conducting Systemic Pedestrian Safety Analyses	University of North Carolina - Chapel Hill	300,000	7/28/2015	12/29/2017	Research complete; contractor's draft final report under review
17-74	Developing Crash Modification Factors for Corridor Access Management	Vanasse Hangen Brustlin, Inc.	450,000	10/24/2016	4/24/2019	Research in progress
17-75	Leveraging Big Data to Improve Traffic Incident Management	Applied Engineering Management Corporation	275,000	8/15/2016	11/15/2017	Research in progress
17-76	Guidance for the Setting of Speed Limits	Texas A&M Transportation Institute	500,000	10/7/2016	4/7/2019	Research in progress

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
17-77	Guide for Quantitative Approaches to Systemic Safety Analysis	MRIGlobal	300,000	8/5/2016	8/4/2018	Research in progress
17-78	Understanding and Communicating Reliability of Crash Prediction Models	University of North Carolina - Chapel Hill	300,000	9/20/2016	3/19/2019	Research in progress
17-79	Safety Effects of Raising Speed Limits to 75 mph and Higher	Texas A&M Transportation Institute	500,000	9/19/2016	9/18/2019	Research in progress
17-80	Expansion of Human Factors Guidelines for Road Systems, Second Edition	Battelle Memorial Institute	499,914	11/9/2016	8/9/2019	Research in progress
17-81	Proposed Macro-Level Safety Planning Analysis Chapter for the Highway Safety Manual	Vanasse Hangen Brustlin, Inc.	400,000	10/26/2017	7/26/2020	Research in progress
17-82	Proposed Guidance for Fixed Objects in the Roadside Design Guide	----	500,000			Contract pending
17-83	Briefings and Training Materials for Implementation of the Highway Safety Manual, Second Edition	----	500,000			Contract pending
17-84	Pedestrian and Bicycle Safety Performance Functions for the Highway Safety Manual	MRIGlobal	500,000	3/27/2017	3/26/2019	Research in progress
17-85	Applications and Use of Crash Severity Safety Performance Functions	----	600,000			In development
17-86	Estimating Effectiveness of Safety Treatments in the Absence of Crash Data	----	600,000			In development
17-87	Enhancing Pedestrian Volume Estimation and Developing HCM Pedestrian Methodologies for Safe and Sustainable Communities	----	700,000			In development
17-88	Roadside Encroachment Data for All Vehicle Types Across a Range of Traffic Volumes	----	675,000			In development
17-89	Safety of Part-Time Shoulder Use and HOV/HOT Lanes	----	700,000			In development
AREA EIGHTEEN : MATERIALS AND CONSTRUCTION--CONCRETE MATERIALS						
18-17	Entrained Air Void System for Durable Highway Concrete	Iowa State University	599,986	11/2/2015	11/2/2018	Research in progress
18-18	Design and Construction of Deck Bulb Tee Girder Bridges with UHPC	Ohio University	478,125	7/3/2017	10/2/2020	Research in progress
AREA NINETEEN : ADMINISTRATION--FINANCE						
19-10	AASHTO Partnering Handbook, Second Edition	Iowa State University	400,000	4/9/2015	6/30/2017	Completed---Publication decision pending
19-11	Applying Risk Analysis, Value Engineering, and other Innovative Solutions for Project Delivery	Value Management Strategies Inc.	193,798	7/14/2015	6/30/2017	Completed---Published as NCHRP Research Report 850

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
19-12	Development of Financial Plans and Performance Measures for Transportation Asset Management	Spy Pond Partners	350,000	5/11/2016	5/10/2018	Research in progress
19-13	Value Capture Toolkit for State Transportation Agencies	Texas A&M Transportation Institute	350,000	6/2/2016	11/1/2017	Completed---Publication decision pending
19-14	Right-Sizing Transportation Investments--Methods for Planning and Programming	Economic Development Research Group, Inc.	499,994	2/3/2017	2/2/2019	Research in progress
19-15	Guidebook for Effective Debt Management Policies and Practices for Surface Transportation	----	300,000			In development

AREA TWENTY : SPECIAL PROJECTS

20-05	Synthesis of Information Related to Highway Problems	TRB Studies and Special Programs Division	1,750,000 **	12/15/1967		Research ongoing; refer to NCHRP Research Results Digest 402 for topic reports published as NCHRP Syntheses
20-06	Legal Problems Arising Out of Highway Programs	TRB Technical Activities Division	350,000 **	11/1/1968		Research ongoing; published as Selected Studies in Transportation Law (CRP-CD-20, Volumes 1-4 and 8) and various NCHRP Legal Research Digests
20-07	Research for AASHTO Standing Committee on Highways	Various	1,200,000 **	12/2/1968		Research ongoing---Refer to project writeup at http://www.trb.org/nchrp
20-24(89)C	Transportation Asset Management, Inclusive Wealth, and Ecosystem Services	----	389,250			Funds reallocated
20-24(95)	Ensuring Essential Capability for the Future Transportation Agency	Spy Pond Partners	200,000	10/7/2016	4/7/2018	Research in progress (Phase I)
20-24(104)	State DOT Implementation of MAP21 Performance Measure Rules	Cambridge Systematics	149,917	7/18/2016	11/15/2017	Completed---Research products delivered to AASHTO for dissemination
20-24(107)	Update to Transportation Governance: A 50-State Review of State Legislatures and Departments of Transportation	J.R. Rall Consulting LLC	100,000	2/17/2016	10/17/2017	Completed---Report published by AASHTO
20-24(110)	Development of Resources to Support State DOT Communications on Safety	Cambridge Systematics	129,713	1/27/2017	7/26/2018	Research in progress
20-24(111)	State DOT CEO Leadership Forum on "Connected & Autonomous Vehicles and Transportation Infrastructure Readiness" in conjunction with 2017 ITSWC, Montreal, Canada	CAVita LLC	173,500	1/26/2017	1/25/2018	Research in progress
20-24(112)	Connected Road Classification System (CRCS) Development	Texas A&M Transportation Institute	180,000	7/28/2017	7/27/2018	Research in progress
20-24(113)	CEO Peer Exchange 2017	Parsons Brinckerhoff	249,978	2/23/2017	4/22/2018	Research in progress

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
20-24(115)	Development of Strategic Plan for Transportation Workforce Planning and Development	-----	100,000			In development; see NCHRP Project 20-24(95)
20-24(116)	Guidance on Roles and Responsibilities in Operation of Automated Vehicles	-----	230,000			In development
20-24(118)	AASHTO reorganization strategic planning	ICF Incorporated	500,000	7/28/2017	10/27/2018	Research in progress
20-24(119)	Strategic Research in Support of the Connected and Automated Vehicle Executive Leadership Team	-----	150,000			In development
20-24(120)	Building a Bridge: A Guide to Communicating Revenue Needs	-----	300,000			In development
20-24(121)	Road Usage Charge: Applying Lessons Learned in New Zealand to the United States	-----	70,000			In development
20-30	NCHRP-IDEA Program	TRB Studies and Special Programs Division	1,250,000 **	7/8/1992		Research ongoing; see project writeup on NCHRP website
20-44	Accelerating the Application of NCHRP Research Results	Various	31,870 **	8/1/1995	9/30/2018	Support for implementation and dissemination activities
20-44(01)	Workshop on Increasing WMA Implementation by Leveraging the State-of-the-Knowledge	Myers McCarthy Consulting Engineering, LLC	101,000	1/26/2017	1/26/2018	Research in progress
20-44(02)	Implementation of the AASHTO Guide for Enterprise Risk Management	-----	300,000			Contract pending
20-44(03)	Intellectual Property Management Guide Workshops and Assessments	Applied Research Associates	115,500	7/28/2017	10/27/2018	Research in progress
20-44(04)	Implementation of NCHRP Reports 639 and 757: Adhesive Anchors	-----	100,000			In development
20-44(05)	Dissemination of "NCHRP Domestic Scan 14-01: Leading Management Practices in Determining Funding Levels for Maintenance and Preservation"	-----	120,000			In development
20-44Q	Communication Services for NCHRP	CTC & Associates LLC	644,923	5/7/2015	8/6/2018	In progress
20-50(18)	LTPP Data Analysis: Significance of As-Constructed Asphalt Pavement Air Voids to Pavement Performance	-----	425,000			In development
20-50(19)	LTPP Data Analysis: Relationships between Material Properties Determined in Field and Laboratory for Untreated Materials	-----	300,000			In development
20-50(20)	LTPP Data Analysis: Develop Tools to Improve Accuracy of Traffic Loading Data Collection	-----	350,000			In development
20-50(21)	Assessment and Simplification of Pavement Environmental Effects Models on Pavement Performance	-----	350,000			In development

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
20-59(14)C(02)	Strategic Plan Implementation Support Services for SCOTSEM	Geographic Paradigm Computing Inc.	100,000	8/11/2015	2/10/2017	Completed---Final report sent to AASHTO
20-59(30)A	Train-the-Trainer Regional Workshops for Incident Command System (ICS) Training for Field Level Transportation Supervisors and Staff	San Jose State University	150,000	7/11/2017	1/10/2019	Research in progress; interim report pending
20-59(51)A	Security 101: A Physical & Cyber Security Primer for Transportation Agencies	Countermeasures Assessment & Security Experts, LLC	100,000	2/10/2016	12/31/2017	Completed---Publication decision pending
20-59(51)B	A Guide to Emergency Management at State Transportation Agencies, Second Edition	Countermeasures Assessment & Security Experts, LLC	100,000	2/3/2016	9/30/2017	Completed---Publication decision pending
20-59(51)C	Research Support for Implementing Security, Emergency Management, and Infrastructure Protection at State Transportation Agencies	Geographic Paradigm Computing Inc.	100,000	11/18/2016	2/17/2018	Research in progress; draft final report pending
20-59(53)	FloodCast: A Framework for Enhanced Flood Event Decision Making for Transportation Resilience	Dewberry Consultants LLC	498,162	9/2/2014	3/1/2018	Research in progress; contractor's draft final report pending
20-59(54)	Transportation System Resilience: Research Roadmap and White Papers	Geographic Paradigm Computing Inc.	200,000	11/18/2016	3/17/2019	Research in progress; interim report pending
20-59(55)	Transportation System Resilience: CEO Primer & Engagement	Louis Berger & Associates	300,000	3/1/2017	2/28/2019	Research in progress; interim report pending
20-59(56)	Support for State DOT Transportation Systems Resilience and All-Hazards Programs	-----	250,000			In development
20-65	Research for the AASHTO Standing Committee on Public Transportation	-----	450,000			Research in progress---Refer to project writeup on NCHRP website
20-65/Task 56	Best Practices in Rural Regional Mobility	Cambridge Systematics	100,000	2/3/2015	3/31/2017	Completed---Published as NCHRP Research Report 861
20-65/Task 63	DOT Oversight of Facility Projects	AECOM Consulting Transportation Group	74,639	2/18/2016	3/6/2017	Research in progress
20-65/Task 64	Health and Human Services (particularly Medicaid) Revenue as Match	Kittelson & Associates	74,963	9/16/2015	1/15/2017	Completed---To be published as an NCHRP research report
20-65/Task 67	Multi-Modal Project Planning	Cambridge Systematics	100,000	9/20/2016	9/19/2017	Completed
20-65/Task 68	Successful Mobility Management Practices for Improving Transportation Services in Small Urban and Rural Areas	Cambridge Systematics	75,000	9/20/2016	1/31/2018	Research in progress
20-65/Task 69	Consolidation of Rural Transit Systems	ICF Incorporated	74,990	9/29/2016	11/30/2017	Completed
20-65/Task 70	Cross Modal Investment	Parsons Brinckerhoff	74,944	10/18/2016	10/17/2017	Completed
20-65/Task 71	Transit Network Balance; Efficiency and Equity	ICF Incorporated	49,987	9/29/2016	12/31/2017	Completed
20-65/Task 72	Small System Alternative Fuel Strategies	ICF Incorporated	74,959	9/29/2016	12/29/2017	Completed

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
20-65/Task 73	Best Practices and Marketing to Increase Rural Transit Ridership and Investment	-----	75,000			Contract pending
20-65/Task 74	Best Practices and Tools for Addressing Transportation Needs and Public Transit Demands to Support the Integration of the Olmstead Population In Community Settings	-----				Cancelled
20-65/Task 75	Baseline Research on Allowable In-Kind and Local Match Sources	-----	100,000			Contract pending
20-65/Task 76	Opportunities for State DOTs (and Others) to Encourage Shared Use Mobility Practices in Rural Areas	-----	100,000			Contract pending
20-65/Task 77	Lessons Learned and Impacts to Date of State DOT Implementation of New Federal Transit Asset Management and Public Transportation Agency Safety Requirements	-----	100,000			Contract pending
20-68A(02)	US Domestic Scan Program	Arora and Associates, P.C.	3,910,592	12/28/2012	12/26/2018	Research in progress
20-83(03)A	Long-Range Strategic Issues Affecting Preservation, Maintenance, and Renewal of Highway Infrastructure	WSP USA Inc.	499,999	5/18/2015	4/30/2018	Research in progress
20-95A	Compendium of Successful Practices, Strategies, and Resources in the FHWA Disadvantaged Business Enterprise (DBE) Program	Keen Independent Research LLC	174,997	4/10/2017	7/9/2018	Research in progress
20-97	Improving Findability and Relevance of Transportation Information	Spy Pond Partners	899,975	4/18/2014	2/28/2019	Research in progress; Phase I report published as NCHRP Research Report 846
20-99	Communication Guidelines for State Departments of Transportation	Parsons Brinckerhoff	300,000	6/30/2014	2/1/2017	Completed---To be published by AASHTO
20-100	Return on Investment in Transportation Asset Management Systems and Practices	Spy Pond Partners	400,000	1/28/2015	6/30/2017	Completed---To be published as NCHRP Research Report 866
20-101	Guidelines to Incorporate the Costs and Benefits of Adaptation Measures in Preparation for Extreme Weather Events and Climate Change	Dewberry Consultants LLC	299,210	9/1/2015	3/31/2018	Research in progress; contractor's draft final report pending
20-102(01)	Policy and Planning Actions to Internalize Societal Impacts of CV and AV Systems into Market Decisions	Texas A&M Transportation Institute	395,766	11/3/2015	5/2/2017	Completed---Published as NCHRP Research Report 845
20-102(02)	Impacts of Transit System Regulations and Policies on CV/AV Technology Introduction	Kimley-Horn & Associates	149,982	1/4/2016	6/16/2017	Completed---Published as NCHRP Web-Only Document 239
20-102(03)	Critical Next Steps for AV/CV Applications in Freight Operations	Booz Allen Hamilton	149,851	10/15/2015	1/31/2017	Completed---Published as NCHRP Web-Only Document 231
20-102(04)	Evaluation Guidance for Automated Vehicle Pilot and Demonstration Projects	-----	75,000			In development

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
20-102(06)	Road Markings for Machine Vision	Texas A&M Transportation Institute	200,000	7/13/2016	11/12/2017	Research in progress
20-102(07)	Implications of Automation for Motor Vehicle Codes	Virginia Polytechnic Institute	350,000	11/14/2016	2/13/2018	Research in progress
20-102(08)	Dedicating Lanes for Priority or Exclusive Use by CVs and AVs	Booz Allen Hamilton	349,929	8/2/2016	2/1/2018	Research in progress
20-102(09)	Providing Support to the Introduction of CV/AV Impacts into Regional Transportation Planning and Modeling Tools	Texas A&M Transportation Institute	300,000	9/1/2016	6/30/2018	Research in progress
20-102(11)	Mobility-on-Demand and Automated Driving Systems: A Framework for Public-Sector Assessment	-----	300,000			In development
20-102(12)	Business Models to Facilitate Deployment of CV Infrastructure to Support AV Operations	WSP USA Inc.	400,000	7/11/2017	1/10/2019	Research in progress
20-102(13)	Planning Data Needs and Collection Techniques for CV/AV Applications	-----	250,000			In development
20-102(14)	Data Management Strategies for CV/AV Applications for Operations	-----	250,000			In development
20-102(15)	Understanding the Impacts of the Physical Highway Infrastructure Caused by the Increased Prevalence of Advanced Vehicle Technologies	-----	650,000			In development
20-103	Guidance for Development and Management of Sustainable Information Portals	Applied Engineering Management Corporation	249,903	4/17/2015	7/16/2017	Completed---To be published as NCHRP Research Report 865
20-104	Capturing and Learning Essential Consultant-Developed Knowledge within Departments of Transportation	Spy Pond Partners	249,992	4/15/2015	10/15/2017	Completed---Published as NCHRP Research Report 867
20-105A	Development of Course Outlines for Ahead of the Curve Training Program: Mastering the Management of Transportation Research	Applied Research Associates	220,700	6/1/2016	6/29/2018	Research in progress
20-107	Effective Construction Project Staffing Strategies for Transportation Agencies	University of Kentucky Research Foundation	499,613	6/28/2016	6/28/2018	Research in progress
20-108	Effective Practices for Creating and Maintaining an Innovation-Delivery Culture within Departments of Transportation	Burns & McDonnell Engineering Company Inc.	249,954	7/11/2016	6/30/2018	Research in progress
20-109	Enhancement of the Transportation Research Thesaurus	Information International Associates Inc.	174,793	7/28/2016	8/27/2018	Research in progress
20-110	A Guide to Ensure Access to the Publications and Data of Federally Funded Transportation-Related Research	University of Michigan	249,960	8/5/2016	2/4/2018	Research in progress; draft final report pending
20-111	Support for AASHTO RAC Task Forces in Response to the SCOR Strategic Plan	-----	18,415			See below

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
20-111A	RAC/SCOR Website	----	15,000			In progress
20-111B	Research Program and Project Management Web Application	----	10,000			In progress
20-111D	Research Performance Management Website	----	15,000			In progress
20-111E	Transportation Pooled Fund Website	----	75,000			In reserve
20-111F	Documenting Research Management Information that Needs to be Shared Amongst AASHTO Member Agencies and Stakeholders	----	25,000			On hold
20-111G	Documenting Deliverables from and Best Practices for Federally-Required, State DOT Research Peer Exchanges	Applied Research Associates	50,000	12/21/2016	12/20/2017	In progress
20-111H	Developing Recommendations for Optimal Skill Sets of State DOT Research Staff and Managers	----	50,000			On hold
20-111J	Successful Practices for State Transportation Research Office's Complying with 2 CFR 200	----	100,000			In development
20-112	A Research Roadmap for Transportation and Public Health	University of North Carolina - Chapel Hill	250,000	9/26/2017	3/25/2019	Research in progress
20-113	Research Roadmap--Transformational Technologies (other than CV/AV)	----	175,000			In development
20-113A	Support for TRB Symposium on Transformational Technologies Affecting Transportation	CAVita LLC	130,000	9/15/2016	4/14/2017	Completed---Final deliverable to be made available as an NCHRP Web-Only Document
20-113B	Impact of Mobility-on-Demand Services for the Transportation System	----	250,000			Incorporated into 20-102(11)
20-114	Multimodal Freight Transportation Research Roadmap	Texas A&M Transportation Institute	250,000	5/15/2017	5/15/2018	Research in progress
20-115	Deploying Transportation Security Practices in State DOTs	----	750,000			In development
20-116	Emergency Management in State Transportation Agencies	----	750,000			In development
20-117	Deploying Transportation Resilience Practices in State DOTs	WSP USA Inc.	1,000,000	6/16/2017	6/15/2019	Research in progress; interim report pending
20-118	Benchmarking for Effective Performance Management for Transportation Agencies	High Street Consulting Group	499,060	4/10/2017	7/9/2018	Research in progress
20-119	Evaluating the Suitability of Roadway Corridors for Use by Monarch Butterflies	University of Minnesota	349,821	3/13/2017	3/13/2019	Research in progress
20-120	Next Generation Transportation Pooled Fund Website	----	150,000			In progress
20-121	State DOT Contributions to the Study, Investigation, and Interdiction of Human Trafficking	----	300,000			In development

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
AREA TWENTY-ONE : SOILS AND GEOLOGY--TESTING AND INSTRUMENTATION						
21-10	Manual on Subsurface Investigations--Update	GeoSyntec Consultants of North Carolina PC	299,912	6/17/2014	4/30/2018	Research in progress
21-11	Improved Test Methods and Practices for Characterizing Steel Corrosion Potential of Earthen Materials	McMahon & Mann Consulting Engineers PC	400,000	7/5/2016	1/5/2019	Research in progress; Phase II underway
AREA TWENTY-TWO : DESIGN--VEHICLE BARRIER SYSTEMS						
22-14(04)	Testing of Cable Median Barrier in a Narrow Ditch	Texas A&M Research Foundation	100,000	3/17/2011	6/30/2017	Completed---Final report sent to AASHTO
22-20(02)	Design Guidelines for TL-3 through TL-5 Roadside Barrier Systems Placed on Mechanically Stabilized Earth (MSE) Retaining Walls	Texas A&M Research Foundation	610,000	5/14/2010	10/31/2017	Completed---Publication decision pending
22-26	Identification of Factors Related to Serious Injury and Fatal Motorcycle Crashes into Traffic Barriers	Virginia Polytechnic Institute	500,000	5/1/2009	12/31/2018	Research in progress; added additional driving season for added crash records; draft final report pending
22-29A	Evaluating the Performance of Longitudinal Barriers on Curved, Superelevated Roadway Sections	George Mason University	250,000	7/28/2014	4/30/2017	Completed---Publication decision pending
22-31	Recommended Guidelines for the Selection and Placement of Test Levels 2 through 5 Median Barriers	Roadsafe LLC	300,000	9/28/2015	9/28/2018	Research in progress; Phase 2 underway
22-32	Development of Methods to Evaluate Side Impacts with Roadside Safety Features	-----	500,000			Contract pending
22-33	Development of a Collaborative Approach for Multi-State In-Service Evaluations of Roadside Safety Hardware	-----	650,000			In development
22-34	Determination of Zone of Intrusion Envelopes under MASH Impact Conditions for Barrier Attachments	-----	400,000			In development
22-35	Bridge Rail Testing Program to Confirm MASH Compliance	-----	500,000			In development
22-36	Development of the Next Generation, MASH, Portable Concrete Barrier	-----	400,000			In development
AREA TWENTY-FOUR : SOILS AND GEOLOGY--MECHANICS AND FOUNDATIONS						
24-37	Combining Individual Scour Components to Determine Total Scour	Georgia Tech Research Corporation	600,000	10/1/2012	9/30/2017	Completed---Publication decision pending
24-41	Defining the Boundary Conditions for Composite Behavior of Geosynthetic Reinforced Soil (GRS) Structures	University of Texas - Austin	500,000	9/1/2014	5/31/2018	Research in progress
24-42	Underwater Installation of Filter Systems for Scour and Other Erosion Control Countermeasures	Ayres Associates	300,000	6/30/2014	3/31/2018	Research in progress

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
24-43	Relationship between Erodibility and Properties of Soils	Texas A&M Transportation Institute	300,000	8/11/2015	8/11/2018	Research in progress
24-44	Guidelines for Managing Geotechnical Risks in Design-Build Projects	Iowa State University	350,000	6/1/2015	1/31/2018	Research in progress
24-45	Evaluating Mechanical Properties of Earth Material During Intelligent Compaction	University of Texas - El Paso	500,000	7/27/2015	7/27/2018	Research in progress
24-46	Development of an Implementation Manual for Geotechnical Asset Management for Transportation Agencies	Shannon & Wilson, Inc.	499,682	7/27/2016	7/27/2018	Research in progress
24-47	Revised Clear-Water and Live-Bed Contraction Scour Analysis	Ayres Associates	500,000	10/6/2016	4/6/2019	Research in progress; interim report under review
24-48	Develop a Formula for Determining Scour Depth around Structures in Gravel-bed Rivers	----	600,000			In development

AREA TWENTY-FIVE : TRANSPORTATION PLANNING--IMPACT ANALYSIS

25-25	Research for the AASHTO Standing Committee on the Environment	----	600,000			Research in progress---Refer to project writeup on NCHRP website and individual tasks
25-25/Task 96	Quick Reference Guide for Traffic Modelers for Generating Traffic and Activity Data for Project-Level Air Quality Analyses	WSP USA Inc.	75,000	11/4/2015	3/1/2018	Research in progress; contractor's final report pending
25-25/Task 97	Historic Roads: A Synthesis of Identification and Evaluation Practices	WSP USA Inc.	74,834	2/16/2016	11/15/2017	Completed---To be published as an NCHRP Web-Only Document
25-25/Task 98	Practical Guide for Developing Effective Scopes of Work for the Geophysical Investigation of Cemeteries	WSP USA Inc.	74,961	2/16/2016	1/26/2018	Research complete; contractor's final report pending
25-25/Task 101	Stormwater Monitoring Program Goals, Objectives, and Protocols for State Departments of Transportation	WSP USA Inc.	124,948	4/15/2016	12/29/2017	Completed---To be published as an NCHRP Web-Only Document
25-25/Task 102	Artificial Bat Roost Mitigation Designs and Standardized Monitoring Criteria	----	125,000			Contract pending
25-25/Task 103	Administration of Categorical Exclusions by State Departments of Transportation (DOTs) under NEPA	----	60,000			Contract pending
25-25/Task 104	Streamlining Carbon Monoxide Project-Level Air Quality Analyses with Programmatic Agreements	----	125,000			Contract pending
25-25/Task 105	A Guidebook for Communications between Transportation and Public Health Communities	----	100,000			Contract pending
25-25/Task 106	National Synthesis of Highway Noise Effects on Historic Properties and Effective Mitigation Practices	----	100,000			Contract pending

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
25-25/Task 107	Synthesis of Best Practices for the Development and Implementation of Section 106 Delegation Programmatic Agreements	-----	100,000			Contract pending
25-25/Task 108	Creating Lookup Tables to Streamline the Determination of Emission Reductions for CMAQ Projects	-----	125,000			Contract pending
25-25/Task 109	Successful Practices for Environmental Commitments in Public/Private Partnerships (P-3) and Design-Build (D-B) Contracts	-----	125,000			Contract pending
25-25/Task 110	National Synthesis of Successful Strategies for Managing Post-World War II Resources in Historic Property Identification Surveys	-----	100,000			Contract pending
25-25/Task 111	Environmental Management System Perspectives for State DOTs	-----	110,000			Contract pending
25-25/Task 112	Enhancing the International Stormwater BMP Database to Serve as a Highway Specific BMP Database	-----	105,000			Contract pending
25-25/Task 113	Highway Passages for Small Terrestrial Wildlife - Summary and Repository of Design Examples	-----	125,000			Contract pending
25-44	Field Evaluation of Reflected Noise from a Single Noise Barrier	Resource Systems Group, Inc.	549,969	9/4/2013	2/1/2018	Research in progress; Phase I published as NCHRP Web-Only Document 218; Phase II contractor's draft final report under review
25-46	Deploying Clean Truck Freight Strategies	ICF Incorporated	500,000	6/10/2014	5/15/2017	Completed---Published as NCHRP Research Report 862
25-49	Development of a Highway Construction Noise Prediction Model	Gannett Fleming, Inc.	349,579	11/2/2015	8/31/2018	Research in progress
25-50	Prioritization Procedure for Proposed Road-Rail Grade Separation Projects along Specific Rail Corridors	Olsson Associates Inc.	349,763	9/28/2015	9/28/2018	Research in progress
25-51	Limitations of the Infiltration Approach to Stormwater Management in the Highway Environment	GeoSyntec Consultants	499,772	8/10/2015	2/10/2018	Research in progress
25-52	Meteorological Effects on Roadway Noise	Resource Systems Group, Inc.	299,912	6/8/2015	10/31/2017	Completed---Publication decision pending
25-53	Approaches for Determining and Complying with TMDL Requirements Related to Roadway Stormwater Runoff	Michael Baker International	199,973	12/9/2016	12/9/2018	Research in progress; interim report pending
25-54	Field Testing of BMPs Using Granulated Ferric Oxide Media to Remove Dissolved Metals in Roadway Stormwater Runoff	Barr Engineering	400,000	9/16/2016	9/15/2018	Research in progress; interim report pending
25-55	Quantifying the Contribution of Vehicle Emissions to Local Air Quality	-----	700,000			In development

TABLE 2 (continued)

Project						
No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status*
25-56	Methods for State DOTs to Reduce Greenhouse Gas Emissions from the Transportation Sector	-----	500,000			In development; additional \$250K from FHWA

* Information on all projects initiated under the NCHRP from its inception in 1962 through 1988 is included in NCHRP Web Document 7: Special Edition of Summary of Progress through 1988 located at <http://tinyurl.com/NCHRPWebDoc7>. Detailed status reports on projects initiated after 1988 for which there is any type of contractual activity can be found on the NCHRP website at www.trb.org/nchrp.

** Continuing activity. Amount shown is for latest fiscal year in which funding was provided.

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Items Available on Request

Some research agencies' final reports, manuals, videotapes, etc. that are identified in the project summaries are available upon written request to:

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500 Fifth Street NW
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A summary of NCHRP projects from 1962 through 1988 is available online as *NCHRP Web Document 7*. This document can be accessed through the link on the NCHRP home page (www.trb.org/NCHRP) or by going to <http://tinyurl.com/NCHRPWebDoc7>.

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