



NCHRP NATIONAL
COOPERATIVE
HIGHWAY
RESEARCH
PROGRAM

2019 ANNUAL REPORT

The National Academies of
SCIENCES • ENGINEERING • MEDICINE



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2019 ANNUAL REPORT

Research sponsored by the American Association of State Highway and Transportation Officials
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Learn more about the Transportation Research Board at www.TRB.org.

Transportation Research Board
500 Fifth Street, NW
Washington D.C. 20001
202.334.3224

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Cover photo: Section of U.S. Route 285 through New Mexico, the host state of the 2019 National Meeting of the AASHTO Research Advisory Committee (RAC), a sub-committee of the AASHTO Special Committee on Research and Innovation (R&I).

Photo credit: Sid Mohan

About the National Cooperative Highway Research Program (NCHRP)

Systematic, well-designed, and implementable research is the most effective way to solve many problems facing state departments of transportation (DOTs) administrators and engineers. Often, highway problems are of local interest and can best be studied by state DOTs 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.

In 1962, recognizing this need, the Chief Executive Officers of the American Association of State Highway and Transportation Officials (AASHTO) initiated an objective national highway research program using modern scientific techniques—the National Cooperative Highway Research Program (NCHRP). Funded by participating member states of AASHTO, NCHRP also receives critical technical support from 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 volunteer 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 and research project management to bring the findings of research directly to those in a position to use them.

The annual research 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, the National Academies, and FHWA. The scopes of 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.

Message from the NCHRP Manager

I am pleased to introduce the NCHRP 2019 Annual Report which details this year's achievements. Under the leadership of Brian Ness, Director of the Idaho Transportation Department and Chair of the AASHTO Special Committee on Research and Innovation (R&I), NCHRP's governing body continued its focus on the implementation of completed research, as well as on assisting AASHTO committees and councils to develop prioritized research agendas and high-quality research problem statements. After serving for 3 years, Mr. Ness stepped down as R&I Chair in November. As Chair, Mr. Ness led R&I in navigating its role in the new AASHTO structure, strengthening the connection between NCHRP and AASHTO leadership, incorporating innovation into R&I's mission, and sharpening NCHRP's focus on understanding the benefits of research to state DOTs.

As is the case with any yearly reporting, this annual report quantifies accomplishments. NCHRP, however, is much more than the numbers; volunteers are at its heart. NCHRP continues to be a research program of national significance because of the outstanding participation by subject matter experts from state DOTs and other organizations, and staff from AASHTO and the Federal Highway Administration, who collectively spend thousands of hours each year serving on research project panels and providing critical technical oversight of each research project. This partnership has ensured that NCHRP's recommendations for new and improved standards and specifications, manuals, and guidelines for improving the state of practice across the landscape of a state DOT's responsibilities are relevant, implementable, and have a direct impact on practice.

It is always gratifying when panel members tell me how much they enjoy serving on project panels because of what they learn, the professional relationships they develop, and the opportunity to serve their profession. At the October 2019 meeting of the AASHTO Board of Directors (and a number of other AASHTO committees and council meetings), speaker after speaker in session after session referred to numerous NCHRP reports and ongoing research, demonstrating how important NCHRP is to the state DOTs' abilities to deliver excellent service and facilities to the traveling public. Our contractors frequently present their NCHRP research at professional meetings and conferences. In addition to providing specific benefits to the state DOTs, it's clear that NCHRP is well-integrated into the larger transportation community.

This year, NCHRP implemented new portfolio and project management software that will provide useful new tools to all staff who support and manage research projects. Other administrative improvements are under way that will improve the panel nomination process, solicitation of problem statements as well as research proposals, NCHRP's website presence, and the presentation of research results. Many of these changes are about modernizing and streamlining our business and project delivery processes, using technology as an enabler to also improve the experience for volunteer panel members and contractors.

If you haven't already, I encourage you to engage with NCHRP. Contribute to writing a problem statement, nominate yourself to serve on a project panel, identify implementation opportunities and apply for assistance, and most of all – read and use NCHRP research. Visit NCHRP's website at www.trb.org/NCHRP to learn more.

– Lori Sundstrom

This Year at NCHRP

This Annual Report provides a concise list of research published in 2019 (Table 1) and a list of all active projects, projects completed in 2019, and projects that were approved in 2019 but are not yet under contract (Table 2). The Annual Report also presents detailed information about how NCHRP operates with oversight by the AASHTO Special Committee on Research and Innovation (R&I).

125

projects completed

58

new projects

320

active projects

2,801

active panel members

51

research products
published

128

panel meetings and
other events held

13

webinars held

4,838

total webinar attendees



113,067

total downloads of
research products from
all 50 states and DC

All data as of November 30, 2019.

New and Continuation Projects

During 2019, NCHRP completed 125 research projects, published 51 research products, and approved 58 new and continuation projects. Exhibit 1 provides a summary of new and continuation projects from FY 2016 through FY 2020.

Exhibit 1. Number of Research Projects Selected by R&I, FY 2016 to FY 2020

Projects	2016	2017	2018	2019	2020
Continuation projects	16	16	22	11	11
New projects	45	37	42	47	56
Total projects	61	53	64	58	67
Total project funds	\$30,840,000	\$32,275,000	\$35,317,000	\$34,429,000	\$33,330,000

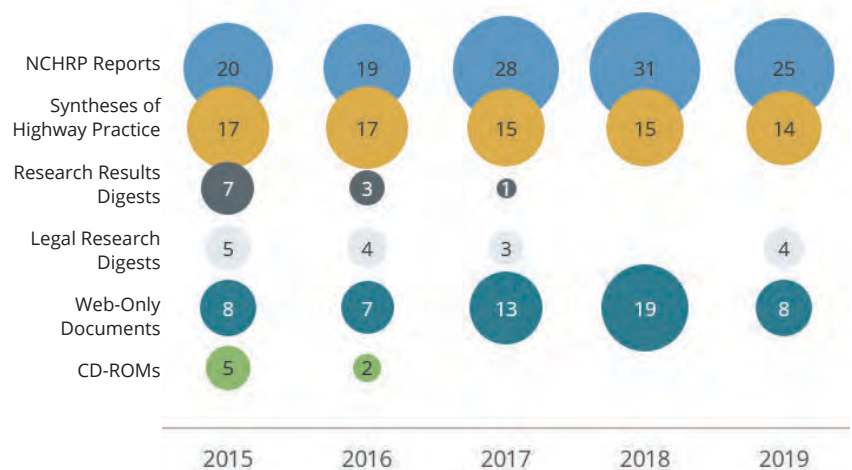
A cumulative total of 1,921 research contracts have resulted from all NCHRP yearly programs through 2019.

Funding for the FY 2020 program is expected in early 2020 permitting execution of contracts and initiation of research. R&I will formulate the FY 2021 program in April 2020 based on research problem statements that were submitted by November 1, 2019, the beginning of another cycle of NCHRP research.

Research Products

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 several numbered series, which are listed in Table 1 of this Annual Report. In FY 2019, NCHRP produced 51 research products, and quantities for these series published over the past five years are shown in Exhibit 2.

Exhibit 2. NCHRP Research Products Produced, FY 2015 to FY 2019



Publications are distributed widely by TRB, with print runs for reports ranging from 600 to 1,000 copies. Print copies are mailed to the CEOs of state DOTs, AASHTO staff, panel members, the research contractor, and the following individuals and organizations:

- TRB members who have chosen to receive publications in the particular subject area of the report

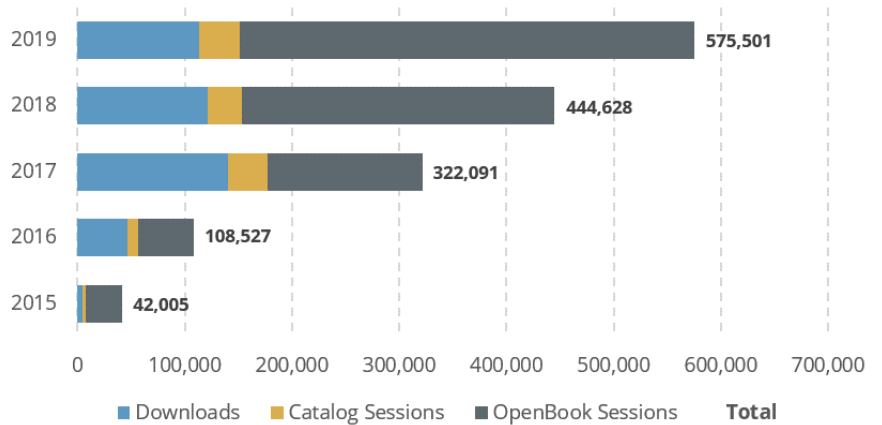
"I try to make sure that NCHRP research gets out to the community and is implemented."

—Greg Slater, Administrator, Maryland Department of Transportation State Highway Administration

- 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

The number of printed reports has been declining, with more people accessing reports online, as shown in Exhibit 3.

Exhibit 3. Downloads, OpenBook Sessions, and Catalog Sessions of NCHRP Research, CY 2015 to CY 2019



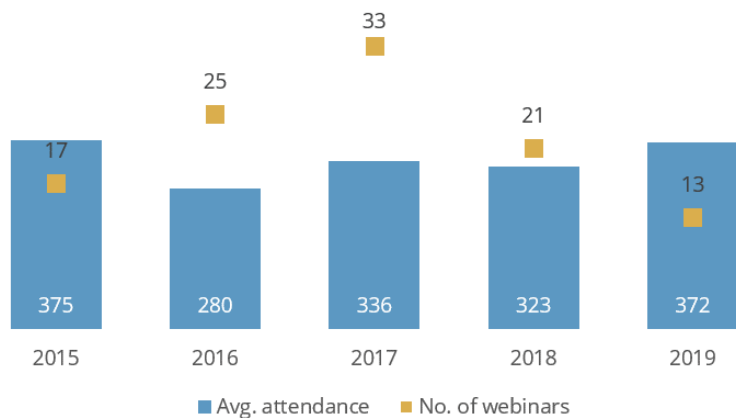
OpenBook Sessions are the number of times a report has been read online.

Catalog Sessions are the number of times a potential reader has visited NAP.edu to get more information about a report.

Webinars

NCHRP research results are also frequently the subject of TRB webinars, and the average attendance of these webinars has grown in the last five years, as shown in Exhibit 4. In 2019, 13 webinars were held for NCHRP research results, and attended by 4838 attendees in total, with an average of 372 attendees per webinar.

Exhibit 4. NCHRP Webinars and Average Attendance, FY 2015 to FY 2019



Panel Members

NCHRP continues to engage panel members drawn from all walks of professional life, with heavy dependence on practitioners from AASHTO member departments. Exhibit 5 provides a breakdown of the affiliation of new NCHRP panel members since CY 2016.

Exhibit 5. Affiliations of New Panel Members, FY 2016 to FY 2020

Affiliation	2016	2017	2018	2019	2020
State agencies	365	380	397	351	336
Federal agencies	16	14	9	3	4
Local agencies, transit agencies, MPOs	24	28	41	35	31
Educational institutions	65	70	87	63	69
Industry, consultants, associations	113	104	193	84	83
Other	2	1	2	1	2
All	585	597	729	537	525*

* as of November 30, 2019.

Update on NCHRP Continuing Projects

Several continuing projects are carried out within NCHRP. Results may be published in hard copy, delivered in the form of internal reports and presentations to AASHTO committees and councils, available on the TRB website, or made available upon request.

NCHRP Project 20-123 – Support for AASHTO Committees and Councils

This continuing project provides ongoing support for AASHTO councils and committees for research-related needs. Tasks must result in, or contribute to, the development of high-quality research problem statements that can be submitted to or pursued by individual state transportation research programs, the Federal Highway Administration (FHWA) pooled fund program, NCHRP, or by other interested entities. Tasks may include but are not limited to: development of research roadmaps or prioritized lists of specific research needs; updating council or committee strategic plans that include a research component; research scoping studies for a narrow research topics; development activities to update specifications and manuals maintained by a committee or council, using previously conducted research and/ or convening experts to arrive at a consensus; and convening Peer Exchanges.

In 2019, the AASHTO Special Committee on Research and Innovation allocated \$1.5 million to fund requests. An NAS-approved oversight panel, consisting of representatives of state DOTs who are also each a member of an AASHTO committee or council, considers funding requests and allocates funds. In this first year of the project, the panel established governance procedures and approved funding requests totalling \$365,000.

NCHRP Project 20-05 – Synthesis of Information Related to Highway Problems

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, which began in 1967,

Update on NCHRP Continuing Projects (continued)

aims to remedy this lack of awareness of existing solutions by assembling and organizing relevant information, practices, and research for particular highway problems. Approximately 17 NCHRP Synthesis reports are published annually.

2019 NCHRP Synthesis Reports Highlights

- *NCHRP Synthesis 534 - Emerging Technologies for Construction Delivery*, by Christofer Harper, Daniel Tran, and Ed Jaselskis, documents the use of selected advanced technologies for highway construction projects of state departments of transportation. The technology areas are (1) visualization and modeling; 2) interconnected technologies; 3) safety technologies; 4) instrumentation and sensors; and 5) unmanned aircraft systems. The report was the subject of a TRB webinar in 2019.
- *NCHRP Synthesis 539 - Landscape Development and Management Practices for Urban Freeway Roadsides*, by Beverly J. Storey and John Habermann, documents practices used by state departments of transportation for designing and maintaining roadsides adjacent to urban freeways. The synthesis focuses on high visibility freeway roadsides with limited pedestrian access. These areas often have wide medians, interchanges, and overpasses.

NCHRP Project 20-30 – IDEA Program

The Innovations Deserving Exploratory Analysis (IDEA) program, begun in 1992, 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. Of the 194 projects completed to-date, products of 39 projects (20%) have been successfully implemented.

NCHRP Project 20-06 – Legal Problems Arising Out of Highway Programs

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. Begun in 1968, this research project identifies and evaluates courses of action for state DOTs, which facilitates the handling of both immediate and long-range needs.

In 2019, Sections 1 and 3 of Volume 8: Transportation Law and Government Relations of the Selected Studies in Transportation Law (SSTL), a legal collection published jointly by the National Cooperative Highway Research Program (NCHRP) and the Transit Cooperative Research Program (TCRP) were updated. *Section 1: Civil Rights and Transportation Agencies* presents an analysis of federal laws and regulations as they affect transportation agencies in their business practices, construction of facilities, hiring, and services provided to the public. *Section 3: Indian Transportation Law* presents an examination and an update of legal issues arising out of federal, state, and local transportation agencies' relations with Indian tribes.

Update on NCHRP Continuing Projects (continued)

NCHRP Project 20-24 – Research for AASHTO and State DOT Leadership

NCHRP conducts research focused on issues facing state DOT decision makers. Reports from this project deliver timely information on such perennial topics as asset and performance-based management, innovative financing and contracting, management, and workforce development; as well as emerging topics such as knowledge management, multi-hazard risk assessment, and consequences of connected and automated transportation development.

NCHRP Project 20-68 – Domestic Scan Program

The objective of the US Domestic Scan Program is to accelerate the rate of advances in practice by facilitating information sharing and technology exchange among the states and other transportation agencies, and to identify actionable items of common interest.

The following scans were active in 2019, and their status as of November 1, 2019 is indicated:

- Scan 17-03, “Experiences in the Performance of Bridge Bearings and Expansion Joints Used for Highway Bridges” will investigate leading practices for monitoring, inspection, testing, and remediation of bearings and expansion joints and implications of damage and repair experience for design.
Status: Final report in preparation
- Scan 18-01, “Hydro-demolition for Partial-Depth Removal of Bridge Decks” will examine bridges undergoing hydro-demolition as well as bridges that have undergone past hydro-demolition deck replacements to study both the hydro-demolition process and long term performance of bridges that have been subject to a partial deck replacement.
Status: Final report in preparation
- Scan 18-02, “Institutionalizing Collaboration and Cooperation in Maintenance, Operations, and Traffic Engineering to Support the Transition to New and Emerging Transportation Technologies” will investigate how state DOTs are changing their organizations, institutional arrangements, and management practices to improve transportation system performance through adoption of new technologies.
Status: In reconnaissance
- Scan 19-01, “Leading Practices for Detailing Bridge Ends and Approach Pavements to Limit Distress and Deterioration” will explore practices and tools for selection of appropriate details for use at the ends of bridges to achieve a jointless structure while minimizing the structural distress, maintenance and repair costs and improving the performance and durability of jointless bridges.
Status: In reconnaissance
- Scan 19-02, “Leading Practices in Strategic Workforce Management by Transportation Agencies” will examine innovative strategic workforce management strategies state DOTs are implementing, particularly those activities that can be quickly adopted and implemented to recruit, develop, and retain the workforces agencies need today and for the future.
Status: Planning and scoping.

Research Showcase: Producing a Research Roadmap on Rural Transportation Issues

Research under NCHRP Project 20-122 – “Rural Transportation Issues: Research Roadmap” was completed in 2019, and the final report is currently in the publication process.

Research Agency:
Montana State University

Principal Investigator:
Jaime Sullivan

NCHRP Project 20-122 – “Rural Transportation Issues: Research Roadmap” was initiated to identify critical rural transportation issues that can be addressed by NCHRP and other research programs. Specifically, the project is developing a research roadmap, a plan that identifies and prioritizes research projects over short-term and longer-term horizons. The project will also develop problem statements, drawn from the roadmap, for funding considerations under future research plans. The information in the roadmap can also be used by state transportation departments and other public agencies to guide transportation state-level investments in rural transportation research.

Led by a research team consisting of the Western Transportation Institute (WTI) at Montana State University Bozeman and the Institute for Transportation (InTrans) at Iowa State University, the project conducted foundational research on current and emerging rural transportation issues, including an environmental scan, literature review, and gap analysis. To ensure that the diversity in rural communities was captured, the team developed a framework for the roadmap, which included definitions of several rural community types and 15 categories of rural research needs. Researchers drafted fact sheets on each category topic, which were used as “conversation starters” at outreach events.

The project encompassed an extensive outreach effort to collect research needs for all rural community types from transportation practitioners, researchers, and other stakeholders. The research team hosted in-person workshops in Georgia and Colorado in late 2018 and at the TRB Annual Meeting in January 2019. Together, these workshops attracted more than 130 participants. In all, more than 750 specific research needs were gathered, consolidated, and prioritized. The team also worked with key TRB committees, hosted an online stakeholder webinar, and posted the fact sheets online to generate additional feedback.



Photo credit: Jaime Sullivan

Using both the foundational research and the stakeholder input, to date the research team has produced 14 issue papers, more than 25 formal research needs statements (RNS), and an interim report. Seven of the RNS were selected and submitted to AASHTO R&I for consideration in 2019, two of which were selected for funding for FY 2020. Researchers are currently drafting themed reports on research needs for all 15 topics. They are also developing the long-term research roadmap, which will include a vision for national-level rural transportation research.

Research Showcase: Researching Traffic Forecasting Accuracy

Research under NCHRP Project 08-110 – “Traffic Forecasting Accuracy Assessment Research” was completed in 2019, and the final report is currently in the publication process.

Research Agency:
University of Kentucky Research Foundation

Principal Investigator:
Gregory Erhardt

Traffic forecasts are used by planners, engineers, and elected officials to inform decisions about proposed transportation projects, including the selection of which projects to build, the sizing of those projects, and other design elements. To ensure both the efficient allocation of public resources and the efficiency of the transportation system itself, it is important that traffic forecasts be as accurate as possible. However, due largely to a lack of data, there has been limited empirical research into the accuracy of traffic forecasts on untolled roads in the US.

NCHRP Project 08-110 – “Traffic Forecasting Accuracy Assessment Research” meets that need. It does so by assembling the largest known database comparing project-level traffic forecasts to observed traffic volumes after the projects open. These data are used to measure the bias and spread in forecasts, showing that on average the counted traffic volume is 6% lower than forecast. The research examines the factors related to accuracy, and goes on to conduct several “deep dives” into the traffic forecasts specific projects, finding that the reasons for inaccuracy are diverse, and do not lend themselves to simple solutions.

Recognizing that forecasts cannot be perfectly accurate, NCHRP Project 08-110 provides a method to estimate the range of uncertainty around a traffic forecast based on historical accuracy. This uses a technique known as quantile regression for estimating the actual traffic as a function of the forecast traffic. In conducting this research, the project team engaged with representatives from state departments of transportation and metropolitan planning organizations to review the work and ensure that it is useful to staff in those organizations. An outcome of this engagement is a set of recommendations both for how to account for uncertainty at the time a forecast is made, and how to establish a process for the continual improvement of forecast accuracy.

The resulting report is divided into two volumes. Part 1: Guidance Document describes the project’s recommendations and how to use and apply the resulting tools, which include a spreadsheet for the application of the quantile regression models, and software to archive forecast data. The Guidance Document also includes an Executive Summary suitable for managers, policy-makers and other high-level consumers of traffic forecasts. Part 2: Technical Report covers the methods and findings of the research in detail, including the lessons from the deep dives into individual projects.

Together, more accurate traffic forecasts and a better understanding of the uncertainty around traffic forecasts can lead to a more efficient allocation of resources and build public confidence in the agencies that produce those forecasts.

Research Showcase: Researching The Effectiveness of Public Involvement in Transportation Planning and Project Development



NCHRP Research Report 905 – Measuring the Effectiveness of Public Involvement in Transportation Planning and Project Development was published in 2019.

Research Agency:
PRR Inc.

Principal Investigator:
Dr. Bruce Brown

While best practices for conducting public involvement in transportation planning and project development have been widely researched, there are few practical or validated methods to gauge the effectiveness of public involvement. *NCHRP Research Report 905 – Measuring the Effectiveness of Public Involvement in Transportation Planning and Project Development* addressed this gap by developing a field-validated and practitioner-ready toolkit to measure the effectiveness of a transportation agency’s public involvement activities, from both the public’s and the agency’s perspectives. The goal was to create the best possible tool that validly measures the effectiveness of public involvement, while also being user-friendly and “doable” given the typical constraints faced by agencies.

The research was conducted in six phases: (1) a systematic literature review of over 1,000 documents; (2) development of indicators for measuring the effectiveness of public involvement; (3) developing items for measuring each indicator; (4) pretesting through in-depth cognitive interviews; (5) testing the surveys on three major transportation projects; and (6) use of focus groups, factor analysis, principal components analysis, tests of validity/reliability, and usability testing to refine the surveys, scoring tool, and user guidelines.

The final toolkit includes paper and online versions of the survey for use with the public, an online version of the survey for use by the public involvement agency, an Excel scoring tool, and guidelines for administering and scoring the surveys. Although the toolkit was tested on three transportation projects, it can be used on all projects that include public involvement.

The “Public Involvement Effectiveness Measurement Toolkit” enables agency professionals to track performance throughout the project lifecycle, identify strengths and weaknesses of public involvement activities, and inform decisions about the best way to allocate resources. In addition, the use of the surveys can serve to improve relationships with affected communities since they now have a means for providing feedback not only on projects, but also on the public involvement processes. Finally, the use of the toolkit allows agencies to demonstrate the seriousness with which they take their responsibilities to conduct effective public involvement.



NCHRP Research Report 905 is a winner of the 2019 International Association for Public Participation (IAP2) USA Core Values Award, and a 2019 IAP2 International Award Winner.

Image credit:
www.iap2.org

Implementation Showcase: Peer Exchange on Data Governance for State DOT Chief Data Officers



NCHRP Project 20-44(11) – “Advancing Practices for Data Governance, Information Management, and Managing the Impact of Digitalization on the DOT Workforces” will implement the research results of *NCHRP Report 666 - Target-Setting Methods and Data Management to Support Performance-Based Resource Allocation by Transportation Agencies* and *NCHRP Report 754 - Improving Management of Transportation Information*, both published in 2016.

Research Agency:
Iteris, Inc.

Principal Investigator:
Anita Vandervalk

Historically, state DOTs have been in the business of planning, designing, managing, constructing, and maintaining their state’s highway system. With rapid advances in technology data management and analytics, information management, a desire to accelerate open and inclusive practices, and expectations to modernize engagement with constituents and employees. State DOTs will need to determine how to react, what role they should play, and what workforce skills are needed to support their work in the future. *NCHRP Report 666 - Target-Setting Methods and Data Management to Support Performance-Based Resource Allocation by Transportation Agencies* and *NCHRP Report 754 - Improving Management of Transportation Information* provide tools for state DOTs to overcome the impact of these challenges, including Data Governance (DG). DG is a critical element of data management and data business planning. It provides:

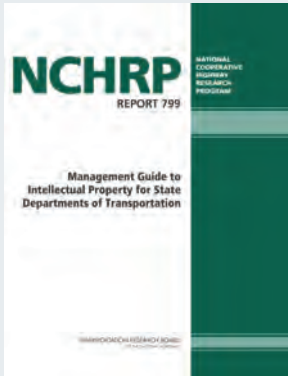
- A central focus to identify and control the collection, storage, and sharing of data.
- Identification of stakeholder roles and responsibilities.
- Enterprise data standards, data dictionaries, and metadata.
- Standard data quality assurance processes.
- Knowledge management processes for sharing and retaining critical organizational knowledge related to data and information.
- Alignment of data program investments with agency needs.

A Peer Exchange was held in Atlanta on September 18 and 19 among Chief Data Officers (CDOs) and other key information technology officials from 13 state DOTs to share practices and identify opportunities to advance the state of the practice surrounding data governance. The Peer Exchange work is a component of a larger project – NCHRP Project 20-44(11) – “Advancing Practices for Data Governance, Information Management, and Managing the Impact of Digitalization on the DOT Workforces”.

The main focus of the Peer Exchange was to inform the participants about NCHRP resources available to assist in developing data business plans, conducting assessments, establishing data governance, improving transportation information practices, and to facilitate the sharing of best practices and challenges as states implement data management and governance.

Other work under this project includes supporting a Joint Task Force (JTF) of AASHTO Committees on Agency Administration, Civil Rights, Data Management and Analytics, Human Resources, and Knowledge Management. The JTF was formed to focus on optimizing the alignment of workforce, civil rights, technology, data and knowledge management, and organizational development, to strengthen agency capabilities and diversity, promote inclusion, and identify gaps, barriers, issues, and obstacles as they relate to these fields.

Implementation Showcase: Disseminating a Management Guide on Intellectual Property



NCHRP Project 20-44(03) - "Dissemination of NCHRP Report 799: Management Guide to Intellectual Property for State Departments of Transportation" was completed in 2019, and implemented the research results of *NCHRP Report 799 - Management Guide to Intellectual Property for State Departments of Transportation*, published in 2016.

Research Agency:
Applied Research Associates

Principal Investigator:
Jason Bittner

NCHRP implementation funding was used to assist three states in the implementation of *NCHRP Report 799 - Management Guide to Intellectual Property for State Departments of Transportation*. A research team led by Applied Research Associates, Inc. (ARA) worked closely with Texas, Illinois, and South Dakota DOTs to deliver tailored facilitated workshops and provide hands-on implementation support.

The research team and the state DOTs pursued the project with the understanding that the Intellectual Property Management model presented in *NCHRP Report 799* would serve as a starting point for helping each state DOT develop a formal and customized process for managing intellectual property. That effort was met with varying levels of success due to the unique opportunities and challenges in each state DOT as they considered financial and human resources necessary for full adaptation and adoption.

Understanding and establishing a formal process guides ultimate Intellectual Property (IP) management in a state DOT. Many variations were discussed during the course of workshops and in the initial gap assessments. *NCHRP Report 799* noted that some state DOTs may choose to outsource the management opportunities altogether or work more closely with an attorney general or department of administration outside of the transportation agency.

One of the key findings from the implementation effort was that state DOTs have relatively little exposure to the topic of IP management and are eager to gather additional information on the cost (both direct and opportunity) of IP management. Awareness of IP topics emerged as one of the key stumbling blocks in advancing conversations on the model process. The variations in key elements of IP, the application of state and federal guidance, university commercialization approaches, and limited knowledge of potential exposure were topics raised in each discussion.

Ultimately, all three state DOTs advanced a potential format for monitoring and assessing IP management in their organizations. These included (1) making modifications to each state DOT's research project management efforts and kickoff meetings, (2) an initiative to standardize IP management approaches across state agencies, and (3) including additional information in employee orientation activities and in procurement activities. In each case, *NCHRP Report 799* served as an invaluable input to IP management development.

Implementation Showcase: Integrated Corridor Management

Research under NCHRP Project 03-121 – “Incorporating Freight, Transit, and Incident Response Stakeholders into Integrated Corridor Management (ICM): Processes and Strategies for Implementation” was completed in 2019. The guidebook produced is currently in the publication process, and a report on the implementation of that guidebook will be released in 2020.

Research Agency:
Cambridge Systematics

Principal Investigator:
Vassili Alexiadis

“I found the ICM workshop I attended to be extremely valuable in terms of getting all of the corridor stakeholders (local agencies, LAX, transit, and active transportation) into the same room and onto the same page.”

Ed Alegre, Senior Manager – Highway ITS Group at Los Angeles County Metropolitan Transportation Authority

NCHRP Project 03-121 – “Incorporating Freight, Transit, and Incident Response Stakeholders into Integrated Corridor Management (ICM): Processes and Strategies for Implementation” produced a guidebook for transportation decision-makers on how to incorporate freight, transit, incident response, and non-motorized transportation stakeholders into the ICM process. The guidebook is based on documented lessons-learned from agencies which have implemented ICM, and includes institutional, technical, and organizational approaches related to implementation of the ICM strategies such as: cooperative procedures and agreements, operational constraints and opportunities, potential ICM strategies, evaluation methodologies and performance measures related to successfully incorporating these stakeholders into ICM.

NCHRP implementation funds were used to conduct three regional workshops were funded in 2019 by the NCHRP Implementation Support Program around the I-105 corridor in Los Angeles, the I- 495, I-190, and I-287 corridors in New York, and the I-95 and US-1 corridors in Fort Lauderdale. These workshops were intended to equip transportation decision makers with a systematic approach to engaging non-traditional stakeholder groups in ICM planning, give transportation professionals the tools to present a strong case to management on why to involve non-traditional stakeholder groups, and provide transportation decision makers with insights on the objectives and needs of each non-traditional stakeholder group to develop win-win scenarios to engage non-traditional stakeholder groups to come on board the ICM planning process.

Each region where these workshops were held faces their own unique transportation challenges, challenges that are critical in developing an effective ICM concept. While each region is unique, common ICM challenges faced by most ICM project teams include:

- Need for strong ownership and leadership of ICM projects,
- Impact of elected officials on support for ICM projects,
- Need to identify funding for operations & maintenance,
- Certain funding sources are limited to capital improvements.

The workshops introduced and conducted hands-on exercises with workshop participants by utilizing the ICM Planning Framework developed for NCHRP Project 03-121, to help transportation agency decision makers engage freight, transit, incident management, and non-motorized stakeholders in an ICM project in a way that is beneficial to all parties. By bringing stakeholders into the same room and educating them on why they need each other to make ICM successful in their region, traditional silos began to be broken down. The interactive exercises helped workshop attendees understand transportation challenges from the perspective of various stakeholder groups.

Implementation Showcase: Training State DOT Staff on Assessing Highway Structures in Emergency Situations



NCHRP Research Report 833 – Assessing, Coding, and Marking of Highway Structures in Emergency Situations, Volume 2: Assessment Process Manual was published in 2016.

Research Agency:
Oregon State University

Principal Investigator:
Michael Olsen

Assessing, coding, and marking highway structures are necessary for ensuring safety in the event of emergencies resulting from natural or man-made disasters. Several state DOTs have adopted processes for assessing, coding, and marking of highway structures in these situations. However, these processes do not provide a uniform means for conducting these assessments or a common form of coding and marking, thus impeding the effectiveness of organizations involved in dealing with these emergencies. *NCHRP Research Report 833 - Assessing, Coding, and Marking of Highway Structures in Emergency Situations, Volume 2: Assessment Process Manual* addresses this need.

The manual is intended for managers who will oversee the emergency response, identifies technologies that are appropriate for each structure type, and addresses prioritization, coordination, communication, and redundancy. The project also developed Coding and Marking Guidelines to serve as a field manual for preliminary damage assessment. In addition, the manual provides Damage Assessment Forms for each structure type and training material to further help highway agencies and other emergency response organizations with the implementation of the developed manual and guidelines.

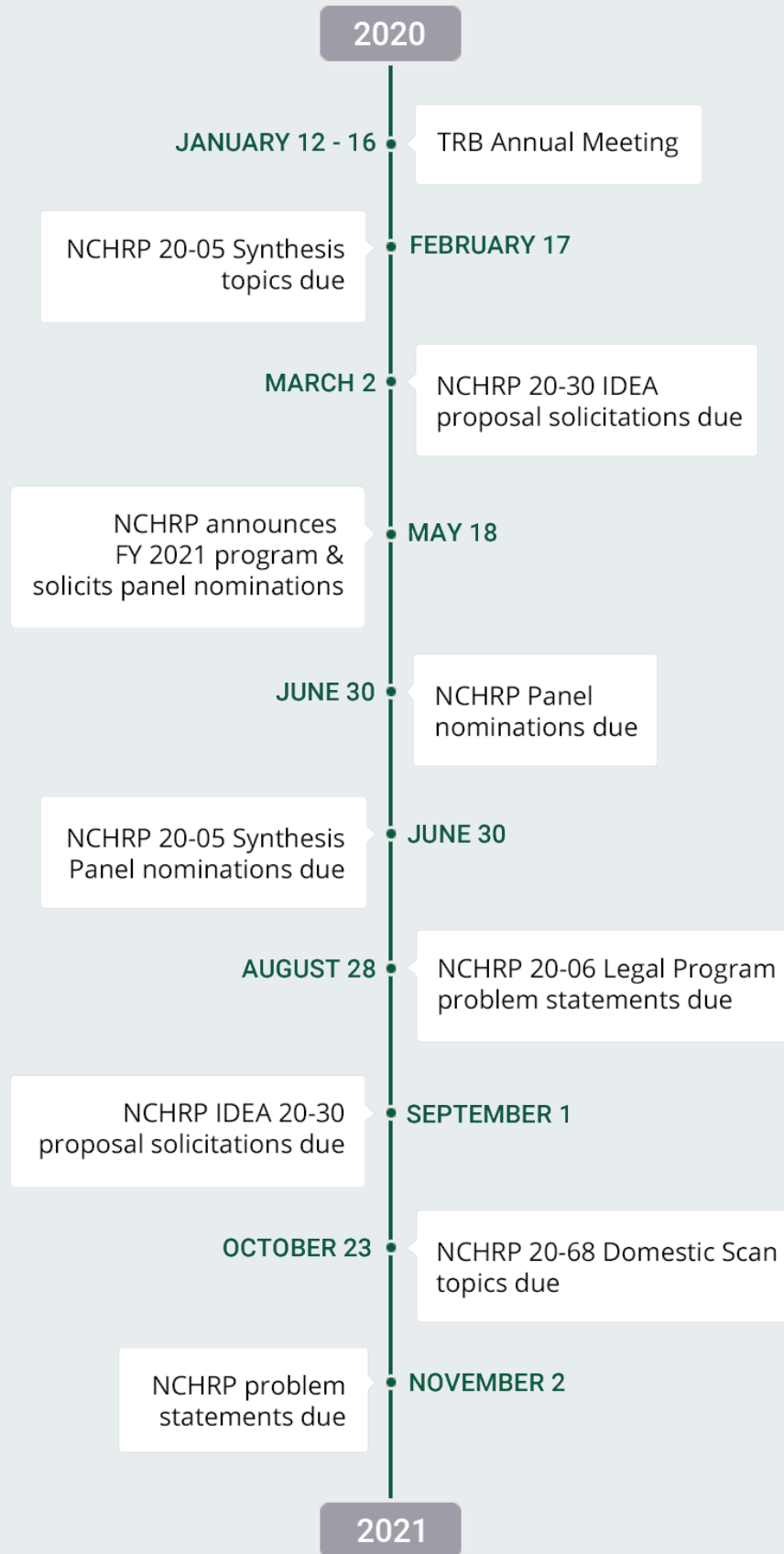
The threat of rising sea levels and tsunamis surround each Hawaiian island, threatening inhabitants and infrastructure on a daily basis. Add to this the potential for earthquakes on a number of the islands, along with their overall isolated location. Staff from the Department of Design and Construction at the City and County of Honolulu, Hawaii, recognized that the recommendations contained in *NCHRP Research Report 833* provided an effective way to establish uniform emergency response procedures between the City and County of Honolulu, the State of Hawaii DOT, and other state agencies across the state.

Dr. Michael Olsen of Oregon State University and his team worked with all of the parties to develop a customized training program that reflected the unique emergency response needs of this multiple island state. The City and County took the lead, and decided that in order to train approximately 150 people, largely made up of first responders, class size should be limited to approximately 30 trainees for a total of 5 workshops. The Hawaii Local Technical Assistance Program (LTAP) hosted the workshops in December 2018 at two separate locations in Honolulu to facilitate attendance of City and County employees from across the state.

Each group received two days of training. On the first day, topics included types of emergency events, potential structural damage, overall planning and preparation, assessment stages, response levels, and communication and coordination. On the second day, topics included fast reconnaissance, preliminary damage assessment, coding and marking guidelines, and mobile technologies. Also, attendees worked on two case studies in which they performed assessments and engaged in constructive discussion and sharing of experiences.

At the conclusion of the workshop, a final discussion allowed each class to narrow down three immediate action items to make progress in planning and preparation. These actions ranged from identifying their specific roles in the response to developing geospatial databases for structural inventories to investigating potential technologies available to improve their emergency response process. The participants realized that many of these efforts were not only important to response, but also had value in day-to-day activities.

Key Dates for 2020



All NCHRP dates are tentative, and are subject to change. Please refer to the NCHRP website at www.trb.org/NCHRP for the latest dates.

Producing Impacts

NCHRP research provides
quantifiable benefits

NCHRP Implementation Support Program

For more information on the NCHRP Implementation Support Program, visit:

www.trb.org/NCHRP/NCHRPImplementationSupportProgram.aspx

To facilitate the implementation of NCHRP research products by state DOTs and others, R&I has made consultant support available through NCHRP Project 20-44 – “NCHRP Implementation Support Program”.

State DOTs, AASHTO committees and councils, and NCHRP project panels can apply for funding for consultant support in delivering a range of implementation products and activities, including pilot/demonstration projects, workshops, peer exchanges, training, and briefing materials. If approved, NCHRP will procure consultant services.

In FY 2019, the NCHRP Project 20-44 oversight panel approved 13 implementation projects, totaling \$2,018,688. Exhibit 6 provides a summary.

Exhibit 6. NCHRP Implementation Projects Approved, FY 2019

Project #	Implementation project name	Amount
20-30/ IDEA 195	Development of an Ideal Cracking Test for Asphalt Mix Design, Quality Control and Quality Assurance	\$119,645
01-55	Performance-Based Mix Design of Porous Friction Courses	\$85,000
03-121	Incorporating Freight, Transit, and Incident Response Stakeholders into Integrated Corridor Management (ICM)	\$250,000
09-61 et al	Short- and Long-Term Binder Aging Methods to Accurately Reflect Aging in Asphalt Mixtures	\$120,000
20-59(55)	Transportation System Resilience: CEO Primer and Outreach	\$149,000
20-44(21)	Synthesis of State Peer Exchanges and RPPM	\$44,785
19-14	Right Sizing Transportation Investments	\$384,260
20-68A, Domestic Scan 17-01	Successful Approaches for the Use of Unmanned Aerial System by Surface Transportation Agencies	\$175,000
15-61	Applying Climate Change Information to Hydrologic and Hydraulic Design of Transportation Infrastructure	\$250,000
09-58	Effects of Recycling Agents on Asphalt Mixtures with High RAS and RAP Binder Ratios	\$150,000
03-128	Business Intelligence Techniques for Transportation Agency Decision Making	\$35,998
09-60	Implementing NCHRP Project 09-60 on Addressing Impacts of Changes in Asphalt Binder Formulation and Manufacture on Pavement Performance through Changes in Asphalt Binder Specifications	\$55,000
14-37	Implementing Guide Specifications for the Construction of Chip Seals and Micro surfacing	\$200,000
Total		\$2,018,688

NCHRP Research Products Contribute to Formulating National Guidance and Standards



In 2018, AASHTO published its *Guide Specifications for the Design of Concrete Bridge Beams Prestressed with Carbon Fiber-Reinforced Polymer Systems, 1st Edition*, which addresses the design of prestressed concrete beams constructed of normal weight concrete and those prestressed via carbon fiber reinforced polymer (CFRP) systems.

The guide is based on *NCHRP Research Report 907 – Design of Concrete Bridge Beams Prestressed with CFRP Systems*.

NCHRP Research Products Inform Research that Benefits State DOTs

NCHRP Research Products in High Value Research

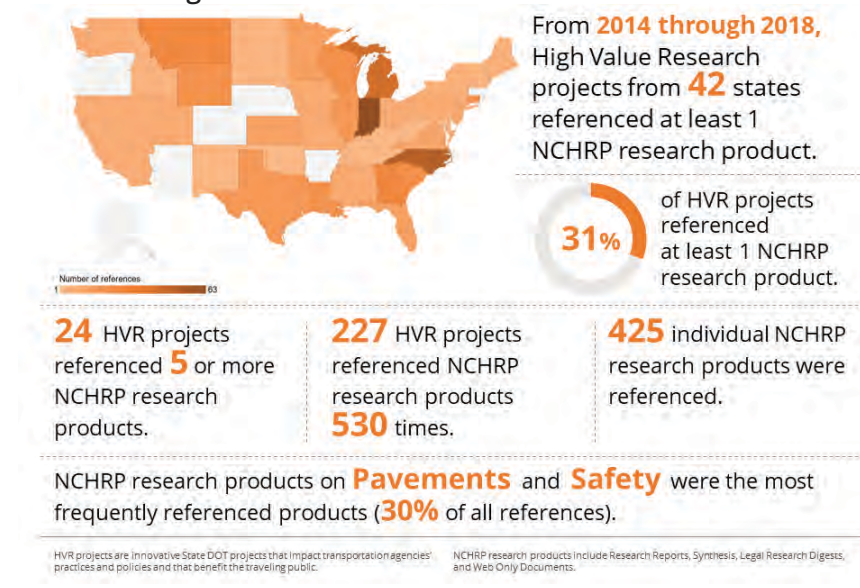
Each year, the AASHTO Research Advisory Committee (RAC) asks states to identify and document recently completed “high value” research (HVR) projects, innovative projects that impact transportation agencies’ practices and policies and that benefit the traveling public. Compiled into *Research Impacts: Better – Faster – Cheaper*, the resulting document is a great resource to state DOTs as a quick reference to HVR projects, and helps eliminate or reduce duplication of research.

In 2019, NCHRP undertook a scan to determine the extent to which NCHRP research products inform these HVR projects. For the years 2014 through 2018, 31% of all HVR projects referenced at least one NCHRP research product, with 24 HVR projects referencing 5 or more NCHRP research products. Covering 42 states and 425 individual NCHRP research products, 530 references were noted, particularly prominent in the research areas of Pavements and Safety, indicating a strong relationship between research done at NCHRP and the research done at the states.

“It’s important to me that the NCHRP research is on topics that are of need. NCHRP reports are resources for these people in the practitioner community and research community. The people for whom I work and the people I facilitate find it very useful.”

—Jack Jernigan,
Team Director, Federal Highway Administration,
Research and Technology Program Development and Partnership Team

Exhibit 7. NCHRP research products in High Value Research, FY 2014 through FY 2018



NCHRP Research Products Apply to All Areas of a Transportation Organization

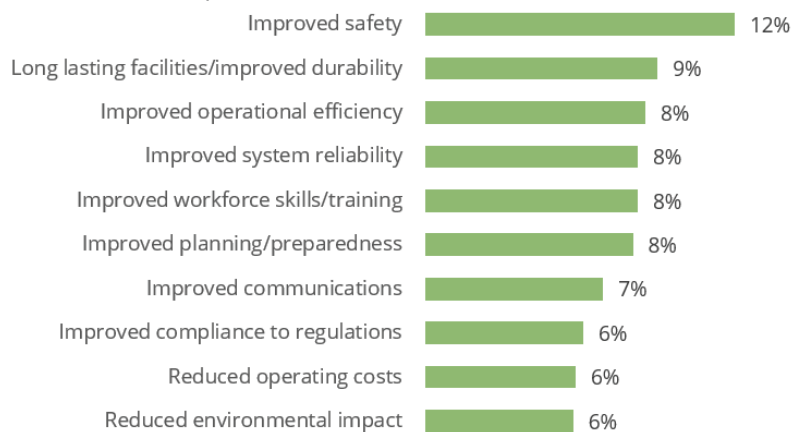
In 2017 and 2019, NCHRP surveyed practitioners, researchers, and decision makers within state DOTs and the larger transportation community to determine how use of NCHRP research products benefits various areas of a transportation organization. 48 publications from the year 2012 and 66 publications from the year 2015 were used in the surveys, and over 900 respondents provided valuable insights into how those publications were used and the benefits they produced within their respective organizations. Exhibit 8 shows the top 10 uses of NCHRP research products, as determined by the percentage of respondents who indicated that use.

Exhibit 8. Top 10 Uses of NCHRP Research Products (n= 904 respondents)



Exhibit 9 shows the top 10 benefits provided by the use of NCHRP research products, as determined by the percentage of respondents who indicated that benefit.

Exhibit 9. Top 10 Benefits Provided by the Use of NCHRP Research Products (n= 904 respondents)



Why NCHRP Works

An effective model for
our stakeholders

A Model for Cooperative Research

The cooperative research model developed for NCHRP has functioned effectively since 1962 and served as the foundation for other successful applied cooperative 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 DOTs 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.

Stakeholders Drive Success

What makes this model so effective? One of the key success factors is stakeholder involvement. Those who 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. 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 shared by a majority of state DOTs.

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.

The NCHRP process is designed to maximize efficiency while producing the highest quality research results. These results will help state DOTs to effectively plan, design, construct, operate, and maintain their 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 typically publicly

The State DOTs' National Highway Research Program

advertised. Successful proposers are selected based on the qualifications of their team members and their research approach.

The Critical Role of State DOTs

The members of AASHTO – the 50 state DOTs 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 state DOTs' most critical challenges. The state DOTs are the sole sponsors of NCHRP and continue to be the driving force behind NCHRP research. The program is operated in partnership with AASHTO under a cooperative agreement with FHWA and is administered by TRB.

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 with NAS, makes them available for research contracts and for administration of the program by TRB.

Available funds for NCHRP have remained strong during the past 21 years, rising along with increases in the Federal-Aid-Highway funds provided by Congress and the 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 available for fiscal years 2014 through 2018. A slight increase was experienced as a result of the Fixing America's Surface Transportation (FAST) Act, signed into law on December 4, 2015.

State DOTs 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 serves as NCHRP's governing body. R&I membership includes 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), a sub-committee of R&I, and composed of research directors from every state DOT.

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

Problem statements are due November 1 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. Submitters are asked to search the relevant literature in the Transport Research International Documentation (TRID) database and the Research in Progress (RiP) database to determine if similar efforts are already underway or if satisfactory answers are already available.

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

At its April meeting, R&I allocates funds (based on expected funding for the next fiscal year) for new and continuation projects. Once the program is developed, TRB sends a report to the AASHTO Board of Directors (CEOs of the state DOTs) requesting final approval. Each project must receive a yes vote from at least two-thirds of the members of the Board of Directors. In addition, each year's program must be approved by FHWA and accepted by the National Academies.

An average of 120 problem statements and 20 requests for project continuations are received each year. Continuation projects include research carried out under NCHRP subprograms, such as the Synthesis of Practice series, the IDEA program, and the Domestic Scan Program, and projects from previous years that request additional funds. In recent years, R&I has funded approximately 100 new projects each year.

State DOTs Help Guide NCHRP Research Projects

Each research project is assigned to a volunteer panel of subject matter experts who will provide technical guidance and counsel throughout the research and reporting phases. 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-hours. The panel members are drawn from many disciplines, with heavy dependence on practitioners from state DOTs. 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 assume a number of key responsibilities for helping ensure the quality of NCHRP research. Project panels analyze the initial problem statement, develop the final project scope and objectives, and 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 responsible for management of the research contracts. Finally, the panels review final reports for acceptability and for accomplishment of the approved research plan.

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. Eligible organizations include private-sector organizations, academic institutions, and nonprofit entities. Throughout its history, NCHRP has awarded research contracts to entities headquartered in a majority of

Selecting the Best Investigators

NCHRP Research Areas

the 50 states, as well as the District of Columbia, Canada, and England. Contractors selected to conduct NCHRP research principally fall into two categories—private sector and university/research institute.

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, available on the NCHRP webpage.

The proposed budget total is established in advance and is 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.

The project panels select investigating agencies after 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.

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

- The proposer’s demonstrated understanding of the problem;
- The merit of the proposed research approach and methodology;
- Experience, qualifications, and objectivity of the research team in the same or closely related problem area;
- The plan for ensuring application of results;
- The proposer’s Diversity and Inclusion Plan; and
- The adequacy of the facilities and equipment.

*From Information and Instructions for Preparing Proposals for the Transportation Research Board’s Cooperative Research Programs, available online at the NCHRP webpage.

Topics Across the Spectrum of Highway Concerns

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

This identification number 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 03-117 identifies the 117th project in Area 3 (Operations and Control). NCHRP Project 17-73 identifies the 73rd project in Area 17 (Safety). Once research was completed, final reports for these projects were published, respectively, as *NCHRP Research Report 881 - Traffic*

"I've been in the business for 50+ years. I read one technical paper every day of the year, devoting 30 minutes each day to keeping current on what's going on in the industry. Of the 365+ papers [I read], a lot of them come from NCHRP."

—Jim Scherocman, Consulting Engineer

Control Devices and Measures for Deterring Wrong-Way Movements, and NCHRP Research Report 893 - Systemic Pedestrian Safety Analysis.

Table 2 of the Annual Report uses this project numbering system to present information about active, completed, and pending NCHRP projects in 2019. The projects are grouped sequentially from Area 1: Pavements through Area 25: Human & Natural Environment.

1. Pavements
2. Economics
3. Operations and Control
4. General Materials
5. Illumination and Visibility
6. Snow and Ice Control
7. Traffic Planning
8. Planning Methods & Processes
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. Agency Administration
24. Mechanics and Foundations
25. Human and Natural Environment

The Central Role of NCHRP Staff

Once research starts, administrative and technical oversight of progress is performed by NCHRP staff.

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.

Program Staff



Christopher J. Hedges
Director, CRP



Lori L. Sundstrom
Deputy Director, CRP, and
NCHRP Manager



Gwen Chisholm Smith
TCRP Manager



**Velvet Basemera-
Fitzpatrick**
Senior Program Officer



Mark S. Bush
Senior Program Officer



**Camille Crichton-
Summers**
Senior Program Officer



Waseem Dekelbab
Senior Program Officer



B. Ray Derr
Senior Program Officer



Mariela Garcia-Colberg
Senior Program Officer



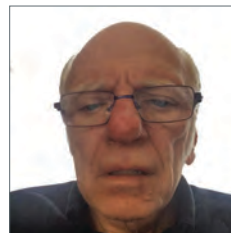
Jo Allen Gause
Senior Program Officer



Lawrence D. Goldstein
Senior Program Officer



Amir N. Hanna
Senior Program Officer



Edward T. Harrigan
Senior Program Officer



Ann M. Hartell
Senior Program Officer



David Jared
Senior Program Officer



Inam Jawed
Senior Program Officer



Andrew C. Lemer
Senior Program Officer



Sid Mohan
Senior Program Officer



Stephan A. Parker
Senior Program Officer



William C. Rogers
Senior Program Officer



Dianne S. Schwager
Senior Program Officer

Supporting Program Staff

Administrative Coordinator

Joseph J. Snell

Administrative Associate

Cynthia E. Butler

Program Coordinators

Deborah Irvin

Brittany Summerlin-Azeez

Program Associate

Sheila A. Moore

Travel Specialists

Daniel J. Magnolia

Robert Turner II

Web Developer

Natassja K. Linzau

Senior Program Assistants

Anthony P. Avery

Stephanie L. Campbell

Cheryl Keith

Thu M. Le

Jarrel McAfee

Hana Vagnerova

Demisha Williams

Director of Publications

Eileen P. Delaney

Associate Director of Publications

Natalie Barnes

Senior Editors

Ellen M. Chafee

Linda A. Dziobek

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Hilary Freer

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Scott E. Hitchcock

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Editors

Kami Cabral

Lea Camarda

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Heidi Willis

Publishing Projects Manager

Jennifer J. Weeks

Assistant Editor

Jennifer Correro

Senior Editorial Assistant

Kathleen Mion

Systems Analyst

Roy N. Mesler

Synthesis Program Contractors

Christopher E. Dunne

M. Andre Primus

Tanya M. Zwahlen

NCHRP Research in 2019

Table 1. Publications of the National Cooperative Highway Research Program, 2019

Research Reports

No.	Project No.	Title, Pages.
889	14-34	Performance Measures in Snow and Ice Control Operations, 164 p.
894	22-29A	Performance of Longitudinal Barriers on Curved, Superelevated Roadway Sections, 136 p.
898	19-12	A Guide to Developing Financial Plans and Performance Measures for Transportation Asset Management, 112 p.
901	25-50	Prioritization Procedure for Proposed Road-Rail Grade Separation Projects Along Specific Rail Corridors, 70 p.
902	20-118	Benchmarking and Comparative Measurement for Effective Performance Management by Transportation Agencies, 160 p.
903	24-46	Geotechnical Asset Management for Transportation Agencies, Vol. 1: Research Overview, 44 p.
903	24-46	Geotechnical Asset Management for Transportation Agencies, Vol. 2: Implementation Manual, 152 p.
904	17-75	Leveraging Big Data to Improve Traffic Incident Management, 202 p.
905	08-105	Measuring the Effectiveness of Public Involvement in Transportation Planning and Project Development, 96 p.
906	12-94	LRFD Minimum Flexural Reinforcement Requirements, 114 p.
907	12-97	Design of Concrete Bridge Beams Prestressed with CFRP Systems, 84 p.
908	14-35	Acceptance Criteria of Complete Joint Penetration Steel Bridge Welds Evaluated Using Enhanced Ultrasonic Methods, 84 p.
909	08-101	Guide to Truck Activity Data for Emissions Modeling, 78 p.
910	15-59	Design Guidelines for Horizontal Sightline Offsets, 112 p.
911	17-55	Guidelines for Traversability of Roadside Slopes, 158 p.
912	10-97	Guidelines for Detection and Remediation of Soluble Salt Contamination Prior to Coating Steel Highway Structures, 100 p.
913	20-95A	Compendium of Successful Practices, Strategies, and Resources in the U.S. DOT Disadvantaged Business Enterprise Program, 212 p.
914	10-93	Measuring, Characterizing, and Reporting Pavement Roughness of Low-Speed and Urban Roads, 164 p.
915	24-43	Relationship Between Erodibility and Properties of Soils, 336 p.
916	10-91A	Sustainable Highway Construction Guidebook (& WOD 262), 154 p.
917	19-14	Right-Sizing Transportation Investments: A Guidebook for Planning and Programming (& WOD 263), 230 p.
917	19-14	Right-Sizing Transportation Investments: A Guidebook for Planning and Programming, Executive Summary, 24 p.
918	25-53	Approaches for Determining and Complying with TMDL Requirements Related to Roadway Stormwater Runoff, 142 p.
919	09-52A	Field Verification of Proposed Changes to the AASHTO R 30 Procedures for Laboratory Conditioning of Asphalt Mixtures, 44 p.
920	08-108	Management and Use of Data for Transportation Performance Management: Guide for Practitioners, 148 p.
921	08-103	Case Studies in Implementing Cross-Asset, Multi-Objective Resource Allocation, 112 p.
925	07-24	Estimating the Value of Truck Travel Time Reliability, 104 p.

Syntheses of Highway Practice (Project 20-05)

No.	Topic No.	Title, Pages.
522	49-07	Managing State Transportation Research Programs, 172 p.
531	49-15	Automated Pavement Condition Surveys, 118 p.
532	49-12	Seismic Design of Non-Conventional Bridges, 138 p.
533	49-04	Very Short Duration Work Zone Safety for Maintenance and Other Activities, 70 p.

534	49-02	Emerging Technologies for Construction Delivery, 112 p.
535	49-08	Pedestrian Safety Relative to Traffic-Speed Management, 122 p.
536	49-03	Bridge Demolition Practices, 90 p.
537	49-05	Impact of Asphalt Thickness on Pavement Quality, 128 p.
538	49-11	Practices for Online Public Involvement, 154 p.
539	49-06	Landscape Development and Management Practices for Urban Freeway Roadsides, 124 p.
540	49-13	Leveraging Private Capital for Infrastructure Renewal, 126 p.
541	49-14	Practices on Acquiring Proprietary Data for Transportation Applications, 222 p.
542	49-01	Prioritization of Freight Investment Projects, 154 p.
543	49-10	Transportation Workforce Planning and Development Strategies, 68 p.

Legal Research Digests (Project 20-06)

No.	Project No.	Title, Pages.
76	23-05	Update of Selected Studies in Transportation Law, Volume 8, Section 3: Indian Transportation Law, 86 p.
77	23-06	Update of Selected Studies in Transportation Law, Volume 8, Section 1: Civil Rights and Transportation Agencies, 148 p.
78	23-01	Condemnation Hierarchy—Competing Public Uses, 188 p.
79	23-04	The Effectiveness of State False Claims Acts in Protecting State Transportation Funding, 78 p.

Web-Only Documents

No.	Project No.	Title, Pages.
258	21-10	Manual on Subsurface Investigations, 372 p.
259	12-104	Guidelines to Improve the Quality of Element-Level Bridge Inspection Data, 281 p.
260	24-41	Proposed Refinements to Design Procedures for Geosynthetic Reinforced Soil (GRS) Structures in AASHTO LRFD Bridge Design Specifications, 69 p.
261	08-101	Case Studies of Truck Activity Data for Emissions Modeling (& Rep. 909), 162 p.
262	10-91A	Sustainable Highway Construction (& Rep. 916), 220 p.
263	19-14	White Papers for Right-Sizing Transportation Investments (& Rep. 917), 108 p.
264	01-53	Proposed Enhancements to Pavement ME Design: Improved Consideration of the Influence of Subgrade and Unbound Layers on Pavement Performance, 231 p.
265	25-54	Field Test of BMPs Using Granulated Ferric Oxide Media to Remove Dissolved Metals in Roadway Stormwater Runoff, 89 p.

Notes:

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

See Table 2 for project titles. See inside back cover of this document for ordering information.

Table 2. Status (as of 12/31/2019) of Projects Active or Pending During 2019

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
AREA ONE : DESIGN--PAVEMENTS						
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	2/28/2019	Completed---Agency report available as an NCHRP Web-Only Document 264
01-54A	Guidelines for Limiting Damage to Flexible and Composite Pavements Due to the Presence of Water	Applied Pavement Technologies	203,699	6/4/2019	4/4/2020	Research in progress
01-57A	Developing Standard Definitions for Comparable Pavement Cracking Data	Oklahoma State University	249,592	10/13/2017	3/31/2020	Research in progress
01-58	Quantifying the Effects of Implements of Husbandry on Pavements	University of Pittsburgh	399,997	9/1/2017	2/28/2020	Research in progress
01-59	Proposed Enhancements to Pavement ME Design: Improved Consideration of the Influence of Subgrade Soils Susceptible to Shrink/Swell and/or Frost Heave on Pavement Performance	Arizona State University	500,000	8/15/2018	5/14/2021	Research in progress
01-60	Measuring the Characteristics of Pavement Surface Images and Developing Standard Practices for Calibration, Certification, and Verification of Imaging Systems	Georgia Tech Research Corporation	593,633	9/10/2018	12/9/2021	Research in progress
01-61	Evaluation of Bonded Concrete Overlays on Asphalt Pavements	Nichols Consulting Engineers	570,000	2/26/2018	7/31/2020	Research in progress
AREA TWO : ADMINISTRATION--ECONOMICS						
02-25	Workforce 2030--Attracting, Retaining, and Developing the Transportation Workforce: Design, Construction, and Maintenance	ICF Incorporated	700,000	5/16/2019	5/15/2021	Research in progress
02-26	Implementation of Life-Cycle Planning Analysis in a Transportation Asset Management Framework	WSP USA Inc.	499,998	4/5/2019	4/4/2021	Research in progress
02-27	Making Targets Matter: Managing Performance to Enhance Decision-Making	High Street Consulting Group	529,647	2/11/2019	12/10/2020	Research in progress
AREA THREE : TRAFFIC--OPERATIONS AND CONTROL						
03-78C	Training and Technology Transfer for Accessibility Guidelines for Roundabouts and Channelized Turn Lanes	Kittelson & Associates	250,000	1/4/2017	3/31/2020	Research in progress---Contractor's final report under review
03-111	Effectiveness of Work Zone Transportation Management Plan Strategies	KLS Engineering LLC	749,961	6/24/2014	11/15/2019	Completed---Publication decision pending
03-113	Guidance for Traffic Signals at Diverging Diamond Interchanges and Adjacent Intersections	North Carolina State University	1,099,875	6/13/2014	6/30/2020	Research in progress
03-118	Decision-Making Guide for Traffic Signal Phasing	Vanasse Hangen Brustlin, Inc.	600,000	8/13/2015	11/12/2019	Completed---Publication decision pending
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	10/31/2020	Research in progress

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
03-121	Incorporating Freight, Transit and Incident Response Stakeholders into Integrated Corridor Management (ICM): Processes and Strategies for Implementation	Cambridge Systematics	799,301	7/5/2016	12/30/2020	Completed---To be published as NCHRP Research Report 899
03-123	Proposed Practices for the Application of Dynamic Lane Use Control	Texas A&M Transportation Institute	430,000	7/1/2016	12/31/2019	Research in progress---Contractor's draft final report under panel review
03-124	Principles and Guidance for Presenting Drivers with Dynamic Information on Active Traffic Management	Battelle Memorial Institute	749,939	11/3/2016	12/2/2019	Completed---Publication decision pending
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	9/20/2020	Research in progress
03-126	Transportation Operations Manual	WSP USA Inc.	499,968	8/2/2019	8/1/2021	Research in progress
03-127	Cybersecurity of Traffic Management Systems	Southwest Research Institute	750,000	8/16/2017	10/15/2019	Completed---Publication decision pending
03-128	Business Intelligence Techniques for Transportation Agency Decision Making	Applied Engineering Management Corporation	359,942	6/20/2018	1/19/2020	Research in progress---Contractor's draft final report under panel review
03-129	Essential Communications: A Guide to Land Mobile Radio (LMR)	Commdux Consulting LLC	536,433	8/1/2018	7/31/2020	Research in progress--Interim report under review
03-130	Guide for Roundabouts	Kittelson & Associates	750,000	6/1/2018	11/30/2020	Research in progress--Contractor's draft report pending
03-131	Guidance for Planning and Implementing Multimodal, Integrated Corridor Management	Kapsch TrafficCom USA Inc.	499,306	5/7/2018	5/7/2020	Research in progress
03-132	Guidance for Safe and Effective of Temporary Traffic Control for Mobile Operations on Two-Lane Two-Way Roadways	Texas A&M Transportation Institute	300,000	5/14/2018	12/31/2020	Research in progress
03-133	Signal Timing Strategies for Non-Motorized Users	Kittelson & Associates	500,000	4/25/2018	4/24/2020	Research in progress
03-134	Determination of Encroachment Conditions in Work Zones	Texas A&M Transportation Institute	491,558	6/20/2019	12/20/2021	Research in progress
03-135	Wrong-Way Driving Prevention Solutions, and Guidance	Auburn University	600,000	7/22/2019	1/21/2022	Contract pending
03-136	Evaluating the Performance of Right-Turn-On-Red Operation at Signalized Intersections (with single and dual right-turn lanes)	Iowa State University	300,000	8/13/2019	8/12/2021	Research in progress
03-137	Algorithms to Convert Basic Safety Messages into Traffic Measures	Noblis Inc.	400,000	8/1/2019	1/31/2021	Research in progress
03-138	Experimental Implementation of Big Data Analytics for Traffic Incident Management	-----	500,000			In development
03-139	Next Generation of the USLIMITS2 Speed Limit Setting Expert System	-----	350,000			In development
03-140	Applications of RFID and Wireless Technologies for Highway Construction	-----	400,000			In development
AREA FOUR : MATERIALS AND CONSTRUCTION--GENERAL MATERIALS						
04-40	Reliability-Based Geotechnical Resistance Factors for Axially-Loaded Micropiles	University of Missouri	249,998	9/1/2017	12/31/2019	Research in progress---Contractor's final report pending

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
AREA FIVE : TRAFFIC--ILLUMINATION AND VISIBILITY						
05-22	Guidelines for Solid-State Roadway Lighting	WSP USA Inc.	399,993	6/1/2017	7/31/2019	Completed---Publication decision pending
05-23	Effects of LED Roadway Lighting on Driver Sleep Health and Alertness	Virginia Polytechnic Institute	399,775	7/1/2018	6/30/2020	Research in progress
05-24	Guidelines for Vehicle and Equipment Color, Marking, and Lighting	Texas A&M Transportation Institute	600,000	6/1/2018	11/30/2020	Research in progress
AREA SIX : MAINTENANCE--SNOW AND ICE CONTROL						
06-18	Guide for Snow and Ice Control Operations	Texas A&M Transportation Institute	300,000	7/1/2019	3/31/2021	Research in progress
AREA SEVEN : TRAFFIC--TRAFFIC PLANNING						
07-23	Access Management in the Vicinity of Interchanges	Texas A&M Transportation Institute	900,000	6/20/2013	3/20/2020	Research in progress
07-24	Estimating the Value of Truck Travel-Time Reliability	WSP USA Inc.	299,920	1/26/2017	4/30/2019	Completed---Published as NCHRP Research Report 925
07-25	Guide for Pedestrian and Bicycle Safety at Alternative Intersections and Interchanges (All)	Kittelson & Associates	400,000	4/12/2017	12/31/2019	Research in progress---Contractor's final report under review
07-26	Update of Highway Capacity Manual: Merge, Diverge, and Weaving Methodologies	Kittelson & Associates	400,000	6/10/2019	12/9/2021	Research in progress
07-27	An Update of the Green Book Design Vehicles	MRIGlobal	400,000	5/8/2019	11/7/2020	Research in progress
07-28(01)	Assessing the Safety Impacts of Right-Turn Lanes on Rural and Suburban Highways	MRIGlobal	250,000	5/6/2019	11/5/2020	Research in progress
07-28(02)	Assessing the Multi-Modal Safety Performance of Turn Lanes	-----	400,000			In development
AREA EIGHT : TRANSPORTATION PLANNING--PLANNING METHODS AND PROCESSES						
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 141	Evaluation of Walk and Bicycle Demand Modeling Practice	RAND Corporation	99,996	5/30/2017	5/15/2019	Completed--Final report sent to AASHTO
08-36/Task 142	Advancing Sustainability through Multi-Agency Collaborations	RAND Corporation	145,000	6/5/2017	2/28/2020	Research in progress
08-36/Task 143	Evolving Transportation Planning Research Needs for the 21st Century	WSP USA Inc.	124,980	6/5/2017	2/15/2019	Completed--Final report sent to AASHTO
08-36/Task 144	Transportation Asset Management and Effective Organizational Models for Program Implementation	Cambridge Systematics	125,000	6/5/2017	1/24/2019	Completed---Final report sent to AASHTO
08-36/Task 145	Scenario Planning Lite	Cambridge Systematics	75,000	4/6/2018	3/29/2019	Completed--Final report sent to AASHTO
08-36/Task 146	Economic Resilience and Long-Term Highway/Transportation Infrastructure Investment	RAND Corporation	150,000	5/3/2018	6/21/2019	Completed--Final report sent to AASHTO
08-36/Task 147	Strategic Mobility Research: Enhancing Mobility, Stimulating Economic Activity, Saving Lives	WSP USA Inc.	150,000	5/3/2018	9/30/2019	Completed---Final report sent to AASHTO
08-102	Bicyclist Facility Preferences and Effects on Increasing Bicycle Trips	Georgia Tech Research Corporation	350,000	6/24/2015	8/30/2019	Completed---Publication decision pending

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
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	7/31/2019	Completed---Publication decision pending
08-107	A Guidebook for Emergency Contracting Procedures for Administration of a Regional Emergency	AECOM Consulting Transportation Group	249,997	12/15/2016	6/30/2020	Research in progress---Contractor's final 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	3/29/2019	Completed---Published as NCHRP Research Report 920
08-109(01)	Updating the AASHTO Transportation Asset Management Guide—A Focus on Implementation, Phase 2	Spy Pond Partners	700,000	6/4/2018	5/3/2020	Research in progress
08-110	Traffic Forecasting Accuracy Assessment Research	University of Kentucky Research Foundation	349,932	2/14/2017	11/22/2019	Completed---Publication decision pending
08-111	Effective Decision Making Methods for Freight-Efficient Land Use	Rensselaer Polytechnic Institute	500,000	3/20/2017	12/31/2019	Research in progress---Contractor's final report pending
08-112	Guidebook for Implementing Alternative Technical Concepts into All Types of Highway Project Delivery Methods	Gransberg & Associates Inc.	450,000	6/1/2017	4/19/2019	Completed---Publication decision pending
08-113	Integrating Effective Transportation Performance, Risk, and Asset Management Practices	CH2M Hill	520,617	3/15/2018	9/14/2020	Research in progress
08-114	Systematic Approach for Determining Construction Contract Time: A Guidebook	Iowa State University	-	3/20/2018	11/19/2019	See NCHRP Project 08-114A
08-114A	Systematic Approach for Determining Construction Contract Time: A Guidebook	Texas A&M University	500,000	7/27/2018	6/30/2020	Research in progress
08-115	Guidebook for Data and Information Systems for TAM	Spy Pond Partners	400,000	8/1/2018	5/31/2020	Research in progress
08-116	Framework for Managing Data from Emerging Transportation Technologies to Support Decision-Making	Applied Engineering Management Corporation	399,973	5/8/2018	3/20/2020	Research in progress
08-117	Impact of Transformational Technologies on Land Use and Transportation	Kittelson & Associates	200,000	5/1/2018	7/31/2019	Completed---To be published as NCHRP Research Report
08-118	Risk Assessment Techniques for Transportation Asset Management	StarLis Corporation	600,000	6/24/2019	6/23/2021	Research in progress
08-119	Data Integration, Sharing, and Management for Transportation Planning and Traffic Operations	Applied Engineering Management Corporation	1,349,990	9/16/2019	9/15/2022	Research in progress
08-120	Initiating the Systems Engineering Process for Rural Connected Vehicle Corridors	Noblis Inc.	350,000	8/1/2019	1/31/2021	Research in progress
08-121	Accessibility Measures in Practice: Guidance for Transportation Agencies	University of Texas - Austin	499,025	5/31/2019	9/29/2021	Research in progress
08-122	Metropolitan Planning Organizations: Strategies for Future Success	Metro Analytics	398,930	6/17/2019	3/16/2021	Research in progress
08-123	Census Transportation Data Field Guide for Transportation Applications	Cambridge Systematics	499,859	6/1/2019	5/31/2021	Research in progress
08-124	Quantifying the Impacts of Corridor Management	Metro Analytics	449,427	6/17/2019	9/16/2021	Research in progress

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
08-125	Attracting, Retaining, and Developing the Transportation Workforce: Transportation Planners	WSP USA Inc.	300,000	6/5/2019	3/4/2021	Research in progress--- Interim report pending
08-126	Continued Availability (Phase 2) of the SHRP 2 Safety Data	-----	450,000			In development
08-127	Emerging Issues: Impact of New Disruptive Technologies on the Performance of DOTs	-----	250,000			In development
08-128	Snapshots of Planning Practices	-----	200,000			In development
08-129	Incorporating Resilience Concepts and Strategies in Transportation Planning Efforts	-----	300,000			In development
08-130	Best Practices in Coordination of Public Transit and Ride Sharing	-----	250,000			In development
08-131	Access to Jobs, Economic Opportunities, and Education in Rural Areas	-----	250,000			In development
08-132	Accessing America's Great Outdoors: Understanding Recreational Travel Patterns, Demand, and Future Investment Needs for Transportation Systems	-----	450,000			In development
08-133	Development and Implementation of the National Intercity Bus Atlas	-----	600,000			In development
08-134	Integrating Freight Movement into 21st Century Communities' Land Use, Design, and Transportation Systems	-----	500,000			In development
08-135	Reliability and Quality of Service Evaluation Methods for Rural Highways	-----	400,000			In development
AREA NINE : MATERIALS AND CONSTRUCTION--BITUMINOUS MATERIALS						
09-52A	Short-Term Laboratory Conditioning of Asphalt Mixtures: Field Verification	Texas A&M Transportation Institute	162,000	10/18/2016	3/31/2019	Completed---Published as NCHRP Research Report 919
09-54	Long-Term Aging of Asphalt Mixtures for Performance Testing and Prediction	North Carolina State University	950,000	5/21/2013	11/30/2019	Research in progress--- Contractor's draft report pending
09-56A	Identifying Influences on and Minimizing the Variability of Ignition Furnace Correction Factors - Phase II	Auburn University	250,000	5/12/2017	1/31/2020	Research in progress--- Contractor's draft report pending
09-57A	Ruggedness of Laboratory Tests to Assess Cracking Resistance of Asphalt Mixture	Texas A&M Transportation Institute	650,000	6/15/2018	10/14/2020	Research in progress
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	3/31/2019	Completed---Published as NCHRP Research Report 927
09-59	Relating Asphalt Binder Fatigue Properties to Asphalt Mixture Fatigue Performance	Advanced Asphalt Technologies, LLC	1,000,000	4/20/2015	6/30/2019	Completed---To be published as NCHRP Research Report
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	6/30/2020	Research in progress
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	5/31/2020	Research in progress

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
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
09-63	A Calibrated and Validated National Performance-Related Specification for Emulsified Asphalt Binder	Asphalt Institute	499,679	5/1/2019	5/1/2023	Research in progress
09-64	Developing Test Method and Specification Limits to Evaluate Trackless Tack and Tack Coats for Different Paving Applications	-----	500,000			In development
AREA TEN : MATERIALS AND CONSTRUCTION--SPECIFICATIONS, PROCEDURES, AND PRACTICES						
10-94	Mitigation of Weldment Cracking of Highway Steel Structures due to the Galvanizing Process	University of Kansas	499,975	7/1/2014	3/31/2020	Research in progress
10-95A	Toughness Requirements for Heat-Affected Zones of Welded Structural Steels for Highway Bridges	University of Kansas	425,000	9/19/2016	12/31/2020	Research in progress
10-98	Protocols for Network-Level Macrotexture Measurement	Virginia Polytechnic Institute	500,000	9/6/2016	1/30/2020	Research in progress
10-99	Guidebook for Implementing Constructability Across the Entire Project Development Process: NEPA to Final Design	University of Florida	450,000	5/24/2018	5/23/2020	Research in progress
10-100	Procedures and Guidelines for Validating Contractor Test Data	University of Nevada - Reno	300,000	8/1/2017	7/31/2019	Completed---To be published as NCHRP Research Report
10-101	Improving Mid-Term, Intermediate, and Long-Range Cost Forecasting: Guidance for State Departments of Transportation	Auburn University	250,000	5/1/2018	4/30/2020	Research in progress---Contractor's draft report pending
10-102	A Guidebook for Risk-Based Construction Inspection	HKA Global Inc.	449,996	6/18/2019	7/17/2022	Research in progress
10-103	Improving Guidance of AASHTO R 80/ASTM C 1778 for Alkali-Silica Reactivity (ASR) Potential and Mitigation	University of Texas - Austin	648,500	6/15/2019	6/14/2022	Research in progress
10-104	Recommendations for Revision of AASHTO M 295 Standard Specification to Include Marginal and Unconventional Source Coal Fly Ashes	South Dakota School of Mines and Technology	600,000	8/1/2019	7/31/2022	Research in progress
10-105	Protocols for Traffic Speed Pavement Deflection Measuring Devices: Calibration and Structural Assessment	-----	600,000			In development
10-106	Improvement of Certification Method of Inertial Profiling Systems for Network Data Collection	-----	250,000			In development
10-107	Performance Specifications Implementation Guide	-----	600,000			In development
10-108	Manual for Incorporating NDT in Quality Assurance	-----	250,000			In development
AREA ELEVEN : ADMINISTRATION--LAW						
11-08	Improving Rights-of-Way Acquisition and Compensation Practices for Utility Relocations	Texas A&M Transportation Institute	400,000	4/1/2019	3/31/2021	Research in progress

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
AREA TWELVE : DESIGN--BRIDGES						
12-95A	Proposed AASHTO Guidelines for Adjacent Precast Concrete Box Beam Bridge Systems	University of Cincinnati	399,516	7/17/2018	10/16/2021	Research in progress
12-105	Proposed AASHTO Seismic Specifications for ABC Column Connections	University of Nevada - Reno	450,000	9/1/2015	7/31/2019	Completed---To be published as NCHRP Research Report 935
12-106	Proposed Guidelines for Performance-Based Seismic Bridge Design	Modjeski & Masters	429,920	9/23/2016	3/30/2020	Research in progress
12-108	Development of Guidelines for Uniform Service Life Design for Bridges	Modjeski & Masters	279,846	9/1/2016	7/31/2019	Research in progress---Contractor's final report pending
12-109	Use of 0.7-in. Diameter Strands in Precast Pretensioned Girders	University of Cincinnati	550,000	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	3/30/2020	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	2/11/2020	Research in progress
12-112	Update of the AASHTO LRFD Movable Highway Bridge Design Specifications	Modjeski & Masters	449,927	7/28/2017	3/31/2021	Research in progress
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	Guidance on Seismic Site Response Analysis with Pore Water Pressure Generation	GeoLogic Associates Inc.	639,989	11/8/2018	1/7/2022	Research in Progress
12-115	Guidelines for Risk-Based Inspection and Strength Evaluation of Suspension Bridge Main Cable Systems	Modjeski & Masters	469,895	8/14/2018	4/13/2021	Research in progress
12-116	Design Specifications for the Static and Seismic Design of Piles for Downdrag	Brigham Young University	439,807	6/27/2019	6/26/2022	Terminated---Follow-on activity under NCHRP project 12-116(01)
12-117	Guidelines for Corrosion Protection of Steel Bridges Using Duplex Coating Systems	Elzly Technology Corporation	429,115	5/16/2019	3/15/2022	Research in progress
12-118	Design and Construction Specifications for Bonded and Unbonded Post-Tensioned Concrete Bridge Elements	Purdue University	800,000	9/1/2019	8/31/2022	Research in progress
12-119	Bridge Deck Overhangs with MASH-Compliant Railings	----	500,000			In development
12-120	Developing High Strength Corrosion Resistant Steel Strands for Prestressing	----	750,000			In development
AREA THIRTEEN : MAINTENANCE--EQUIPMENT						
13-05	Guide for Utilization Measurement and Management of Fleet Equipment	Washington State University	399,998	6/1/2015	12/31/2019	Research in progress---Contractor's final report pending
13-06	Guide for the Formulation of Long Range Plans for Replacement Needs and Budget of Highway Operations Equipment	Research Foundation for SUNY	74,632	11/12/2018	8/15/2019	Terminated---Phase I completed, deliverable available on web page; see project 13-06A for follow-on activity
13-07	Guide to Calculating Ownership and Operating Costs of Department of Transportation Vehicle and Equipment Fleet	Cadmus Group, LLC	300,000	4/1/2018	10/31/2019	Completed---To be published as NCHRP Research Report

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
13-08	Guideline for Decision Making for Repair vs. Replacement of Highway Maintenance Equipment	-----	350,000			In development
AREA FOURTEEN : MAINTENANCE--MAINTENANCE OF WAY AND STRUCTURES						
14-27A	A Guide for the Preservation of Highway Tunnel Systems	Gannett Fleming, Inc.	75,000	3/28/2018	3/27/2019	Completed--- Contractor's report available on project webpage
14-36	Proposed AASHTO Guide for Bridge Preservation Actions	University of Colorado - Boulder	609,887	11/13/2015	3/31/2020	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
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	6/30/2020	Research in progress
14-41	Permanent Vegetation Control Treatments for Roadsides	Texas A&M Transportation Institute	200,000	5/23/2018	5/22/2020	Research in progress--- Contractor's draft report under review
14-42	Determining the Impact of Connected and Automated Vehicle Technology on State DOT Maintenance Programs	Iowa State University	300,000	4/23/2019	3/5/2020	Contract pending
14-43	Guide Construction Specifications for Cold In-place Recycling (CIR) and Cold Central Plant Recycling (CCPR)	-----	250,000			In development
14-44	Construction Specifications for Pavement Treatments--Slurry Seals and Tack Coats	-----	250,000			In development
14-45	Model Procedures for Post-Event Bridge Damage Assessment and Engineering Evaluation	-----	500,000			In development
AREA FIFTEEN : DESIGN--GENERAL DESIGN						
15-50(01)	Implementation Assessment of 3R Design Guidelines	MRIGlobal	97,963	7/2/2018	8/1/2020	Research in progress
15-53	Roadside Design for Conflicts in Proximity to Bridge Ends and Intersecting Roadways	KLS Engineering LLC	744,767	8/25/2014	2/29/2020	Research in progress
15-54	Proposed Modifications to AASHTO Culvert Load Rating Specifications	Michael Baker, Jr., Inc.	541,524	7/7/2015	7/1/2019	Completed---To be published as NCHRP Research Report
15-55	Guidance to Predict and Mitigate Dynamic Hydroplaning on Roadways	Virginia Polytechnic Institute	499,992	6/17/2015	2/29/2020	Research in progress
15-56	Guidelines for Selecting Ramp Design Speeds	MRIGlobal	400,000	11/10/2015	1/31/2020	Research in progress
15-57	Highway Capacity Manual Methodologies for Corridors Involving Freeways and Surface Streets	University of Florida	799,999	8/18/2016	3/17/2020	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	11/30/2019	Completed--- Contractor's final report pending
15-62	Design and Access Management Guidelines for Truck Routes	MRIGlobal	500,000	7/5/2016	7/31/2019	Completed---To be published as NCHRP Research Report
15-63	Guidance to Improve Pedestrian and Bicycle Safety at Intersections	University of North Carolina - Chapel Hill	499,846	7/19/2016	4/30/2019	Completed--To be published as NCHRP Research Report 926

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
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	5/31/2019	Completed---To be published as NCHRP Research Report
15-65	Development of Safety Performance-Based Guidelines for the Roadside Design Guide (RDG)	Roadsafe LLC	300,000	9/1/2017	9/4/2020	Research in progress
15-67	Wind Drag Coefficients for Highway Signs and Support Structures	University of Iowa	299,781	11/7/2018	3/6/2021	Research in progress
15-68	Effective Low-Noise Rumble Strips	Illingworth & Rodkin, Inc.	699,828	7/25/2018	1/24/2021	Research in progress
15-69	Utility Conflict Impacts During Highway Construction	----	600,000			In development
15-70	Valuation of Permitting Utility and Communications Installations in Public ROW	----	350,000			In development
15-71	Methodology for Addressing Project Constraints in Early Construction Cost Estimates	----	250,000			In development
15-72	Methodology to Define New AASHTO Green Book 7.0 Context Classification Settings Implementation as Related to Active Transportation Infrastructure	----	300,000			In development
15-73	Design Options to Reduce Turning Motor Vehicle-Bicycle Conflicts at Intersections	----	600,000			In development
15-74	Safety Evaluation of On-Street Bikeway Designs	----	600,000			In development
15-75	Acceleration and Deceleration Rates Used in Roadway Design Criteria	----	500,000			In development
15-76	Designing for Target Speed	----	750,000			In development
15-77	Aligning Geometric Design Controls, Criteria and Elements with Roadway Context, Modal Priority and Functional Classification	----	350,000			In development
15-78	Trade-offs for Cross-sectional Reallocation on Urban and Suburban Roads	----	600,000			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	3/31/2020	Research in progress---Contractor's draft final report pending
AREA SEVENTEEN : TRAFFIC--SAFETY						
17-11(02)	Development of Clear Recovery Area Guidelines	Texas A&M University	270,000	9/7/2008	1/31/2021	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	12/31/2020	Research in progress---Contractor's draft final report pending
17-64	Guidance for the Implementation of the Toward Zero Deaths National Strategy on Highway Safety	University of Minnesota	496,810	3/4/2016	3/31/2020	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	4/30/2020	Research in progress---Contractor's final report pending
17-68	Intersection Crash Prediction Methods for the Highway Safety Manual	MRIGlobal	750,000	9/1/2014	12/31/2019	Completed---NCHRP project 17-71 for follow-on activity

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
17-71	Proposed AASHTO Highway Safety Manual, Second Edition	Kittelson & Associates	1,200,000	10/12/2015	2/1/2022	Research in progress
17-72	Update of Crash Modifications Factors for the Highway Safety Manual	University of North Carolina - Chapel Hill	845,000	8/31/2015	4/30/2020	Research in progress
17-74	Developing Crash Modification Factors for Corridor Access Management	Vanasse Hangen Brustlin, Inc.	450,000	10/24/2016	3/31/2020	Research in progress
17-76	Guidance for the Setting of Speed Limits	Texas A&M Transportation Institute	500,000	10/7/2016	3/31/2020	Research in progress
17-77	Guide for Quantitative Approaches to Systemic Safety Analysis	MRIGlobal	300,000	8/5/2016	2/28/2020	Research in progress
17-78	Understanding and Communicating Reliability of Crash Prediction Models	University of North Carolina - Chapel Hill	300,000	9/20/2016	2/28/2020	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	3/31/2020	Research in progress
17-80	Expansion of Human Factors Guidelines for Road Systems, Second Edition	Battelle Memorial Institute	499,914	11/9/2016	5/31/2020	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	MRIGlobal	500,000	12/12/2017	12/12/2020	Research in progress
17-83	Briefings and Training Materials for Implementation of the Highway Safety Manual, Second Edition	University of North Carolina - Chapel Hill	500,000	12/12/2017	12/12/2020	Research in progress
17-84	Pedestrian and Bicycle Safety Performance Functions for the Highway Safety Manual	MRIGlobal	500,000	3/27/2017	2/28/2020	Research in progress
17-85	Development and Application of Crash Severity Models for the Highway Safety Manual	University of Connecticut	600,000	1/10/2019	1/9/2022	Research in progress
17-86	Estimating Effectiveness of Safety Treatments in the Absence of Crash Data	Vanasse Hangen Brustlin, Inc.	599,567	10/22/2018	1/22/2022	Research in progress
17-87	Enhancing Pedestrian Volume Estimation and Developing HCM Pedestrian Methodologies for Safe and Sustainable Communities	Kittelson & Associates	690,000	4/20/2018	4/20/2020	Research in progress
17-88	Roadside Encroachment Database Development and Analysis	Virginia Polytechnic Institute	675,000	6/19/2018	6/18/2022	Research in progress
17-89	Safety Performance of Part-Time Shoulder Use on Freeways	Kittelson & Associates	400,000	6/15/2018	6/14/2020	Research in progress
17-89A	HOV/HOT Freeway Crash Prediction Method for the Highway Safety Manual	Vanasse Hangen Brustlin, Inc.	299,998	7/10/2018	7/9/2020	Research in progress
17-90	Evaluation of Roadside Crash Injury Metrics in MASH	Virginia Polytechnic Institute	400,000	7/8/2019	7/8/2021	Research in progress
17-91	Assessing the Impacts of Automated Driving Systems (ADS) on the Future of Transportation Safety	Booz-Allen & Hamilton	764,997	5/24/2019	11/23/2021	Research in progress
17-92	Developing Safety Performance Functions for Rural Two-Lane Highways that Incorporate Speed Measures	Texas A&M Transportation Institute	500,000	4/24/2019	4/23/2022	Research in progress

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
17-93	Updating Safety Performance Functions for Data-Driven Safety Analysis	University of North Carolina - Chapel Hill	500,000	7/1/2019	12/31/2022	Research in progress
17-94	Tactile Walking Surface Indicators To Aid Wayfinding For Visually Impaired Travelers In Multimodal Travel	University of North Carolina - Chapel Hill	384,260	2/26/2019	8/25/2021	Research in progress--- Contractor's final report pending under TCRP B-46
17-95	Crash Modification Factors for Intelligent Transportation Systems (ITS) Applications	-----	400,000			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	8/30/2019	Completed---Publication decision pending
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
18-19	Rating Concrete Water Permeability Based on Resistivity Measurements	University of Florida	600,000	8/12/2019	8/11/2022	Research in progress
18-20	Structural Design Methodology for Cured In Place Pipe (CIPP) Liners In Gravity Stormwater Conveyance Conduits	-----	600,000			In development
AREA NINETEEN : ADMINISTRATION--FINANCE						
19-14	Right-Sizing Transportation Investments--Methods for Planning and Programming	Economic Development Research Group, Inc.	499,994	2/3/2017	3/29/2019	Completed--Published as NCHRP Research Report 917 and NCHRP Web-Only Document 263
19-15	Guidebook for Effective Policies and Practices for Managing Surface Transportation Debt	WSP USA Inc.	300,000	6/25/2018	2/15/2020	Research in progress
19-16	Federal Funding Uncertainty in State, Local, & Regional Departments of Transportation: Impacts, Responses & Adaptation	WSP USA Inc.	400,000	5/22/2019	5/21/2021	Research in progress
19-17	The Application of Federal Funding Flexibility at the State DOTs	-----	400,000			In development
AREA TWENTY : SPECIAL PROJECTS						
20-05/ Topic 49-01	Prioritization of Freight Investment Projects	Texas A&M Transportation Institute	45,000	1/5/2018	4/12/2019	Completed---Published as NCHRP Synthesis Report 542
20-05/ Topic 49-02	Emerging Technologies for Construction Delivery	Louisiana State University	45,000	2/12/2018	8/12/2019	Terminated---See Project 20-05/Topic 49-02A for follow-on activity
20-05/ Topic 49-02A	Emerging Technologies for Construction Delivery	Colorado State University	23,000	11/27/2018	7/29/2019	Completed---Published as NCHRP Synthesis Report 534
20-05/ Topic 49-03	Bridge Demolition Practices	Collins Engineers, Inc.	45,000	12/12/2017	2/28/2019	Completed---Published as NCHRP Synthesis Report 536
20-05/ Topic 49-04	Very Short Duration Work Zone Safety for Maintenance and Other Activities.	Texas A&M Transportation Institute	45,000	12/21/2017	6/21/2019	Completed---Published as NCHRP Synthesis Report 533
20-05/ Topic 49-05	Impact of Asphalt Materials Lift Thickness on Pavement Quality	Purdue University	45,000	1/23/2018	7/23/2019	Completed---Published as NCHRP Synthesis Report 537
20-05/ Topic 49-06	Landscape Development and Management Practices for Urban Freeway Roadsides	Texas A&M Transportation Institute	45,000	12/21/2017	2/28/2019	Completed---Published as NCHRP Synthesis Report 539
20-05/ Topic 49-07	Managing State Transportation Research Programs	CPCS Transcom Inc.	45,000	12/1/2017	3/1/2019	Completed---Published as NCHRP Synthesis Report 522

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
20-05/ Topic 49-08	Pedestrian Safety Relative to Traffic Speed Management	Toole Design Group	45,000	12/1/2017	3/1/2019	Completed---Published as NCHRP Synthesis Report 535
20-05/ Topic 49-09	Concrete Technology for Transportation Applications	Global Sustainable Solutions, LLC	45,000	12/4/2017	2/15/2019	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 49-10	Transportation Workforce Planning and Development Strategies	Eno Transportation Foundation	45,000	1/24/2018	7/22/2019	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 49-11	Practices for Online Public Involvement	Rutgers, The State University of New Jersey (OSP)	45,000	1/16/2018	7/16/2019	Completed---Published as NCHRP Synthesis Report 538
20-05/ Topic 49-12	Seismic Design of Non-conventional Bridges	T.Y. Lin International Eng, Arch & Land Surv	45,000	12/1/2017	2/15/2019	Completed---Published as NCHRP Synthesis Report 532
20-05/ Topic 49-13	Leveraging Private Capital for Infrastructure Renewal	Sperry Capital Inc.	45,000	1/8/2018	7/18/2019	Completed---Published as NCHRP Synthesis Report 540
20-05/ Topic 49-14	Methods to Acquire Proprietary Data for Transportation Applications	University of Kentucky Research Foundation	45,000	1/16/2018	7/16/2019	Completed---Published as NCHRP Synthesis Report 542
20-05/ Topic 49-15	Automated Pavement Condition Surveys	Nichols Consulting Engineers	45,000	12/21/2017	2/15/2019	Completed---Published as NCHRP Synthesis Report 531
20-05/ Topic 50-01	Improving Geotechnical Design Efficiency and Reducing Construction Uncertainties and Delays with Advanced Geophysical Methods	University of Missouri (2)	45,000	11/16/2018	5/18/2020	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 50-02	Highway Hydraulic Engineering State of Practice	Michigan Technological University	45,000	11/1/2018	5/1/2020	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 50-03	Use of Weigh-in-Motion Data for Pavement, Bridge, Weight Enforcement, and Freight Logistics Applications	University of Texas - Austin	45,000	10/19/2018	2/19/2020	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 50-04	Utility Pole Safety and Hazard Evaluation Approaches	Zegeer, Charles	45,000	11/7/2018	3/9/2020	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 50-05	Incorporating Access Management into Local Ordinances	University of South Florida	45,000	11/1/2018	5/1/2020	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 50-06	Advances in Unstable Slope Instrumentation and Monitoring	BGC Engineering USA, Inc	45,000	10/25/2018	4/24/2020	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 50-07	Electronic Ticketing of Materials for Construction Management	University of Kentucky Research Foundation	45,000	10/25/2018	2/26/2020	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 50-08	Emerging Challenges to Tolling on Managed Lanes	Texas A&M Transportation Institute	45,000	11/20/2018	3/20/2020	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 50-09	Performance-Based Pavement Warranty Practices	Nichols Consulting Engineers	45,000	12/4/2018	6/4/2020	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 50-10	Availability of Pedestrian Infrastructure Data For Routing and Network Analysis	Alta Planning + Design Inc	45,000	11/7/2018	3/9/2020	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 50-11	Alternative Intersection Design and Selection	University of Missouri (2)	45,000	11/16/2018	5/18/2020	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 50-12	How Was it Built? State of Practice for As-Built Plans on Highway Projects	University of Kentucky Research Foundation	45,000	11/16/2018	3/16/2020	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 50-13	Estimating and Contracting Rock Slope Scaling Adjacent to Highways	Landslide Technology	45,000	12/4/2018	6/4/2020	Completed---To be published as NCHRP Synthesis Report

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
20-05/ Topic 50-14	Practices for Fabricating Asphalt Specimens for Performance Testing in Laboratories	Myers McCarthy Consulting Engineering, LLC	45,000	12/4/2018	6/4/2020	Terminated---See Project 20-05/Topic 50-14A for follow-on activity
20-05/ Topic 50-14A	Practices for Fabricating Asphalt Specimens for Performance Testing in Laboratories	Sias, Jo Ellen	42,000	2/28/2019	4/28/2020	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 50-15	Asset Management Approaches to Identifying and Evaluating Assets Damaged Due to Emergency Events	Applied Pavement Technologies	45,000	11/16/2018	5/18/2020	Completed---To be published as NCHRP Synthesis Report
20-05/ Topic 51-01	Practices for Construction-Ready Digital Terrain Models	University of Kentucky Research Foundation	45,000			Contract pending
20-05/ Topic 51-02	Design and Construction for Durability, Ride, and Water Management of Bridge Approach Systems	Wiss, Janney, Elstner & Associates	45,000	10/10/2019	4/9/2021	Research in progress
20-05/ Topic 51-03	Temporary Pavement Markings Placement and Removal Practices in Work Zones	Curators of the University of Missouri	45,000			Contract pending
20-05/ Topic 51-04	Practices for Selecting Pedestrian and Bicycle Projects	T.Y. Lin International Eng, Arch & Land Surv	45,000			Contract pending
20-05/ Topic 51-05	Collaborative Practices for Performance-Based Asset Management between State Transportation Agencies and Metropolitan Planning Organizations	Spy Pond Partners	45,000			Contract pending
20-05/ Topic 51-06	State DOT Use of Vehicle Probe and Cellular GPS Data	Michael L. Pack, LLC	45,000	10/18/2019	4/19/2021	Research in progress
20-05/ Topic 51-07	Practices for Assessing and Mitigating the Moisture Susceptibility of Asphalt Pavements	Purdue University	45,000			Contract pending
20-05/ Topic 51-08	Practice and Performance of Cold In-Place Recycling and Cold Central Plant Recycling	Gardiner Technical Services	45,000	10/23/2019	4/23/2021	Research in progress
20-05/ Topic 51-09	Portland Cement Concrete Pavement Joint Sealant Practices and Performance	Texas A&M Transportation Institute	45,000			Contract pending
20-05/ Topic 51-10	Practices for Integrated Flood Prediction and Response Systems	Villanova University	45,000			Contract pending
20-05/ Topic 51-11	Lighting Practices for Isolated Rural Intersections	Rensselaer Polytechnic Institute	45,000			Contract pending
20-05/ Topic 51-12	Night and Weekend Movement of Oversize/Overweight Loads	Applied Research Associates	45,000	10/25/2019	4/25/2021	Research in progress
20-05/ Topic 51-13	Load Rating of Bridges and Culverts with Missing or Incomplete As-Built Information	University of Delaware	45,000			Contract pending
20-05/ Topic 51-14	Repair and Maintenance of Post-Tensioned Concrete Bridges	Ohio State University	45,000			Contract pending
20-05/ Topic 51-15	State DOT Practice for Developing and Implementing TSMO Plans	Texas A&M Transportation Institute	45,000			Contract pending
20-05/ Topic 51-16	Maintenance and Surface Preparation Activities Prior to Pavement Preservation	Applied Pavement Technologies	45,000			Contract pending
20-05/ Topic 51-17	Practices for Closing Out Highway Projects from Substantial Completion to Final Payment	----	45,000			Contract pending

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
20-05/ Topic 51-18	Practices for Project-Level Analyses for Air Quality	Zamurs and Associates LLC	45,000			Contract pending
20-05/ Topic 51-19	Performance Metrics for Public-Private Partnerships	Gransberg & Associates Inc.	45,000			Contract pending
20-06/ Topic 23-01	Condemnation Hierarchy-Competing Public Uses	The Thomas Law Firm	63,500	3/9/2018	6/14/2019	Completed---To be published as NCHRP LRD Report 78
20-06/ Topic 23-04	The Effectiveness of State False Claims Acts in Protecting State Transportation Funding	Conner Gwyn Schenck PLLC	50,000	3/8/2018	1/9/2019	Completed---To be published as NCHRP LRD Report 79
20-06/ Topic 23-06B	Update of Selected Studies in Transportation Law: Volume Eight, Section 1: Transportation Agencies and Civil Rights	The Thomas Law Firm	55,860	3/27/2018	3/1/2019	Completed---Published as NCHRP LRD Report 77
20-06/ Topic 24-01	Buy America Requirements For Federal Highway Projects	Conner Gwyn Schenck PLLC	40,000	5/2/2018	8/1/2019	Completed---To be published as NCHRP LRD Report
20-06/ Topic 24-02	Potential Liability Associated with Unstable Slope Management Programs	Conner Gwyn Schenck PLLC	50,000	8/29/2018	8/29/2019	Completed---To be published as NCHRP LRD Report
20-06/ Topic 24-03	Guidelines for Drafting Liability Neutral Transportation Engineering Documents	Parker Corporate Enterprises, Ltd	50,000	1/22/2019	1/22/2020	Research in progress
20-06/ Topic 24-04	The Legal Issues Concerning the Use of Transportation Facilities to Generate Revenue for State DOTs	Texas A&M Transportation Institute	60,000	9/19/2018	10/15/2019	Completed---To be published as NCHRP LRD Report
20-06/ Topic 24-05	Fix It, Sign It, or Close It: State of Good Repair in an Era of Budget Constraints	Parker Corporate Enterprises, Ltd	50,000	1/28/2019	1/28/2020	Research in progress
20-06/ Topic 25-01	Public Liabilities Relating to Driveway Permits	-----	50,000			In development
20-06/ Topic 25-02	Summary of Unmanned Aircraft Systems (UAS) Rules and Regulations for DOTs	-----	50,000			In development
20-06/ Topic 25-03	Managing Enhanced Risk in the 'Mega Project' Era	-----	150,000			In development
20-06/ Topic 25-04	Laws Governing Homeless Encampments in Transportation Rights of Way	-----	50,000			In development
20-06/ Topic 25-05	The Legal Issues Associated with Consequential Damages Provisions in Construction Contracts	-----	75,000			In development
20-06/ Topic 25-06	Legal Aspects of Best-Value Procurement for Highway Construction (Update)	-----	75,000			In development
20-06/ Topic 25-07	Review of Statutory and Case Law on Planning and Environmental Linkages	-----	50,000			In development
20-07/Task 334	Primer on the Joint Use of the HSM and HFG	Battelle Memorial Institute	199,971	7/27/2016	9/30/2020	Research in progress
20-07/Task 368	Development of a Roadmap for Use of SHRP2 Safety Data to Enhance Existing Publications	Texas A&M Transportation Institute	100,000	4/17/2019	4/17/2020	Research in progress
20-07/Task 372	Evaluation of MASH Test Vehicles	University of Nebraska - Lincoln	90,000	9/27/2018	9/30/2020	Research in progress
20-07/Task 374	Guidelines for Selecting Sign Sheeting Materials for AASHTO M268	Texas A&M Transportation Institute	75,000	10/1/2017	5/31/2020	Research in progress
20-07/Task 383	Review and update of the AASHTO Roadside Design Guide	Leidos Inc.	220,000	6/27/2016	10/1/2021	Research in progress

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
20-07/Task 384	Core Competencies for Key Safety Analyses	Texas A&M Transportation Institute	75,000	6/17/2019	6/17/2020	Research in progress
20-07/Task 391	Energy Criteria for Maintaining Fully Animated Particles of Loose Asphalt in AASHTO T 209 Testing	Auburn University	100,000	7/21/2016	9/30/2019	Completed---Final report sent to AASHTO
20-07/Task 393	Impacts of Motor Vehicle Safety Countermeasures on Pedestrian and Bicyclist Safety	MRIGlobal	100,000	3/20/2017	5/31/2019	Completed---Final report sent to AASHTO
20-07/Task 400	Effect of Elevation on Rolling Thin Film Oven Aging of Asphalt Binders	Advanced Asphalt Technologies, LLC	99,974	11/15/2016	3/31/2019	Completed---Final report sent to AASHTO
20-07/Task 401	Addressing Roadside Safety: A Systemic Approach to Hardware Replacement Analysis to Support MASH Implementation	Roadsafe LLC	100,000	1/4/2019	8/4/2020	Research in progress
20-07/Task 407	Utility Coordination Efficiency, Safety, Cost, and Schedule Impacts using various Contracting Methods	University of Kentucky Research Foundation	100,000	10/4/2018	4/3/2020	Research in progress
20-07/Task 408	Transportation System Management and Operations (TSMO) Workforce: Skills, Positions, Recruitment, Retention, and Career Development	Gannett Fleming, Inc.	199,954	10/24/2017	3/23/2019	Completed---Final deliverables sent to AASHTO
20-07/Task 410	Calibration of Load Factors for the FAST Act Emergency Vehicles EV-2 and EV-3 for Load Rating	HNTB NY Engineering & Architecture, PC	100,000	3/26/2018	3/25/2019	Completed
20-07/Task 411	Review and Update of AASHTO Standard Practice R 87	Wood Environment & Infrastructure Solutions, Inc.	97,973	9/24/2018	1/31/2020	Research in progress
20-07/Task 412	Adjustments to the Superpave Volumetric Mixture Design Procedure for Selecting Optimum Asphalt Content	Auburn University	100,000	2/1/2018	8/31/2019	Completed---Final report sent to AASHTO
20-07/Task 413	Relocation and Acquisition of Outdoor Advertising Signs Impacted by State Highway Projects: Time and Cost Comparison	O.R. Colan Associates LLC	94,936	2/12/2018	4/11/2019	Completed---Final report sent to AASHTO
20-07/Task 414	Benefits of Adaptive Traffic Control Deployments -- A Review of Evaluation Studies	Florida Atlantic University	99,912	5/24/2018	8/16/2019	Completed
20-07/Task 415	Guidelines for Bottom Flange Limits of Steel Box Girders	Georgia Tech Research Corporation	80,000	8/9/2018	7/8/2019	Completed
20-07/Task 416	Alternative Technologies for Mitigating the Risk of Injuries and Deaths in the Work Zone	----	75,000			In development
20-07/Task 417	Reorganization and Strategy to Update the AASHTO Drainage Manual	Ayres Associates	75,000	7/16/2018	7/15/2019	Completed---Final report sent to AASHTO
20-07/Task 418	An Impact and Value Analysis of Requiring Geo-spatial Locations for Utility Installation As-builts	Utility Mapping Services, Inc.	100,000	2/8/2019	2/7/2020	Research in progress
20-07/Task 419	Process and Guidelines for Permitting Small Wireless Facilities within Public Rights-of-Way	----	75,000			Terminated
20-07/Task 420	Road User Understanding of Bicycle Signal Faces on Traffic Signals	Portland State University	100,000	10/11/2018	11/10/2019	Completed---Final report sent to AASHTO
20-07/Task 421	Review and Update of AASHTO Standard Methods of Test T27 and T30	University of Arkansas	100,000	4/29/2019	4/29/2020	Research in progress

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
20-07/Task 423	Planning for a Comprehensive Update and Restructuring of AASHTO's A Policy on Geometric Design of Highways and Streets (8th Edition)	Kittelson & Associates	99,986	6/14/2018	6/13/2019	Completed---Agency report available on project write-up webpage
20-07/Task 424	Best Practices for the Operation of Movable Bridges from Remote Locations	HDR Engineering, Inc.	99,796	8/20/2019	8/19/2020	Research in progress
20-07/Task 425	Emerging LED technologies, and their spectrum of use within tunnels	Gannett Fleming, Inc.	99,826	8/1/2019	7/31/2020	Research in progress
20-07/Task 426	Update to NCHRP 20-7/ Task 309, Challenges and Opportunities: A Strategic Plan for Equipment Management Research	-----	99,000			In development
20-07/Task 427	Developing a Recommended AASHTO Standard Practice for Selection of Temperature-Measuring Devices	Gardiner Technical Services	150,000	5/21/2019	2/20/2020	Research in progress
20-07/Task 428	Update of the 2012 AASHTO Guide Specifications for Design of Bonded FRP Systems for Repair and Strengthening of Concrete Bridge Elements	University of Kentucky Research Foundation	130,000	9/3/2019	12/2/2020	Research in progress
20-24(95)A	Ensuring Essential Capability for the Future Transportation Agency (Phases 2 and 3)	Spy Pond Partners	375,000	9/19/2018	12/18/2019	Completed---Publication decision pending
20-24(112)	Connected Road Classification System (CRCS) Development	Texas A&M Transportation Institute	180,000	7/28/2017	1/17/2020	Research in progress
20-24(118)	AASHTO reorganization strategic planning	ICF Incorporated	500,000	7/28/2017	3/27/2019	Completed-- -Contractor's deliverables sent to AASHTO
20-24(121)	Road Usage Charge: Applying Lessons Learned in New Zealand to the United States	Cambridge Systematics	70,000	5/1/2018	4/28/2019	Completed---Final report sent to AASHTO
20-24(123)	Roadmap for Supporting Specialty Personnel Recruitment, Development, and Retention in the DOT Workforce	-----	50,000			In development
20-24(124)	Performance Management Peer Exchange	Cambridge Systematics	125,000	8/15/2018	4/14/2019	Completed---Final report sent to AASHTO
20-24(125)	Scoping Study to Develop the Basis for a Highway Standard to Conduct an All-Hazards Risk and Resilience Analysis	-----	250,000			In development
20-24(126)	National Automation Readiness Framework: Coast-to-Coast Automated Mobility by 2025	-----	180,000			In development
20-24(127)	Performance Management Implementation Concerns, Issues and Challenges	Spy Pond Partners	124,977	6/10/2019	9/9/2020	Research in progress
20-24(128)	State-of-the-Art Review of Cooperative Automated Transportation (CAT) Systems	WSP USA Inc.	674,998	7/16/2019	7/15/2021	Research in progress
20-24(129)	CEO Peer Exchange, 2019	Regents of the University of Minnesota	250,000	10/10/2019	6/9/2020	Research in progress
20-24(130)	Support for AASHTO Strategic Plan, 2020	-----	200,000			In development
20-36	Highway Research and Technology--International Information Sharing	TRB Cooperative Research Programs	850,000	1/26/1993	9/30/2023	Research ongoing; see project writeup on NCHRP website
20-44	Accelerating the Application of NCHRP Research Results	Various	31,870	8/1/1995	9/30/2023	Support for implementation and dissemination activities

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
20-44(02)	Implementation of the AASHTO Guide for Enterprise Risk Management	Starliss Corporation	299,979	4/2/2018	4/1/2020	Research in progress--- Interim report pending
20-44(03)	Intellectual Property Management Guide Workshops and Assessments	Applied Research Associates	115,500	7/28/2017	1/27/2019	Completed
20-44(04)	Implementing Products from NCHRP Research on Adhesive Anchor Systems	Prestressed Concrete Institute	100,000	1/22/2019	7/22/2020	Research in progress
20-44(05)	Dissemination of "NCHRP Domestic Scan 14-01: Leading Management Practices in Determining Funding Levels for Maintenance and Preservation"	Arora and Associates, P.C.	120,000	2/14/2018	8/13/2019	Completed--- Contractor's final report available on NCHRP Project 20-68A web site
20-44(06)	Consultant Support for Massachusetts DOT's Commission on the Future of Transportation in the Commonwealth	Burns & McDonnell Engineering Company Inc.	395,506	2/12/2018	2/28/2019	Completed---Agency report available on NCHRP webpage
20-44(07)	Implementing Single-User Software for Bidding Alternative Drainage Pipe Systems	Golder Associates Inc.	50,530	12/1/2018	8/31/2019	Completed---Software sent to DOTs
20-44(09)	Quantitative and Qualitative Methods for Capturing the Impacts and Value of NCHRP Research	Texas A&M Transportation Institute	800,000	5/10/2019	5/9/2021	Research in progress
20-44(11)	Advancing Practices for Data Governance, Information Management, and Managing the Impact of Digitization on DOT Workforces	Iteris, Inc.	209,960	4/25/2019	3/24/2020	Research in progress
20-44(12)	Dissemination of data self-assessment guide (NCHRP Report 814)	-----	220,000			In development
20-44(13)	Implementation of NCHRP Research Report 893: The Oregon DOT Statewide Pedestrian and Bicycle Plan	Kittelson & Associates	154,000	8/5/2019	8/4/2020	Research in progress
20-44(14)	Implementation of NCHRP Research Report 887 - Guidance for Underwater Installation of Filter Systems	Ayres Associates	50,000	3/25/2019	3/24/2020	Research in progress
20-44(15)	Consultant Support for implementation of Design Hydrology for Stream Restoration and Channel Stability at Stream Crossings	University of Georgia	99,990	5/1/2019	2/28/2021	Research in progress
20-44(16)	Implementation of IDEAL Cracking Test for Asphalt Mix Design QC/QA	Texas A&M Transportation Institute	119,645	8/1/2019	10/31/2020	Research in progress
20-44(17)	Successful Approaches for the Use of Unmanned Aerial System by Surface Transportation Agencies	-----	175,000			In development
20-44(18)	Validation of Performance-Based Mix Design of Porous Friction Courses	Auburn University	85,000	9/1/2019	3/1/2021	Research in progress
20-44(19)	Implementation of Asphalt Binder Methods and Standards	-----	120,000			In development
20-44(21)	Synthesis of State Peer Exchanges and RPPM	CTC & Associates LLC	44,785	9/6/2019	12/5/2020	Research in progress
20-44(22)	Right Sizing Transportation Investments	Metro Analytics	384,260	8/15/2019	6/14/2021	Research in progress
20-44(23)	Pilot Test of Climate Change Design Practices Guide for Hydrology and Hydraulics	-----	250,000			In development

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
20-44(24)	Pilot Test of Proposed Standard Practice for Recycling Agents in Asphalt Mixtures Incorporating RAP and RAS	Texas A&M Transportation Institute	150,000			In development
20-44CS	CRP Communication Services Task Orders	LGND, LLC	150,000	12/15/2018	12/31/2020	Communications services task order base continuing
20-44R	Support of G. Eyring	-----	28,344			Completed
20-50(18)	LTPP Data Analysis: Significance of As-Constructed Asphalt Pavement Air Voids to Pavement Performance	Auburn University	425,000	4/1/2018	2/29/2020	Research in progress
20-50(19)	LTPP Data Analysis: Feasibility of Using LTPP Data to Develop Relationships Between Laboratory- and Field-Derived Properties of Unbound Materials	AMEC Foster Wheeler Environ & Infrastructure Inc.	69,762	6/11/2018	6/28/2019	Completed---To be published as NCHRP Research Report
20-50(20)	LTPP Data Analysis: Develop Practical Tools and Procedures to Improve WIM Data Quality	Applied Research Associates	350,000	10/1/2018	3/31/2021	Research in progress
20-50(21)	Enhancements of Climatic Inputs and Related Models for Pavement ME Using LTPP Climate Tool (MERRA-2)	Applied Research Associates	350,000	8/24/2018	2/23/2021	Research in progress
20-50(22)	LTPP Data Analysis: Feasibility of Using LTPP data to improve Use of FWD and Longitudinal Profile Measurements	Michigan State University	100,000	9/3/2019	7/2/2020	Research in progress
20-59(30A)	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	9/30/2019	Research in progress---Contractor's 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	3/31/2019	Completed---To be published as NCHRP Research Report
20-59(53A)	FloodCast, Phase IV: A Framework for Enhanced Flood Event Decision Making for Transportation Resilience	Dewberry Engineers Inc.	650,000	6/27/2019	6/26/2021	Research in progress---Interim report pending
20-59(54)	Transportation System Resilience: Research Roadmap and White Papers	Geographic Paradigm Computing Inc.	200,000	11/18/2016	12/31/2019	Completed---Publication decision pending
20-59(55)	Transportation System Resilience: CEO Primer & Engagement	Louis Berger & Associates	449,000	3/1/2017	12/31/2020	Completed---Publication decision pending
20-59(56)	Support for State DOT Transportation Systems Resilience and All-Hazards Programs	WSP USA Inc.	250,000	5/6/2019	8/5/2020	Completed---Final report sent to AASHTO
20-65/Task 75	Baseline Research on Allowable In-Kind and Local Match Sources	AECOM Technical Services, Inc	125,000	5/14/2018	11/13/2019	Completed
20-65/Task 76	Opportunities for State DOTs (and Others) to Encourage Shared Use Mobility Practices in Rural Areas	WSP USA Inc.	99,080	4/23/2018	11/22/2019	Completed
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	ICF Incorporated	100,000	4/16/2018	10/31/2019	Completed
20-65/Task 78	Impact of Decline in Volunteerism on Rural Transit Systems	AECOM Technical Services, Inc	99,943	8/24/2019	10/23/2020	Contract pending

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
20-65/Task 79	Program Management Insights for the 5310 Program (Including Sub-Grantee Consolidation and Urban 5310)	ICF Incorporated	124,955	7/12/2019	11/11/2020	Contract pending
20-65/Task 80	Capacity Building Options for DOT Transit Staff	ICF Incorporated	100,000	7/23/2019	7/22/2020	Contract pending
20-65/Task 81	Best Practices in Rural Service Assessment	AECOM Technical Services, Inc	75,000	7/10/2019	9/9/2020	Contract pending
20-65/Task 82	Issues Associated with Providing Customized, Client-Based Transportation Services	-----	150,000			In development
20-97	Improving Findability and Relevance of Transportation Information	Spy Pond Partners	737,010	4/18/2014	2/28/2019	See Project 20-97A for follow-on activity
20-97A	Improving Findability and Relevance of Transportation Information	Spy Pond Partners	162,965	4/1/2019	1/31/2020	Research in progress; Phase I report published as NCHRP Research Report 846
20-102(11)	Mobility-on-Demand and Automated Driving Systems: A Framework for Public-Sector Assessment	Booz-Allen & Hamilton	300,000	5/17/2018	5/31/2020	Research in progress---interim report pending
20-102(12)	Business Models to Facilitate Deployment of CV Infrastructure to Support AV Operations	WSP USA Inc.	400,000	7/11/2017	11/10/2019	Terminated---Decision pending on disposition of interim deliverables
20-102(15)	Impacts of Connected and Automated Vehicle Technologies on the Highway Infrastructure	Booz-Allen & Hamilton	649,966	5/24/2018	2/23/2020	Research in progress
20-102(16)	Preparing TIM Responders for Connected Vehicles and Automated Vehicles	-----	250,000			In development
20-102(17)	Deployment Guidance for CV Applications in the Open Source Application Development Portal	-----	450,000			In development
20-102(19)	Update AASHTO's Connected Vehicle/ Automated Vehicle Research Roadmap	Booz-Allen & Hamilton	124,904	3/13/2018	3/12/2020	Research in progress
20-102(19) B	Research Roadmap for NCHRP 20-102	-----	125,000			In development
20-102(20)	Workforce Capability Strategies for State and Local Agencies	-----	300,000			In development
20-102(21)	Infrastructure Modifications to Improve the Operational Domain of Automated Vehicles	-----	400,000			In development
20-102(22)	State and Local Impacts of Automated Freight Transportation Systems	The Tioga Group	339,990	9/16/2019	6/16/2021	Research in progress
20-102(23)	Potential impacts of Highly Automated Vehicles and Shared Mobility on Traveler Behavior	-----	450,000			Research in progress---under TCRP Project B-47 for follow-on activity
20-102(24)	Infrastructure Enablers for Connected and Automated Vehicles and Shared Mobility--Near-Term and Mid-Term	-----	600,000			In development
20-102(25)	Readiness and Effectiveness of Freeway-Based Corridor V2X Applications for Improving Congestion and Safety	-----	500,000			In development
20-102(26)	Dynamic Curbside Management in the Era of CAVs, SAVs, Scooters, Transportation Network Companies (TNCs), and Traditional Vehicles	-----	250,000			In development
20-102(27)	Realistic Estimates of CAV Implementation Timing	-----	150,000			In development

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
20-102(28)	Best Practices in Work Zones for AVs and CVs	-----	250,000			In development
20-102(29)	Incorporating New Mobility Options into Transportation Demand Modeling	-----	125,000			In development
20-105B	Instructor's Manual for Ahead of the Curve Training Courses	Applied Research Associates	75,000	2/21/2019	1/20/2020	Completed
20-111J	Successful Practices for State Transportation Research Office's Complying with 2 CFR 200	Applied Research Associates	100,000	5/15/2018	9/30/2019	Completed--- Contractor's final report available on project webpage
20-112	A Research Roadmap for Transportation and Public Health	University of North Carolina - Chapel Hill	250,000	9/26/2017	6/14/2019	Completed---To be published as NCHRP Research Report
20-113F	Topical White Papers for the TRB Forum on Automated Vehicles and Shared Mobility	-----	25,000			In development
20-117	Deploying Transportation Resilience Practices in State DOTs	WSP USA Inc.	1,076,200	6/16/2017	6/30/2020	Research in progress--- Contractor's final report pending
20-119	Evaluating the Suitability of Roadway Corridors for Use by Monarch Butterflies	University of Minnesota	349,821	3/13/2017	9/13/2019	Completed---To be published as NCHRP Research Report
20-121	State DOT Contributions to the Study, Investigation, and Interdiction of Human Trafficking	Project Performance Corporation	299,883	5/31/2018	3/30/2020	Research in progress--- Contractor's final report pending
20-122	Rural Transportation Issues: Research Roadmap	Montana State University	140,000	10/9/2018	3/31/2020	Research in progress--- Contractor's draft report pending
20-123(01)	Transportation Asset Management Strategic Planning and Research Roadmap Development	Spy Pond Partners	220,000	9/12/2019	9/11/2021	Research in progress
20-123(02)	Research Roadmap for the AASHTO Council on Active Transportation	-----	250,000			In development
20-124	Deploying Transportation Security Practices in State DOTs	-----	750,000			In development
20-125	Strategies for Incorporating Resilience into Transportation Networks	-----	600,000			In development
20-126	Support for Critical Issues in Transportation and Commitment to the Future IHS	-----	1,000,000			In development
20-127	Development of Business Case and Communication Strategies for a State DOT Resilience Program	-----	350,000			In development
20-128	Organizational and Operational Models Used by State DOTs for Emergency Response	-----	400,000			In development
AREA TWENTY-ONE : SOILS AND GEOLOGY--TESTING AND INSTRUMENTATION						
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	3/31/2020	Research in progress
AREA TWENTY-TWO : DESIGN--VEHICLE BARRIER SYSTEMS						
22-26	Identification of Factors Related to Serious Injury and Fatal Motorcycle Crashes into Traffic Barriers	Virginia Polytechnic Institute	500,000	5/1/2009	12/31/2020	Research in progress--- Contractor's draft report pending
22-29B	Evaluating the Performance of Longitudinal Barriers on Curved, Superelevated Off-Ramps	George Mason University	249,867	1/29/2019	1/29/2021	Research in progress

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
22-31	Recommended Guidelines for the Selection and Placement of Test Levels 2 through 5 Median Barriers	Roadsafe LLC	577,000	9/28/2015	5/31/2020	Research in progress
22-32	Development of Methods to Evaluate Side Impacts with Roadside Safety Features	Roadsafe LLC	500,000	1/2/2018	5/2/2021	Research in progress
22-33	MultiState InService Performance Evaluations of Roadside Safety Hardware	Roadsafe LLC	650,000	1/2/2018	5/2/2021	Research in progress
22-34	Determination of Zone of Intrusion Envelopes under MASH Impact Conditions for Barrier Attachments	University of Nebraska - Lincoln	400,000	6/20/2018	9/19/2021	Research in progress
22-35	Evaluation of Bridge Rail Systems to Confirm AASHTO MASH Compliance	Texas A&M Transportation Institute	500,000	6/1/2018	6/30/2021	Research in progress
22-36	Synthesis of the Performance of Portable Concrete Barrier Systems	Texas A&M Transportation Institute	49,985	7/13/2018	3/12/2019	Completed--- Contractor's final report available on project webpage
22-36(01)	Synthesis of the Performance of Portable Concrete Barrier Systems	-----	50,000			In development
22-37	Development of a MASH Barrier to Shield Pedestrians, Bicyclists, and Other Vulnerable Users from Motor Vehicles	Texas A&M Transportation Institute	449,819	5/3/2019	1/2/2022	Research in progress--- Interim report pending
22-38	Development of MASH TL-3 Deflection Reduction Guidance for 31-inch Guardrail	Texas A&M Transportation Institute	499,429	7/8/2019	1/8/2022	Research in progress
22-39	Guardrail Performance at Various Offsets from Curb for MASH TL-3 Applications	University of Nebraska - Lincoln	600,000	6/3/2019	6/2/2022	Research in progress
22-40	Update to AASHTO M 180-18 and Associated Highway Guardrail Specification	Roadsafe LLC	300,000	7/1/2019	7/1/2021	Research in progress
22-41	Improvement and Reorganization of Section 13 of the AASHTO LRFD Bridge Design Specifications to Address MASH Loading	Modjeski & Masters	229,996	6/6/2019	6/5/2021	Research in progress
22-42	Impact Performance Assessment of Barrier Performance at High Speeds	-----	600,000			In development
22-43	Developing Testing Protocol for a Family of Devices--Signs, Breakaway Poles, and Work Zone Devices	-----	500,000			In development
22-44	Development of a Crash Data Collection Tool and Application Guidelines for MASH In-Service Performance	-----	400,000			In development
22-45	Understanding and Analyzing the Crash--Contributing Factors	-----	650,000			In development
22-46	Supporting Data-Driven Decision Making through an Expansion of the Human Factors Guidelines for Road Systems	-----	550,000			In development
22-47	Incorporating Driver Behavior Considerations in Safety Performance Estimates of Infrastructure Improvements	-----	600,000			In development
22-48	Methods for Short-Term Crash Prediction	-----	650,000			In development

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
22-49	The Effect of Vehicle Mix on Crash Frequency and Crash Severity	-----	400,000			In development
AREA TWENTY-THREE : AGENCY ADMINISTRATION						
23-01	Assessing and Communicating the Economic and Quality of Life Benefits of Transportation Infrastructure Investment	WSP USA Inc.	249,990	7/9/2019	1/8/2020	Research in progress
23-02	Secure Information Environments for Collaboration and Knowledge Sharing: Guidance for State DOTs	-----	350,000			In development
23-03	Targeted Guidance and Information Support to State DOT CEOs on Cybersecurity Issues and Protection Strategies	-----	350,000			In development
23-04	Cost-Savings Analysis of Statewide Insurance Pooling for Public Transit	-----	300,000			In development
23-05	Addressing Construction Inspector Qualifications for the Future: Best Practices for Education, Training and Certification	-----	450,000			In development
23-06	Developing an AASHTO Guide to System-Level Asset Valuation in Support of Transportation Asset Management Decision Making	-----	600,000			In development
23-07	Guidebook for Identifying and Implementing Forecasting Techniques for Effective Target Setting	-----	500,000			In development
23-08	Guidelines for Incorporating Maintenance Costs into a Transportation Asset Management Plan	-----	350,000			In development
AREA TWENTY-FOUR : SOILS AND GEOLOGY--MECHANICS AND FOUNDATIONS						
24-45	Evaluating Mechanical Properties of Earth Material During Intelligent Compaction	University of Texas - El Paso	500,000	7/27/2015	4/1/2020	Research in progress
24-47	Revised Clear-Water and Live-Bed Contraction Scour Analysis	Ayres Associates	500,000	10/6/2016	5/15/2020	Research in progress
24-48	Develop a Formula for Determining Scour Depth around Structures in Gravel-bed Rivers	University of Idaho	600,000	1/11/2019	1/10/2022	Research in progress
24-49	Guidance on the Selection and Use of Flow Resistance Values in Two-Dimensional (2D) Hydraulic Models	-----	600,000			In development
AREA TWENTY-FIVE : TRANSPORTATION PLANNING--HUMAN AND NATURAL ENVIRONMENT						
25-25	Research for the AASHTO Committee on Environment and Sustainability	-----	600,000			Research in progress---Refer to project writeup on NCHRP website and individual tasks
25-25/Task 102	Artificial Bat Roost Mitigation Designs and Standardized Monitoring Criteria	Louis Berger Group	125,000	11/27/2017	5/26/2019	Completed---Final report sent to AASHTO
25-25/Task 103	Administration of Categorical Exclusions by State Departments of Transportation (DOTs) under NEPA	WSP USA Inc.	59,897	3/5/2018	4/1/2019	Completed---Final report sent to AASHTO
25-25/Task 104	Streamlining Carbon Monoxide Project-Level Air Quality Analyses with Programmatic Agreements	Louis Berger Group	125,000	11/27/2017	11/26/2019	Completed---Final report sent to AASHTO

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
25-25/Task 105	A Guidebook for Communications between Transportation and Public Health Communities	Louis Berger U.S. Inc.	125,000	3/1/2018	5/3/2019	Completed---Final report sent to AASHTO
25-25/Task 106	Highway Noise and Historic Properties: A National Review of Effects and Mitigation Practices	Louis Berger U.S. Inc.	100,000	3/1/2018	2/28/2019	Completed---Final report sent to AASHTO
25-25/Task 107	Section 106 Delegation Programmatic Agreements: Review and Best Practices	Louis Berger U.S. Inc.	100,000	3/1/2018	2/28/2019	Completed---Final report sent to AASHTO
25-25/Task 108	Creating Lookup Tables to Streamline the Determination of Emission Reductions for CMAQ Projects	Louis Berger U.S. Inc.	125,000	3/1/2018	6/28/2019	Completed---Final report sent to AASHTO
25-25/Task 109	Successful Practices for Environmental Commitments in Public/Private Partnerships (P-3) and Design-Build (D-B) Contracts	Louis Berger U.S. Inc.	125,000	4/2/2018	4/1/2019	Completed---Final report sent to AASHTO
25-25/Task 110	Review of Historic Property Identification Surveys and Strategies for Managing Post-World War II Housing in Transportation Projects	Louis Berger U.S. Inc.	100,000	2/15/2018	2/14/2019	Completed---Final report sent to AASHTO
25-25/Task 111	Environmental Management System Perspectives for State DOTs	Louis Berger Group	110,000	1/1/2018	2/28/2019	Completed---Final report sent to AASHTO
25-25/Task 113	Road Passages and Barriers for Small Terrestrial Wildlife: Summary and Repository of Design Examples	Louis Berger U.S. Inc.	125,000	3/20/2018	9/19/2019	Completed---Final report sent to AASHTO
25-25/Task 114	Integrating Tribal Expertise into Processes to Identify, Evaluate, and Record Cultural Resources	Louis Berger U.S. Inc.	125,000	11/15/2018	11/14/2019	Completed---Publication decision pending
25-25/Task 115	Estimates of Emissions Reductions from Future Fleet Changes for Use in Air Quality Models	Louis Berger U.S. Inc.	125,000	12/1/2018	11/30/2019	Completed---Publication decision pending
25-25/Task 116	Potential Section 106 Exempted Categories or Program Comments for Federal Highway Administration Projects: National Streamlining Opportunities	Louis Berger U.S. Inc.	125,000	12/15/2018	12/14/2019	Completed---Final report sent to AASHTO
25-25/Task 117	Valuing Wildlife Crossing Enhancements for Mitigation Credits	Louis Berger U.S. Inc.	115,000	11/15/2018	11/14/2019	Completed---Publication decision pending
25-25/Task 118	Context-Sensitive Design Options for Workhorse Bridges in Rural Historic Districts	Louis Berger U.S. Inc.	110,000	11/30/2018	11/29/2019	Completed---Publication decision pending
25-25/Task 119	Enhancing the International Stormwater BMP Database to Serve as a Highway Specific BMP Database	Water Research Foundation	80,000	12/3/2018	12/30/2019	Completed---Final report sent to AASHTO
25-25/Task 120	Use of the State Department of Transportation Portal to the International Stormwater BMP Database	GeoSyntec Consultants	24,999	8/13/2018	3/15/2020	Research in progress---Contractor's final report pending
25-47	How to Measure and Communicate the Value of Access Management	University of South Florida	600,000	5/17/2018	11/16/2020	Research in progress
25-49	Development of a Highway Construction Noise Prediction Model	Gannett Fleming, Inc.	349,579	11/2/2015	1/22/2019	Completed---Agency report available on project webpage
25-51	Limitations of the Infiltration Approach to Stormwater Management in the Highway Environment	GeoSyntec Consultants	499,772	8/10/2015	1/31/2019	Completed--To be published as NCHRP Research Report 922

Project No.	Title	Research Agency	Contract Amount	Starting Date	Completion Date	Project Status
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	6/28/2019	Completed---Agency report will be available as NCHRP Web-Only Document 265
25-55	Assessment of Regulatory Air Pollution Dispersion Models to Quantify the Impacts of Transportation Sector Emissions	ICF Incorporated	700,000	6/4/2018	6/3/2021	Research in progress--Interim report under review
25-56	Methods for State DOTs to Reduce Greenhouse Gas Emissions from the Transportation Sector	Cambridge Systematics	600,000	5/1/2018	10/31/2020	Research in progress---Interim report pending
25-57	Breaking Barriers: Alternative Approaches to Avoiding and Reducing Highway Traffic Noise Impacts	Cross-Spectrum Acoustics Inc.	249,963	4/23/2019	4/22/2021	Research in progress---Interim report pending
25-59	Pollinator Habitat Conservation along Roadways	ICF Jones & Stokes	489,978	8/1/2019	8/1/2022	Research in progress
25-60	Watershed Approach to Mitigating Hydrologic Impacts of Transportation Projects	Kilgore Consulting and Management	500,000	6/15/2019	10/14/2021	Research in progress---Interim report pending
25-61	Effective On-Bridge Treatment of Stormwater	-----	500,000			In development
25-62	Improving the Efficiency and Consistency of Section 106 Compliance for State DOTs: Strategies for Project-Level Programmatic Agreements and Postwar Commercial Properties	-----	500,000			In development

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 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 25 subject areas. If you select "All Projects" in the 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 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.

TRID is 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's Joint Transport Research Centre's International Transport Research Documentation. The Research in Progress (RiP) database allows a person to check the research in progress.

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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:

Cooperative Research Programs
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Summary of Progress Through 1988—Special Edition

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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