



ANNUAL REPORT

# NCHRP

National Cooperative Highway  
Research Program

NATIONAL *Sciences*  
ACADEMIES *Engineering*  
*Medicine*

**TRB** TRANSPORTATION RESEARCH BOARD





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*Medicine*

 TRANSPORTATION RESEARCH BOARD

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# ABOUT

## THE NATIONAL ACADEMIES OF SCIENCES, ENGINEERING, AND MEDICINE

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

The National Academy of Engineering was established in 1964 under the charter of the National Academy of Sciences to bring the practices of engineering to advising the nation. Members are elected by their peers for extraordinary contributions to engineering. Dr. John L. Anderson is president.

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

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

Learn more about the National Academies of Sciences, Engineering, and Medicine at [www.nationalacademies.org](http://www.nationalacademies.org).

The Transportation Research Board is one of seven major program divisions of the National Academies of Sciences, Engineering, and Medicine. The mission of the Transportation Research Board is to mobilize expertise, experience, and knowledge to anticipate and solve complex transportation-related challenges. The Board's varied activities annually engage about 8,500 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest. The program is supported by state transportation departments, federal agencies including the component administrations of the U.S. Department of Transportation, and other organizations and individuals interested in the development of transportation.

Learn more about the Transportation Research Board at [www.TRB.org](http://www.TRB.org).

### **Transportation Research Board**

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# 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 department of transportation (DOT) administrators and engineers. Often, highway problems are of local or regional 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.



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

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

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

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

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113 Avenue Rd.  
Bathurst St. 6 km  
Keele St.





## MESSAGE FROM THE CRP DEPUTY DIRECTOR AND NCHRP MANAGER

**Waseem Dekelbab**

I am pleased to introduce the NCHRP 2023 Annual Report. The report demonstrates how the NCHRP is providing value to state departments of transportation (DOTs) and the transportation industry. The NCHRP continued to grow as a research program and expand the impact and influence of its research products. The 2021 Infrastructure Investment and Jobs Act provided increased funding to state DOTs which in turn contributed additional funds to the NCHRP. As a result of this increase in funding, and to replace recently retired staff, this year the NCHRP hired five new talented senior program officers with the practical expertise and technical knowledge to effectively manage the NCHRP's diverse portfolio and deliver the results needed by state DOTs. The NCHRP is still growing, and we are actively recruiting additional senior program officers.

The COVID-19 national emergency ended in 2023, and the NCHRP saw a return to normal operations with the resumption of in-person panel meetings. The in-person collaborative environment is appreciated by project panel members, NCHRP staff, and contractors. This productive and synergistic environment is crucial for the NCHRP's continued success.

This Annual Report includes stories of how different stakeholders have implemented and benefited from NCHRP research products. To maximize the potential for state DOTs and others to implement NCHRP research products, the NCHRP standardized the practice of adding conduct of research reports, implementation plans, videos, training materials, presentations, recorded webinars, and other products to the publication summary web pages. Access and downloads are always free.

A list of recent NCHRP publications and a list of pending, active, and recently completed research are in Table 1 and Table 2, respectively. This report includes multiple showcases of accomplishments in different research fields, including the development of the first edition of the *Transportation Operations Manual (TOM)* under NCHRP Project 03-126 and the development of an asphalt-testing device with a robotic arm that automatically conditions or cools down hot specimens under NCHRP Project 20-30/IDEA 224, "Development of an Automated and Rapid Conditioning and Testing Device for Cracking and Rutting."

The NCHRP shares the same challenges our stakeholders are facing after the pandemic, including workforce disruption. The NCHRP continues working with the leadership of our sponsors—the state DOTs, through the American Association of State Highway and Transportation Officials (AASHTO)—with the Federal Highway Administration (FHWA), and with stakeholders to enhance program delivery. Many new policies and initiatives have been implemented to ensure research projects are conducted on time and on budget, to address the important problems faced by state DOTs and other transportation agencies.

The success stories and accomplishments presented in this report reflect TRB's commitment to working with our stakeholders to deliver a research program that serves state DOTs, the greater transportation community, and the nation. I look forward to working with you in 2024.

# The NCHRP Then and Now

## CHRISTOPER J. HEDGES

Director, Cooperative Research Programs, TRB (retired)

It was my privilege to serve as manager of NCHRP from 2014 to 2016 and as director of CRP from 2016 until my retirement earlier this year. Over that time, I saw many changes in the program but also a good deal of consistency. I wanted to use this opportunity to look back on the origin of the NCHRP and how it led to a program that remains relevant and critically valuable to this day.




Many readers will have heard the story of the NCHRP's origin (indeed, it was described in *Ideas & Actions: A History of the Highway Research Board 1920–1970*): that in the late 1950s it was noted that 32 state DOTs were researching the same topic without any knowledge of each other's work. This revelation provided incentive for the states to pool their resources on a national research program addressing common problems. The extent of duplicative and isolated research was mentioned in a conversation between Edward Holmes of the Bureau of Public Roads (BPR) and Alfred E. Johnson, the American Association of State Highway Officials (AASHO) executive director at the time. These two organizations later evolved into the FHWA and AASHTO, respectively. Like many simple explanations, there was a lot more to the story of how the NCHRP was founded and how it continued to thrive and grow into the present. The conversation between Holmes and Johnson no doubt happened, but many other transportation professionals were surely discussing the problem and considering solutions at the same time.

In the mid-1950s, AASHO formally asked the Highway Research Board (HRB—now TRB) to administer the AASHO Road Test, a large-scale effort aimed at understanding the impacts of heavy truck size and weight on the nation's roadways. The program was built on a long-standing history of collaboration between AASHO and HRB, as well as a formal mechanism developed in 1948 that enabled states to pool funding for cooperative efforts. This mechanism would later serve as a key enabling factor for the NCHRP. Ironically, the AASHO Road Test came about in large part due to a log jam in Congress about how to allocate the costs of road construction and maintenance equitably among road users.

In 1960, the HRB released *Special Report 55: Highway Research in the United States: Needs, Expenditures, and Applications*. The report was known informally as the Holmes Report, after the aforementioned study committee's chair Edward Holmes. This report revealed that only a disconcerting 0.2% of highway expenditures were being spent on research. Special Report 55 became the rallying cry for the formation of a national 4-to-5-year research program with an estimated cost of \$34 million. If the program had been initiated as planned, it would have been analogous to the AASHO Road Test, a fixed time and budget model used more recently in SHRP and SHRP2. However, AASHO leaders proposed instead a continuing program where states pooled funds for common needs on an ongoing basis. This proposal was accepted by a vote of states, and in 1962 HRB began setting up an initiative known originally as the Continuing AASHTO Research Program.

When the three-way agreement was signed in 1962 by AASHO, BPR, and the National Academy of Sciences, it was given the name that stands to this day: the National Cooperative Highway Research Program. Under the leadership of HRB Deputy Executive Director William Carey, the foundations and principles of the NCHRP were established and continue to this day. One important consideration was to implement sufficient checks



and balances so the research met the standards and requirements of the three partners but was not overly influenced by any one of them. Such measures include advisory panels for each project and the review and approval of projects by both subject-matter experts and senior administrators.

One other significant aspect of those early days was the recognition that states needed help to absorb and implement research results. William Carey, who by 1966 was the executive director of HRB, described the frustration experienced by highway engineers who had scant time to read even the abstracts of research reports. Carey recognized a need to focus on information transfer, which led to an emphasis on guidelines, handbooks, and manuals, and in 1968 to the development of the Synthesis of Practice series. Activities supporting and expediting the implementation of research results have grown steadily and are now a mainstay of the NCHRP.

In my view, two things are clear: that the development of the NCHRP came about organically from the circumstances of the time, and that its founders provided a foundation that guarantees its success to this day. Over the years, the program has grown, new research fields have emerged, and our procedures have become more automated and facilitate better project management and greater accountability. However, the strengths and value of the NCHRP have remained constant since its inception.

My thanks and appreciation to Sarah Jo Peterson for her excellent history of TRB (*The Transportation Research Board: Everyone Interested Is Invited*) on its 100th anniversary. Without this resource, I would undoubtedly have gotten some of my facts and dates wrong.



# THIS YEAR AT THE NCHRP

## NEW AND CONTINUING PROJECTS SELECTED

In 2023, the NCHRP completed 73 research projects, published 124 research products, and approved 70 new and continuing projects, as shown in Exhibit 1. This brings the cumulative total of NCHRP research contracts to 2,207.

Funding for the FY 2024 program is expected in early 2024, which will allow contracts to be executed and research to begin. R&I will formulate the FY 2025 program in April 2024 based on research problems submitted by November 1, 2023, marking the beginning of another cycle of NCHRP research.

**EXHIBIT 1. Number of research projects selected by R&I, FY 2020 through FY 2024.**

<b>Projects</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>
Continuing projects	11	11	12	12	7
New projects	56	47	49	64	63
Total projects	67	58	61	76	70
<b>Total project funds</b>	<b>\$33,330,000</b>	<b>\$31,304,200</b>	<b>\$31,893,000</b>	<b>\$40,524,000</b>	<b>\$37,855,000</b>

## RESEARCH PRODUCTS

Disseminating research findings to practitioners is a primary goal of the NCHRP research process; publishing the final report or other deliverables is a key means of dissemination. NCHRP research findings are published in several numbered series (listed in Table 1). In 2023, the NCHRP produced 124 research products; the numbers for each series over the past 5 years are shown in Exhibit 2. Exhibit 3 shows examples of research products downloaded by state DOTs.

Publications are distributed by TRB online and in print, with print runs for reports ranging from 400 to 700 copies. Print copies are mailed to the chief operating officers (COOs) of state DOTs, AASHTO staff, panel members, the research contractor, and the following individuals and organizations:

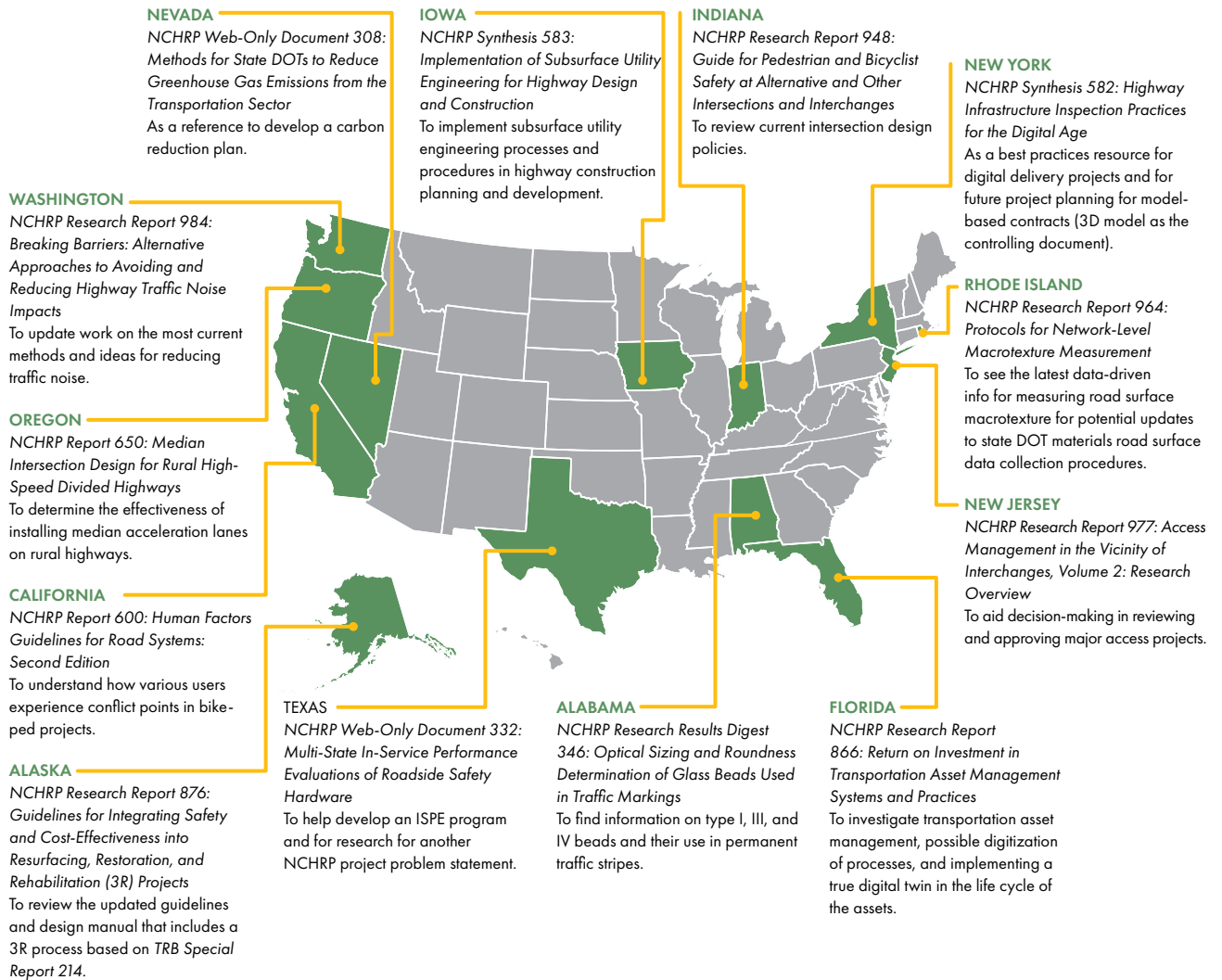
- ➔ TRB members who have chosen to receive publications in the subject area of the report
- ➔ About 100 libraries
- ➔ TRB representatives in the state DOTs
- ➔ Numerous educational institutions
- ➔ Liaison representatives from industry and transportation organizations in other countries
- ➔ Relevant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

## EXHIBIT 2. NCHRP research products produced CY 2019 through CY 2023.

Publication	2019	2020	2021	2022	2023*
Research Reports	30	34	24	44	59
Syntheses of Highway Practice	14	16	17	21	16
Research Results Digests	0	0	0	1	1
Legal Research Digests	4	4	1	4	2
Web-Only Documents	8	25	22	30	45
Transportation Research Circular	0	1	1	0	0
WebResources	0	0	0	1	1
<b>Total</b>	<b>52</b>	<b>80</b>	<b>65</b>	<b>101</b>	<b>124</b>

\*Estimated

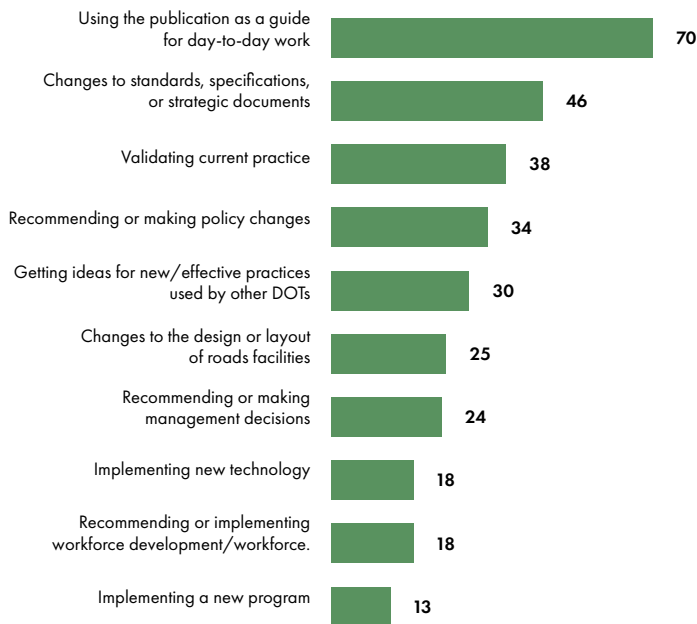
## EXHIBIT 3. Examples of state DOTs downloading and using NCHRP research products.



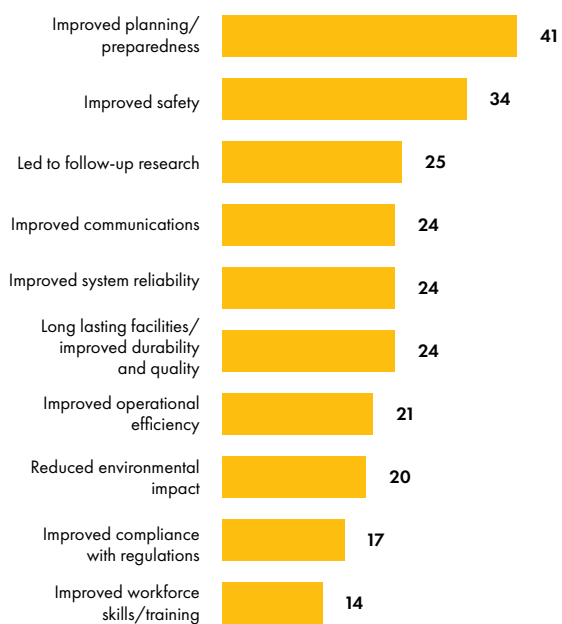
# APPLICATION OF NCHRP RESEARCH PRODUCTS

In 2022, the NCHRP conducted a survey targeting professionals, researchers, and decision-makers in state DOTs and the broader transportation community to assess the uses, applications, and advantages of NCHRP research products. This study focused on 75 publications released in 2018 and garnered over 450 responses. Exhibits 4–6 summarize respondents’ feedback.

**EXHIBIT 4. How NCHRP research products were applied in 2022.**

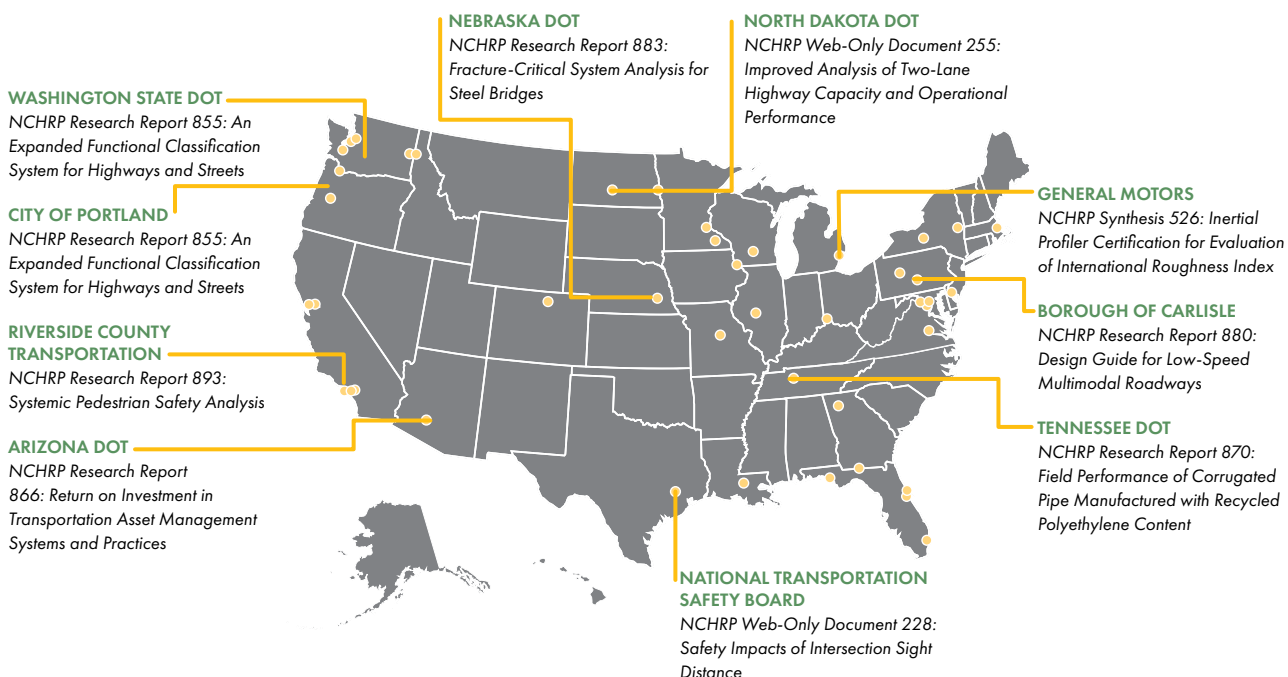


**EXHIBIT 5. Benefits of applying NCHRP research products.**



The bars and the numbers in them denote the number of responses for that application.

**EXHIBIT 6. Where NCHRP research products were applied in 2022.**



## PANEL MEMBERS

NCHRP panel members come from a wide range of professional backgrounds, with a heavy reliance on practitioners from state DOTs, which are NCHRP's program sponsors. Exhibit 7 shows the affiliations of new NCHRP panel members appointed since FY 2020.

**EXHIBIT 7. Affiliations of new panel members, FY 2020 through FY 2024.**

Affiliation	2020	2021	2022	2023	2024
State agencies	264	313	326	407	363
Federal agencies	17	11	10	4	9
Local agencies, transit agencies, MPOs	20	19	13	24	13
Educational institutions	56	74	67	62	65
Industry, consultants, associations	117	130	101	82	64
Other	11	9	5	5	4
<b>All</b>	<b>485</b>	<b>556</b>	<b>522</b>	<b>584</b>	<b>518*</b>

\*as of November 2023

## WEBINARS

NCHRP research is frequently featured in TRB webinars, which are attended by transportation professionals from all 50 states and the District of Columbia with a wide range of expertise and interests. In 2023, 5,250 participants attended 24 NCHRP research product webinars (see Exhibit 8).

**EXHIBIT 8. NCHRP webinar attendees, CY 2019 through CY 2023.**

Year	No. of webinars	No. of webinar attendees	Avg. attendance
2019	13	4,838	372
2020	25	8,953	358
2021	22	5,447	248
2022	14	4,025	288
2023	24	5,250	219





# NCHRP

## CONTINUING PROJECTS

Several continuing projects are carried out at 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 on request.

### **NCHRP PROJECT 20-05, "SYNTHESIS OF INFORMATION RELATED TO HIGHWAY PROBLEMS"**

The NCHRP Synthesis series documents current practice at state DOTs on a wide range of highway topics. The program is in its 55th year and publishes approximately 17 reports annually.

## **Notable NCHRP Syntheses Published in 2023**

*NCHRP Synthesis 602: Resilient Design with Distributed Rainfall-Runoff Modeling* documents current DOT practice related to the use of distributed rainfall-runoff models. Distributed rainfall-runoff modeling is a relatively new type of hydrologic modeling approach that divides the watershed under study into smaller spatial elements. Different hydrological processes are represented in each element, which enables more detailed and accurate representation of runoff formation, transport, and accumulation.

*NCHRP Synthesis 605: Electric Vehicle Charging: Strategies and Programs* documents practices in use by DOTs to facilitate the provision and operation of electrical vehicle (EV) charging facilities. The synthesis includes DOTs' current plans to address the future maturity of EV charging, such as preparation for medium- and heavy-duty electrification.

For more information: <https://www.trb.org/SynthesisPrograms/SynthesesNCHRP.aspx>

## **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 and facilitates handling both immediate and long-range needs. The final products of this research are Legal Research Digests (LRDs), available at <http://www.trb.org/Publications/PubsNCHRPLegalResearchDigests.aspx>, and TRB's Selected Studies in Transportation Law (SSTL), available at <https://crp.trb.org/selected-studies-law/>. The SSTL is designed to help state highway departments and public transportation agencies keep abreast of operating practices and legal elements of specific problems in highway and transit law.

## **NCHRP Legal Research Digests Published in 2023**

Public entities negotiating transportation construction contracts must strike the right balance between protecting the public from risk and affording counterparties the flexibility necessary to complete projects. Few contractual provisions exemplify this tension more than those dealing with consequential damages. The public nature and cost of transportation construction projects creates a risk of large consequential damages awards, which has led to a proliferation of different contractual clauses and strategies to mitigate this risk. *NCHRP Legal Research Digest 88: Consequential Damages Provisions in Construction Contracts: Legal Issues* explores the issues associated with consequential damages provisions in construction contracts, and provides information to those drafting such contracts. The digest specifically discusses:

- ➔ How and what kind of consequential damages often are and are not awarded in transportation contract disputes
- ➔ The potential risk to the parties to public transportation contracts of large consequential damages awards
- ➔ The use of consequential damages provisions in industry practice and model forms to limit exposure to consequential damages risks
- ➔ Federal, state, and common-law rules bearing on consequential damages in the public transportation contracting context
- ➔ Information for drafting consequential damages provisions
- ➔ Examples of consequential damages provisions in state DOT contracts
- ➔ Trends in consequential damages provisions

This LRD also includes a checklist to help contracting officials, attorneys, procurement officers, planners, engineers, agency financial officials, administrators, and staff involved in the construction process navigate the risks associated with consequential damages in public transportation contracts. For more information: <https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=508>.

*NCHRP Legal Research Digest 89: Planning and Environment Linkages: Review of Statutory Authority and Case Law* presents the key legal bases and aspects of the Planning and Environment Linkages (PEL) program. It covers the evolution of PEL, highlighting key statutory and regulatory authorities for PEL and corresponding agency guidance and policy. This digest includes a description and comparison of the various approaches to PEL at the federal and state levels. It also analyzes the history of litigation relevant to PEL. Finally, it summarizes key considerations for PEL going forward. This LRD will be helpful to all involved in the development, construction, and planning of transportation projects, including attorneys, planners, state transportation agencies, metropolitan regional planning organizations, federal personnel, consultants, and contractors. For more information: <https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4817>.

*NCHRP Legal Research Digest 90: Best Value Procurement for Highway Construction: Legal Issues and Strategies* addresses the best-value procurement systems used for highway projects and notes the flexibility regarding selection criteria, rating systems, and award algorithms. It also presents a definition of best-value procurement, describes the best-value procurement process and approach, gives steps for implementation, and analyzes the existing federal, state, and local legislation focused on best-value procurement. A compilation of relevant bid protests, the affected competition level, increased procurement cost, and other procurement or project execution issues are offered. This LRD will be helpful to attorneys, procurement officers, planners, engineers, agency financial officials, administrators, and staff involved in the agency procurement process. For more information: <https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4816>.

## **NCHRP PROJECT 20-24, “RESEARCH FOR AASHTO AND STATE DOT LEADERSHIP”**

This project is designed to conduct research focused on issues facing state transportation agency leadership. Reports from this project deliver timely information on such topics as enterprise knowledge management, workforce development, enterprise-level decision-making frameworks, measurement and management of transportation system performance and asset condition, economic and social benefits of transportation system performance, transportation system resilience, and the significance of new technologies and societal trends that are shaping transportation.

NCHRP Project 20-24 also supports events that bring together state DOT leadership to share information and experiences. NCHRP Project 20-24(139), “Into the 2020s: A Peer Exchange Series for State DOT CEOs,” supported two peer exchanges in Philadelphia (November 13–15, 2022) and Atlanta (April 2–4, 2023) since last year’s Annual Report.

Project work recently commenced on NCHRP 20-24 (141), “Advancing the Art and Science of Decision-Making.” The goal of this effort is to develop guidelines for decision-makers at executive levels of state DOTs and other transportation agencies for selecting and using decision-making strategies that can improve the quality, agility, and durability of decision-making. Through “decision dissection” case studies, state DOT leadership feedback, and other investigative methods, the research team will prepare final products such as a practitioner guide, final report, and recommendations for implementation.

Requests for proposals have been issued for four anticipated projects in the 20-24 series. Research team selection is underway as of December 2023 for each effort:

- ➔ NCHRP Project 20-24(144), “Enhancing State DOTs’ Agility in Project Development and Delivery”
- ➔ NCHRP Project 20-24(145), “Harnessing the Safe System Approach to Improve Traffic Safety”
- ➔ NCHRP Project 20-24(146), “Guide to Supporting and Sustaining Transportation Grant Programs for Local Governments and Tribes”
- ➔ NCHRP Project 20-24(147), “Identify Best Practices for Automated Driving Systems and Other Emerging Technologies”

For more information: <https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=560>.

## **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 describing current and completed projects is published annually. To date a total of 252

projects have been awarded by the program, of which 221 have been completed. Of these 221 projects, products of 42 projects (~20%) have been successfully implemented. Another 45-plus completed or active projects have resulted or are expected to result in products with a high implementation potential in the near term, if given resources for further development and evaluation. At least 11 AASHTO and ASTM standard test methods or procedures have resulted from NCHRP IDEA research; the most recent, was adopted at the end of last year: *Standard Test Method for Evaluation of Fatigue Performance of Asphalt Mixtures Using the Three-Point Bending Cylinder (3PBC) Test*.

NCHRP Project 20-30/IDEA Project 224 developed an asphalt testing device with a robotic arm that automatically conditions or cools down hot specimens from the Superpave Gyratory Compactor to specified test temperatures, performs cracking and rutting tests, and identifies and reports to the plant control center asphalt mixes (or sublots) likely to be susceptible to cracking or rutting. Current cracking or rutting tests are not suitable for quality control at the plant, as they take at least a day to complete. This IDEA innovation can complete the tests in about an hour, making it possible to evaluate asphalt mixes for cracking and rutting potential as part of daily quality control/quality acceptance testing during mix production. More detail is available in the research showcase on page 28.

For more information: <http://www.trb.org/IDEAProgram/IDEAHighway.aspx>.

### **NCHRP PROJECT 20-44, “IMPLEMENTATION SUPPORT PROGRAM”**

The NCHRP Implementation Support Program provides funding to state DOTs and other eligible transportation agencies to implement NCHRP research results. The NCHRP procures and manages consultant services to undertake the implementation projects and draws on panels of experts to oversee them. State DOTs, AASHTO committees and councils, and NCHRP project panels can apply for funding for a range of implementation activities, including pilot/demonstration projects, workshops, peer exchanges, training, and briefing materials. Both completed and in-development NCHRP research results and products are eligible, and there is no maximum funding amount.

In FY 2023, the NCHRP Project 20-44 oversight panel approved 7 implementation projects, totaling \$ 1,902,000.

For more information: <https://www.trb.org/NCHRP/NCHRPImplementationSupportProgram.aspx>.

## NCHRP PROJECT 20-68, “U.S. DOMESTIC SCAN PROGRAM”

The objective of the U.S. 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. Summaries of the multiyear program and access to its principal products are available on the TRB website at <https://www.trb.org/NCHRP/USDomesticScanProgram.aspx>.

Each year, two to three new scan topics are programmed and initiated. Scan duration, from topic selection to completion of the scan team’s report, is typically 2 to 3 years. The following scans were initiated in 2023:

- ➔ Scan 23-01, “Experiences in the Use of Mini and Modular Roundabouts by Highway Agencies” examines the experiences and lessons learned by states in design, construction, operation, and maintenance that may be valuable to others considering using mini or modular roundabouts. Mini and modular roundabouts may offer appropriate safety, capacity, and other benefits of a full-size version at a significantly reduced cost.
- ➔ Scan 23-02, “Recent Experiences in Advancing and Deploying of Automated Vehicle Technologies” looks to gain critical knowledge to better understand the methods, barriers, and opportunities associated with automated technology testing and pilots needed by agencies exploring testing and deploying automated and connected technologies, specifically automated driving systems (ADSs). The scan reviews the experience of DOTs or other agencies by examining a representative sample of successful ADS tests, pilots, and deployments to explore the institutional and management changes credited for the success and to extract lessons that can inform other agencies’ development.
- ➔ Scan 23-03, “Advances in Evaluation of Weld Quality” investigates the processes and controls used to produce quality welds in highway structures. It examines the equipment involved in weld inspection and quality assurance, the specifications used for equipment requirements and quality control procedures, and calibration of the equipment to the appropriate quality standards. The study includes reviewing the state of practice of the in-process inspection, including items such as monitoring welding variables, measuring weld size using laser scanning, and assessing the resulting reliability of the weld quality using in-process inspection of both highway structures and products in other industries. The scan also examines the current state of practice in the AASHTO bridge community for comparative purposes.
- ➔ Scan 23-04, “Developing and Maintaining a Culture of Innovation within DOTs” examines organizations that have successfully designed and implemented programs and/or initiatives that support a culture of innovation. Specifically, the scan looks at the characteristics of a strong organizational culture of innovation, how innovation culture differs by discipline in an organization, examples of successful initiatives to

change organizational culture to one that encourages and supports innovation, and how improvements in a culture of innovation can be sustained. Examples of specific programs at state DOTs aimed at supporting innovation will also be documented.

- ➔ Scan 23-05, “Successful Approaches to Validating and Communicating the Long-Term Effects of Aging Government Fleet Assets” examines organizations that have successfully developed and implemented practices and procedures to estimate the cost of delayed replacement of DOT fleet assets beyond the optimal replacement period to gather data that might be used to develop decision-making tools and models that can demonstrate the long-term effects of aging fleet assets to decision-makers. By documenting and sharing successful practices, the scan will produce a valuable resource for fleet managers and stakeholders, including state DOTs, on how to assess and make better decisions to prioritize fleet funding among the long list of agency needs.

For more information: <https://www.trb.org/NCHRP/USDomesticScanProgram.aspx>.

## **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 state transportation research programs, the FHWA pooled fund program, the NCHRP, or other interested entities. Tasks may include developing research roadmaps or prioritized lists of specific research needs; updating council or committee strategic plans that include a research component; conducting research scoping studies for narrow research topics; developing activities to update specifications and manuals maintained by a committee or council, using previously conducted research, and convening experts to arrive at a consensus; and convening peer exchanges. In FY 2023, the NCHRP Project 20-123 oversight panel approved two projects, totaling \$450,000.

For more information: <http://www.trb.org/NCHRP/NCHRP20-123.aspx>.





# SHOW- CASES

## RESEARCH SHOWCASE

### **AASHTO Committee on Bridges and Structures Strategic Plan, Operating Guidelines, and Research Roadmap Development**

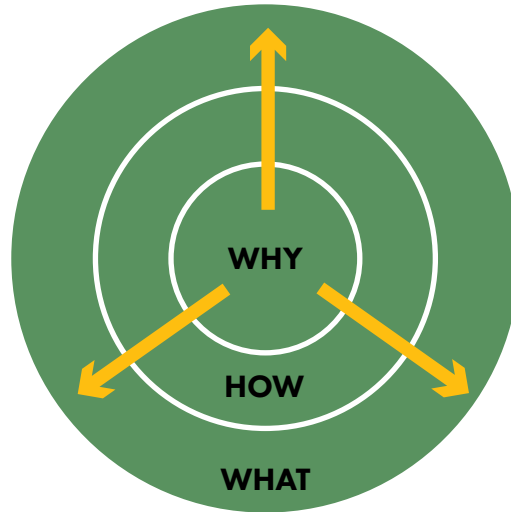
NCHRP Project 20-123(10) consisted of developing three major documents for the AASHTO Committee on Bridges and Structures (COBS).

Research agency: Clough, Harbor & Associates LLP

Principal investigator: Mike Culmo

The first document was an update to the 2018 strategic plan for the committee. This document defines the purpose and goals of the committee and the strategic plan to deliver on these goals. The research team used the principle of the Golden Circle for the development of the new strategic plan.

## The Golden Circle



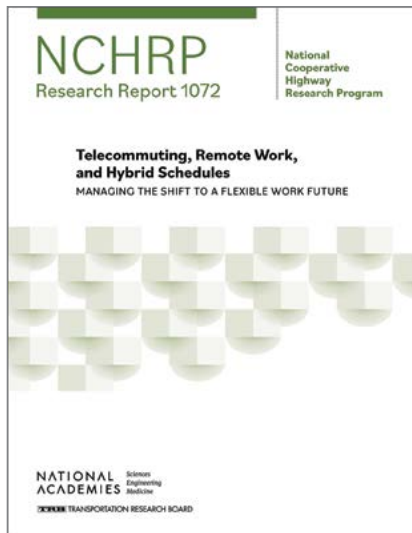
This process starts with defining the “why,” which is the purpose or vision of the committee. The “what” is the product or services that the committee delivers. The “how” is the strategic plan that the committee can use to execute its vision.

The research team along with the project panel worked with a group of stakeholders (current and former members of COBS) and industry experts to identify the vision and goals of the committee. The group developed a concise strategic statement that formed the basis of the remainder of the strategic plan development. From there a list of committee goals were developed by the working group. The research team then developed recommended tasks to accomplish the goals.

The second document developed was the operating guidelines for the committee. This document defines the organization of the committee and how it functions. The research team, in conjunction with the working group explored several reorganization approaches. Ultimately, three recommended committee structures were developed. The operating guideline document formally adopts the use of “friends of the committee.” The goal is to allow technical committees access to the leading industry experts to assist with their work on a volunteer basis. Friends can greatly contribute to the work of the committee; however, they cannot vote on committee business as specified by AASHTO. Another change is the ability of technical committees to better collaborate on cross-cutting issues through the use of Task Forces, which can include members and friends from multiple committees. The intent is to have the Task Forces work on committee business outside the normal committee meetings and report back to the technical committees at scheduled meetings, thereby allowing the technical committee to keep abreast of the work without getting bogged down in the minutia of the tasks.

The third document developed was a research roadmap, which can be used by the committee in developing and managing research that is consistent with the strategic plan. The roadmap places an emphasis on collaboration with research organizations and industry organizations to ensure that the overall needs of the bridge industry are addressed. A collaboration matrix was developed for each COBS technical committee listing industry organizations and committees at the Transportation Research Board that are applicable to their work. The document also focuses on how to prioritize research and address the most pressing needs of the industry.

Based on the recommendations of this study, AASHTO has adopted a new COBS committee structure.



## RESEARCH SHOWCASE

### **Telecommuting, Remote Work, and Hybrid Schedules: Managing the Shift to a Flexible Work Future**

NCHRP Project 23-13(01) has been published as *NCHRP Research Report 1072: Telecommuting, Remote Work, and Hybrid Schedules: Managing the Shift to a Flexible Work Future*.

Research agency: ICF Incorporated, LLC

Principal investigator: Beth Heinen

The COVID-19 pandemic required state DOTs to quickly shift to telework and flexible work arrangements (FWAs) without extensive planning and thorough examination of job and employee suitability

for successful remote work. However, this rapid shift helped state DOTs recognize the benefits of telework and FWAs for their agencies, individual employees, and managers. Now, as state DOTs reimagine how work looks, there are considerations when planning for longer-term and wider adoption of FWAs, including various ways of adapting work arrangements to fit the needs of the organization and employees during regular business operations.

While remote work allowed state DOTs to maintain business continuity through the pandemic, it also presented challenges that must now be considered as teleworking is implemented more permanently. Organizational and employee barriers must be considered, as well as strategies to overcome them. Because not all positions and tasks can be performed remotely and not all employees can telework successfully, state DOTs need to examine employee and job suitability for these arrangements. This research gives state DOTs a resource to do that.

The research approach for NCHRP Project 23-13(01) involved conducting a literature review to gather background information and get an understanding of recent state DOT experience with FWAs, including successful practices and key considerations; interviewing contacts across seven state DOTs to understand the benefits, challenges, and risks associated with telecommuting and to identify best practices; and developing a telework suitability tool, a tracking tool, and a guide.

The telework suitability tool is designed to be completed by managers to determine if their employee is suitable for a telework arrangement. The tool asks the manager a series of questions, and options are eliminated based on the responses about the suitability of the individual employee and their job tasks. Once all questions are answered, the tool populates one or more potential telework options:

- ➔ Not suitable for telework
- ➔ May be suitable for ad hoc hybrid telework
- ➔ May be suitable for hybrid telework
- ➔ May be suitable for full-time telework

In addition, the tracking tool allows the agency to track approved arrangements employees have in place, and the data can be aggregated and used to report about telework and FWAs to agency leadership. Finally, the guide helps state DOTs understand different telework and FWA options, the benefits and challenges of telework, and how to determine telework program effectiveness. It also provides instructions for using and adapting the tools.

## RESEARCH SHOWCASE

### **Realistic Timing Estimates for Automated Vehicle Implementation**

NCHRP Project 20-102(27) has been published as *NCHRP Research Report 1049: Realistic Timing Estimates for Automated Vehicle Implementation*.

Research agency: WSP USA Inc.

Principal investigator: Steve Kuciemba

Automated vehicle (AV) technology has evolved quickly, and the transportation industry has exerted considerable effort toward advancing its capabilities based on the desire to reduce traffic crashes, improve fuel economy, enhance lane capacity, reduce travel time, and support a growing economy. Infrastructure owner and operator (IOO) executives, planners, and policymakers face several questions in addressing the potential impacts of AVs. Central to an impact assessment is understanding how, why, and at what rates key market-share levels of highly automated vehicles could be reached.

The purpose of this research was to better understand existing market forecasts; develop a framework of considerations for IOO decision-makers to rely on regardless of their size, geographic location, miles of roadway, number of transit vehicles, or funding sources; and create a framework for defining a model or tool for estimating future conditions.

The research team found 16 publications that provided explanations of AV deployment forecasting methods and were considered worth summarizing. An extensive review analyzed these forecasts and concluded that, with no substantive AV market in place today, the current framework for AV forecasting relies entirely on subjective factors. These initial findings were validated through a virtual meeting with sample potential users of the model to discuss what input parameters would be feasible to include in an AV forecasting model that would rely on more objective factors. These objective factors are referred to as input parameters and are organized into the following categories:

- ➔ Current technological capabilities
- ➔ Government regulations
- ➔ Average travel behavior and comparable benefits by AV and non-AV



- ➔ General consumer trends
- ➔ Technology costs
- ➔ Investor sentiment and forecasts

The proposed framework would entail IOOs entering data on these input parameters, as well as other information, into a computer model and using the resulting outputs to guide planning processes. The model would work by considering key actors and decision-makers in the AV space and considering what levers such individuals have at their disposal. The identified key actor groups are:

- ➔ Vehicle producers and providers
- ➔ IOOs
- ➔ Private transportation operators
- ➔ Financial institutions and investors
- ➔ Consulting and strategy firms and researchers
- ➔ Public officials and politicians
- ➔ Consumers

The project team also postulated that to better understand AV adoption, it is important to look beyond the umbrella term “automated vehicle” and examine specific uses for automation. As AVs are adopted, there are likely to be independent adoption rates for different use cases, depending on what becomes safely possible while addressing a viable market need. The proposed use cases are freight vehicles, transit vehicles, fleet vehicles (ride-hailing robotaxis), and personal passenger vehicles.

This research resulted in a framework for further consideration. The report sets recommendations for developing the model and recommends that beyond initial development, the model should continue to be updated when certain levels of market maturity are reached, as more information is obtained on what the deployment of AVs is likely to look like.

## IDEA SHOWCASE

### **Development of an Automated and Rapid Conditioning and Testing Device for Cracking and Rutting**

NCHRP Project 20-30/IDEA 224

Research agency: Texas Transportation Institute

Principal investigator: Fujie Zhou

The quality of asphalt mixtures has been a persistent concern for state DOTs. The asphalt mixture automated testing system with zero intervention (AMAZE) developed in this project shows potential for alleviating this concern and helping ensure a high quality of asphalt mixtures. The AMAZE system consists of four modular components: (1) an air void

measurement unit, (2) two temperature conditioning units, (3) a material testing unit, and (4) a robotic arm to automate the process. The units work together to measure three essential properties of asphalt mixtures: air voids, cracking tolerance index (CTIndex) and indirect tensile strength, and rutting tolerance index (RTIndex). The IDEA product was extensively evaluated in the laboratory with various asphalt mixtures for these properties. The results were very similar to those measured by laboratory technicians but much more consistent and reproducible.



**Asphalt mixture automated testing system with zero intervention (AMAZE). Photograph by Fujie Zhou, Texas Transportation Institute.**

### **Benefits**

The cost of repairing asphalt pavement distresses (such as fatigue cracking and rutting) caused by poor-quality asphalt mixtures is a major expenditure for state DOTs. The AMAZE device could potentially help the DOTs and contractors avoid using cracking- and rutting-prone mixtures by screening them out during production at asphalt mixture production plants.

Test results from this device are objective, free from human error, and much more consistent and reproducible than those obtained from laboratory technicians, which could also help minimize potential test result disputes between DOTs and contractors.

### **Application/Implementation**

The research team is working on product transfer and implementation by promoting the AMAZE device at professional meetings (such as the FHWA's Asphalt Pavement and Materials Technical Feedback Group Meeting in November 2022, the 2023 Construction, Materials, and Alternative Delivery Conference organized by the Texas DOT, and the National Road Research Alliance Meeting in August 2023). The team has also approached the panel for NCHRP Project 20-44, "Implementation Support Program" to help support demonstration and training of the developed technology. Nine states (Florida, Indiana, Maine, Minnesota, North Dakota, Oklahoma, Texas, Virginia, and Vermont) have committed to participate. An AMAZE demonstration is also being considered for the TRB Annual Meeting in January 2024.

## **SYNTHESIS SHOWCASE**

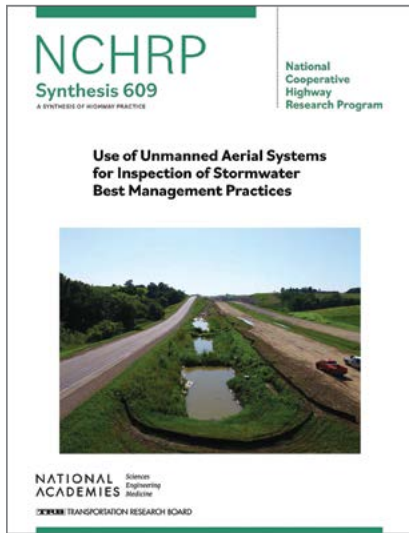
### **Use of Unmanned Aerial Systems for Inspection of Stormwater Best Management Practices**

NCHRP Project 20-05/Topic 53-09 has been published as *NCHRP Synthesis 609: Use of*

*Unmanned Aerial Systems for Inspection of Stormwater Best Management Practices.*

Research agency: Maple Consulting, LLC

Principal investigator: Michael Perez



Stormwater best management practices (BMPs) are a collection of communication, education, structural, nonstructural, and management controls that, when properly designed, installed, inspected, and maintained, provide effective erosion, sediment, water quantity and pollution reduction for design storm rainfall events. Over the past decade, unmanned aerial system (UAS) technologies have emerged as a tool for surveying, tracking, monitoring, and improving safety. The objective of this synthesis was to identify and document state DOT practices regarding UAS technology as a tool for stormwater inspections. This synthesis investigates how UAS stormwater BMP inspections have been deployed by state DOTs and the strategies and programs that have been adopted or created.

First, an extensive literature review was conducted of documents pertaining to UAS inspections of BMPs. Second, information identified from the literature review was used to create a web-based questionnaire that was distributed to all 50 state DOTs and the Washington, DC, DOT. A total of 41 DOTs (80%) responded. Finally, semistructured case example interviews were conducted with four state DOTs (Alabama, Colorado, Delaware, and Kansas; one from each AASHTO region) to document and highlight unique aspects of their UAS stormwater BMP inspection program.

Key findings of the literature review, survey, and case example interviews were:

- ➔ Application of UAS technologies during highway construction and maintenance operations is widely researched.
- ➔ State DOTs using UAS technologies for stormwater BMP inspections often require an internal staff champion to lead adoption and implementation.
- ➔ Cost of equipment and associated software is not considered a hindrance to adoption by interviewed state DOTs.
- ➔ State DOTs that have UAS stormwater inspection capabilities rarely use these capabilities as traditional on-foot inspections are still required to meet permit requirements.
- ➔ Availability of trained stormwater inspectors or UAS operators was a major factor limiting the use of the technology.
- ➔ A need exists for operation guidelines and DOT staff training.
- ➔ Dataset processing and management are challenges for DOT staff.



Overall, the synthesis provides a comprehensive overview of how state DOTs are leveraging UAV technology to conduct stormwater BMP inspections. It explores the strategies and programs state DOTs have developed to effectively integrate drone technology into their stormwater management program, ultimately contributing to improved environmental protection and water quality management.



UAV image of sediment basins. Photograph courtesy of Billur Kazaz.

## RESEARCH SHOWCASE

### **Virtual Public Involvement: A Manual for Effective, Equitable, and Efficient Practices for Transportation Agencies**

Phase I of NCHRP Project 08-142 has been published as *NCHRP Web-Only Document 349: Virtual Public Involvement: Lessons from the COVID-19 Pandemic*.

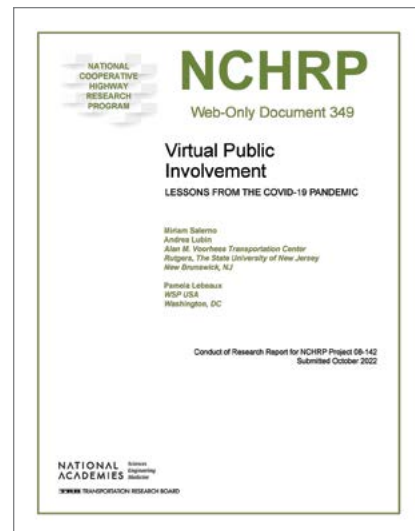
Research agency: Rutgers, The State University of New Jersey

Principal investigator: Miriam Salerno

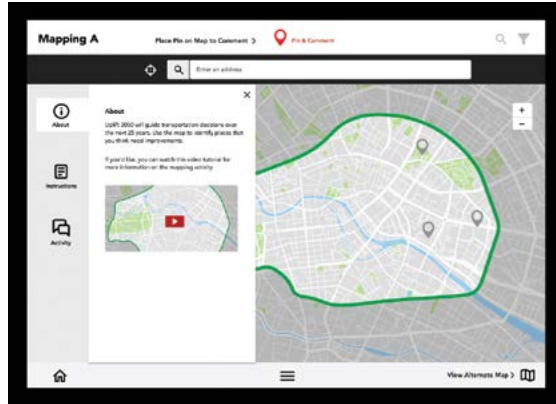
Virtual public involvement, or VPI, is an engagement strategy using online or virtual means to communicate with and receive feedback from the public. COVID-19 and the resulting quarantine forced transportation agencies to transition to virtual engagement. While VPI increased public engagement and provided more nuanced feedback, it failed to reach or accommodate all individuals. Specifically, VPI held back individuals with lower levels of technological literacy, barred individuals with limited internet access, and challenged individuals with disabilities. A significant gap exists in public engagement best practices for transportation agencies that wish to use virtual tools to facilitate two-way communication with the public.

The objective of NCHRP Project 08-142 was to develop a structured, research-based manual for transportation practitioners to learn how to choose and employ VPI tools effectively, efficiently, and equitably. This information can better prepare state DOTs, metropolitan planning organizations (MPOs), rural planning organizations (RPOs), and other transportation agencies to move toward the future of more frequent virtual engagement.

The content for the manual was informed by extensive quantitative and qualitative research collected through surveys, interviews, and focus groups. Special care was taken to collect information from various DOTs, MPOs, and RPOs to clarify the recent experience of undertaking and transitioning to VPI during the pandemic. Feedback from the public and



those who engage with VPI tools was collected by four original online user-testing groups and nine one-on-one sessions using a customized prototype engagement site that tested a variety of self-guided (asynchronous) online tool types. Findings from these groups will help agency practitioners understand how the public uses, experiences, and prefers to interact with VPI platforms.



Screenshot of the asynchronous engagement prototype developed by Inkroots, a UX firm and subconsultant on the project. Image courtesy of the Voorhees Transportation Center at Rutgers.

The manual itself includes information on how to select VPI tools best suited for particular agency and outreach needs. The manual also outlines available VPI tools and provides commentary on how and when to use each tool. Success stories from various agencies provide practitioners tangible examples to work toward. The manual outlines equity considerations and barriers, such as the digital divide, and gives agency practitioners suggestions and real-world solutions for reaching socially vulnerable populations, including individuals with disabilities, older

adults, minority and low-income populations, rural residents, and persons with limited English proficiency (LEP).

Transportation agencies can use this straightforward and easy-to-understand manual to inform their use of VPIs throughout their outreach and engagement process.

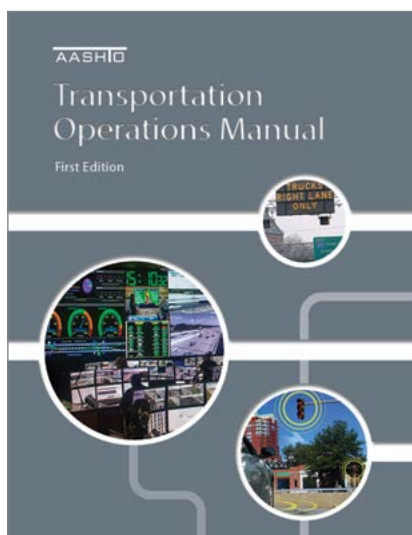


Image courtesy of AASHTO.

## RESEARCH SHOWCASE

### **Transportation Operations Manual**

NCHRP Project 03-126 developed a single reference for all elements of transportation systems management and operations (TSMO) and provided the document to AASHTO, which published the *Transportation Operations Manual*.

Research agency: WSP USA

Principal investigator: Les Jacobson

NCHRP Project 03-126 developed the first manual on transportation operations for AASHTO. The objective of this project was to develop a single reference for all elements of TSMO—strategic, programmatic, and tactical. The *Transportation Operations Manual*

(TOM) provides agencies and their partners a single source to gain knowledge of and familiarity with operational improvements and provide a platform to engage the industry

in developing appropriate future TSMO applications. The manual expands current practice through a more cohesive approach.

The target audience for the TOM spans a range of public- and private-sector individuals, from state agencies to regional planning organizations to local municipalities to private-sector individuals involved in providing services to public-sector agencies.

The research included typical tasks such as stakeholder engagement, analyzing existing documentation and research, and developing and reviewing the document. Some of the more unique aspects of the research were:

- The manual was envisioned to be digital only. Links, wayfinding, and references were developed with this in mind.
- An enhanced review was included. Members of the sponsoring AASHTO committee and the project panel were included in the initial chapter-by-chapter review. A second review phase was undertaken that included a broad array of stakeholders from various AASHTO committees and stakeholders outside AASHTO.
- Diversity, equity, and inclusion concepts were incorporated throughout the manual.
- Recommendations were included for the process for updating the manual and for organizing the National Operations Center of Excellence (NOCoE) website to make optimal use of the manual.

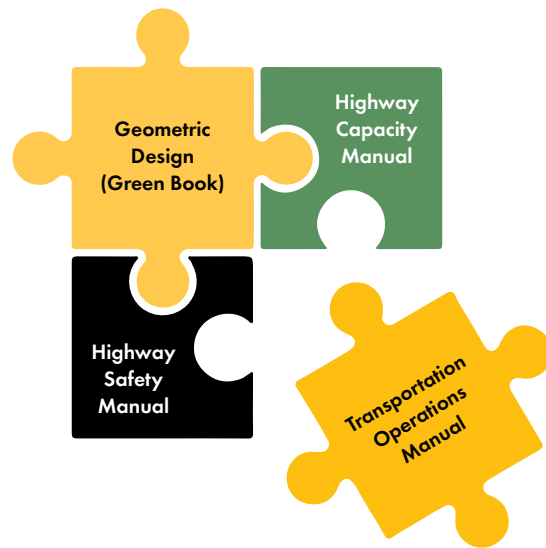


Image adapted from the *Transportation Operations Manual*.

## SYNTHESIS SHOWCASE

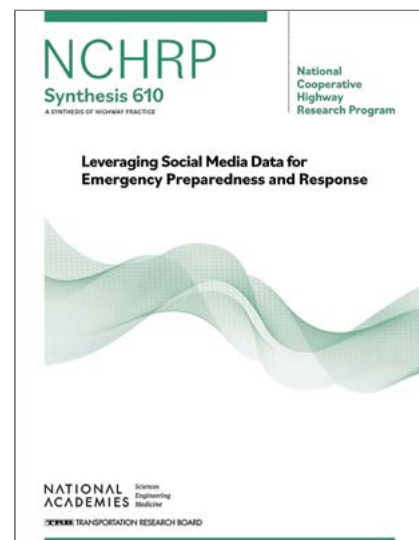
### Leveraging Social Media Data for Emergency Preparedness and Response

NCHRP Project 20-05/Topic 53-03 has been published as *NCHRP Synthesis 610: Leveraging Social Media Data for Emergency Preparedness and Response*.

Research agency: University of Nebraska–Lincoln

Principal investigator: Christine Wittich

Emergencies are often unpredictable, unique, and hard to track. Timely response to emergencies on highways is a critical issue faced by state DOTs. While several national initiatives guide emergency management at state DOTs with respect to working with government and private agencies, the traveling public are highly impacted in an emergency situation and state DOTs must both monitor activity and communicate information. Given that some social media platforms have billions of active monthly users, these platforms have become critical for reaching the



public and disseminating information. Many DOTs have undergone technology renovations and have started using social media for rapid emergency situation detection, damage assessment, and evacuation plan propagation.

NCHRP Project 20-05/Topic 53-03 was initiated to document state DOT practices that leverage social media for emergency preparedness, response, and recovery, and to identify knowledge gaps that could be addressed through further research to aid state DOTs. Methods included a comprehensive literature review and a web-based quantitative survey of state DOTs. The survey was conducted to find out the current state of the practice regarding using social media to disseminate information and monitor emergencies, metrics for effectiveness, and barriers to implementation. The results of this survey were used to guide the selection of four state DOTs for case example interviews, which were intended to elaborate on state DOT decisions about using social media for emergencies.

Key observations from this study include:

- Nearly all responding state DOTs use social media to broadcast information on a broad range of emergencies, particularly status updates and instructions for the public.
- While the majority of responding state DOTs use social media to monitor emergencies, only 7.1% rely on it as their primary source of situation monitoring. Reasons for the lower percentage included personnel availability and training, privacy concerns, and data reliability.
- Despite the existence of automated social media listening and analysis tools, only 26.1% of responding state DOTs use them, and even fewer rely on these tools as a primary source. Case examples identified that there is a common desire to better leverage social media for emergencies, but automated services are not tailored to DOT needs. This leads to a very manual and time-intensive approach to filter and vet data.

This research identified three areas for potential further study. First was improving state DOT social media policies to optimize emergency use. Policy barriers are common, but best practices are lacking. Secondly, developing DOT-specific automated social media tools could enhance implementation and address data reliability concerns. Lastly, research could be conducted focusing on online behaviors toward state or other authoritative accounts, which could help provide knowledge on combatting misinformation and data reliability.



# WHY NCHRP WORKS

## A MODEL FOR COOPERATIVE RESEARCH

The cooperative research model developed for the NCHRP has functioned effectively since 1962 and served as the foundation for other successful applied cooperative research programs managed by the TRB. The 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 the NCHRP. From other units of the National Academies to industry associations in a variety of fields, experts approach the 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. The NCHRP does not own roads, make laws, or set policy. Instead, it provides a neutral forum for objective research without bias or prejudice. The 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.

The NCHRP works on shared national problems and issues, and 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 to receive far more value for the research dollars it spends. By joining forces to solve common problems, state DOTs can 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 the 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 advertised. Successful proposers are selected based on the qualifications of their team members and their research approach.

## 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 the NCHRP and continue to be the driving force behind NCHRP research. The program is administered by TRB under a cooperative agreement with FHWA and in partnership with AASHTO.

### **States Provide the Funding for the NCHRP**

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

Available funds for the NCHRP have remained strong during the past 22 years, rising along with increases in the Federal-Aid Highway Program 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 the NCHRP for fiscal years 1992 through 1997. This was increased by more than 50% 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 annually 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 the NCHRP’s governing body. R&I membership includes 16 state DOT members (two research managers and two senior managers 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 subcommittee 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.

From November through February, the NCHRP receives comments on the problem statements from AASHTO, FHWA, and NCHRP staff. In February, the NCHRP sends these comments and the problem statements to AASHTO R&I and RAC for review. Those committees rate each of the candidates according to need, value, and appropriateness. The results help establish a preliminary ranking to 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 continuing projects. Once the program is developed, AASHTO 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 board. In addition, each year's program must be approved by the FHWA and accepted by the National Academies.

An average of 120 problem statements and 15 requests for project continuations are received each year. Continuing projects include research carried out under NCHRP subprograms, such as the Synthesis series, the IDEA Program, and the U.S. 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 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 managing the research contracts.

Finally, the panels review final reports for acceptability and for accomplishment of the approved research plan.

## SELECTING THE BEST INVESTIGATORS

The 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, the NCHRP has awarded research contracts to entities headquartered in a majority of 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 TRB Weekly, an 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 the NCHRP or others. The successful proposals are retained by panel members for use in monitoring the research.

The 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 method
- 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
- 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 Information for Proposers* webpage.

## NCHRP RESEARCH AREAS

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. Problem statements 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 19-18 identifies the 18th project in Area 19 (Finance). NCHRP Project 25-59 identifies the 59th project in Area 25 (Human and Natural Environment). Once research was completed, final deliverables for these projects were published, respectively, as *NCHRP WebResource 2: Road Usage Charge Guide* ([crp.trb.org/nchrpwebresource2](http://crp.trb.org/nchrpwebresource2)) and the 16-volume *NCHRP Web-Only Document 362: Pollinator Habitat Conservation along Roadways* (<https://www.trb.org/NCHRP/NCHRPWOD362.aspx>).

Table 2 of the Annual Report uses this project numbering system to present information about active, completed, and pending NCHRP projects in 2023. The projects are grouped sequentially from Area 1: Pavements through Area 25: Human and 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 and 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 Evaluation of Soils
22. Vehicle Barrier Systems
23. Agency Administration
24. Foundations and Scour
25. Human and Natural Environment

## 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 changes to the approved research plan must be approved in advance by the NCHRP and are authorized through a contract amendment. Contractor invoices are checked by the staff. Finally, the panel and NCHRP project manager evaluate the final research results to determine their acceptability and suitability for publication, respectively.



# PANEL MEMBER PROFILES





**MAUREEN BOCK**, chief innovation officer at the Oregon Department of Transportation (ODOT), served as the panel chair for NCHRP Project 19-18. She currently leads Oregon's statewide initiative toward a sustainable funding solution for transportation. She previously served as ODOT's fuels tax manager, where she worked on Oregon's first road usage charge pilot and worked with the Oregon Department of Energy, where she redesigned its tax credit programs, including those affecting transportation. Since 2014, Bock has led efforts to design and implement the business processes and systems that support collecting road usage charges in Oregon, including the feasibility of having a local option road usage charge program for cities and counties.



**HENRY BROWN** is a research engineer in the Department of Civil and Environmental Engineering at the University of Missouri. He has led five NCHRP synthesis projects on road safety audits, truck emergency escape ramps, smart work zones, temporary pavement markings for work zones, and alternative intersections. He has also been on research teams for NCHRP projects on element level bridge inspection and crash modification factors for alternative intersections, and has served on NCHRP panels. He is a member of the TRB Standing Committee on Performance Effects of Geometric Design (AKD10) and the TRB Standing Committee on Transportation Planning Policy and Processes (AEP10).



**CHARLES (CHARLIE) HEBSON** is a professional engineer and certified geologist, and is the manager of the Surface Water Resources Division at the Maine Department of Transportation. Hebson's contributions to the NCHRP are invaluable. He currently serves as chair of NCHRP Project 15-80 and NCHRP Project 24-50 and is a panel member for NCHRP Project 15-61A. His leadership and dedication have laid the foundation for producing innovative, technically sound, useful projects that have advanced the water resources- and resilience-related disciplines.



**CESAR QUIROGA** is a senior research engineer and manager of the Utility Engineering Program at the Texas A&M Transportation Institute (TTI). He is an expert on utility engineering topics, but his contributions also include areas such as optimization of the project delivery process, right-of-way acquisition, and spatial data technologies. He is leading NCHRP Project 15-69, which focuses on the impacts of utility conflicts during highway construction. He recently finished working on NCHRP Project 11-08, which addressed the issue of utility property interests and reimbursement

eligibility for utility relocations. He led SHRP2 Project R15B, which produced a holistic utility conflict management approach for managing utility conflicts during project delivery.



**DANIEL TRAN** is David A. and Patricia P. Ross Chair Associate Professor in the Department of Civil, Environmental and Architectural Engineering at the University of Kansas. His research focuses on risk-based construction inspection, performance-based decision-making, alternative project delivery, constructability, risk analysis, asset management, and the application of statistics, modeling, and technology to solve problems in civil infrastructure projects. He has

participated in five FHWA projects, 15 NCHRP projects, and several research projects funded by state DOTs. Tran is a member of the TRB Standing Committee on Construction Management (AKC10) and the TRB Standing Committee on Project Delivery Methods (AKC20).





PANEL PROFILE:

**NCHRP**

**Project**

**12-113**



Xiaohua "Hannah"  
Cheng



Domenic Coletti



Karl Frank



John Hastings



Thomas Macioce



Norm McDonald



Michelle Lauren  
Romage-Chambers



Dayi Wang

Successful NCHRP projects have common traits, including having a dedicated and engaged project panel. NCHRP Project 12-113, "Proposed Modification to AASHTO Cross-Frame Analysis and Design," is an example of a successful project that benefited from having a talented and culturally and technically diverse panel. The panel was chaired by Norm McDonald, the state bridge engineer for Iowa DOT who served as the chair of the AASHTO Bridges and Structures technical committee on steel bridges. McDonald retired from Iowa DOT before project completion but continued to serve on the panel. McDonald was joined by Xiaohua "Hannah" Cheng, supervising engineer at New Jersey DOT, who is active in many NCHRP projects and AASHTO committees; Domenic Coletti, principal professional associate at HDR and a longtime TRB member; Karl Frank, professor emeritus at the University of Texas and a steel fabrication consultant; John Hastings, a steel bridge engineer with the National Steel Bridge Alliance and a consultant; Thomas Macioce, a retired state bridge engineer with Penn DOT and former chair of the AASHTO Bridges and Structures technical committee on steel bridges; and Michelle Lauren Romage-Chambers, Texas Bridge Leader with Burgess & Niple. In addition to the voting members of the panel from state DOTs and industry, Dayi Wang, a senior bridge engineer and a steel specialist, served as the FHWA liaison for this project. This group of steel bridge design professionals guided and supported the research by providing extensive and timely reviews. As a result, the NCHRP recommended steel bridge design specification updates that were implemented by AASHTO and published two regular research reports, *NCHRP Research Report 962: Proposed Modification to AASHTO Cross-Frame Analysis and Design* and *NCHRP Research Report 1045: Improved Cross-Frame Analysis and Design: Wide-Flange T-Shape Sections*. As of November 2023, these have been downloaded 1,314 times across 69 countries and 217 times across 39 countries, respectively.

**COOPERATIVE  
RESEARCH  
PROGRAMS**

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**Information Technology Specialist**

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**NEW  
NCHRP  
SPOs**





**MIKE BROOKS** joined the NCHRP in January 2023 as a senior program officer in the Environment, Sustainability, Planning, and Policy team. He also serves as the team liaison to AASHTO's Environment & Sustainability subcommittee. He has previously been involved in intelligent transportation and transportation economics research for the U.S. DOT and supported the modernization of navigation practices for the U.S. Coast Guard. Brooks is a certified project management professional (PMP), scrum master (CSM), and scaled agile framework (SAFe) practitioner.



**AREFEH NASRI** joined TRB as a senior program officer in January 2023. Nasri is an experienced researcher and project manager with a history of working in the areas of transportation planning and travel behavior analysis, travel demand modeling, transportation policy analysis and evaluation, built environment and transportation interactions, and micromobility analysis. She mainly manages the projects funded by the Synthesis program at the NCHRP.



**ANNE-MARIE TURNER** has more than 11 years of transportation-related experience, including traffic safety, pedestrian and bicycle safety, speed management, sign design, pavement marking design, special event operations planning, evacuation planning, and transportation planning. Before joining the NCHRP, she worked in the private sector and at the NYC Departments of Transportation and City Planning. Turner is a licensed professional engineer (PE) registered in New York, Maryland, Virginia, and the District of Columbia, and a road safety professional level 2, infrastructure (RSP2I).



**PATRICK ZELINSKI** joined TRB as a senior program officer in January 2023. Before joining the NCHRP, he worked at AASHTO for 10 years, where his job titles included engineering operations specialist; associate program manager; program manager, operations policy; and program manager, operations. Zelinsky previously worked at TRB from 2008 to 2013 as a manuscript preparer in the Publications Department and then as a communications/media associate for the second Strategic Highway Research Program (SHRP2).



**YI ZHAO** is a senior program officer at TRB and recently joined the Safety and TSMO team at the NCHRP. Before TRB, his 15-year career in traffic engineering and transportation planning spanned roles including assistant professor, senior research associate at the FHWA, and traffic engineering branch manager at the District Department of Transportation (DDOT). His areas of expertise are multimodal transportation system modeling, traffic engineering, traffic signal system operations, and work zone management. Zhao is also a registered professional engineer (PE) and certified professional transportation operations engineer (PTOE).





# NCHRP

PUBLICATIONS AND  
PROJECTS IN 2023



# TABLE 1. PUBLICATIONS OF THE NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM, 2023

## Research Reports

No.	Proj. No.	Title and Pages
1012	15-67	Wind Drag Coefficients for Highway Signs and Support Structures), 178 p.
1014	23-09	Developing a Highway Framework to Conduct an All-Hazards Risk and Resilience Analysis, 222 p.
1017	13-06A	Formulation of Long-Range Plans and Budgets for Replacement of Highway Operations Equipment, 108 p.
1026	12-95A	Guidelines for Adjacent Precast Concrete Box Beam Bridge Systems, 138 p.
1027	23-05	Guide to Recruiting, Developing, and Retaining Transportation Infrastructure Construction Inspectors (& WOD 337), 64 p.
1028	20-102(22)	State and Local Impacts of Automated Freight Transportation Systems, 172 p.
1029	17-72	Review of Crash Modification Factors in the <i>Highway Safety Manual</i> , 52 p.
1030	03-141	A Guide to Midblock Pedestrian Signals, 56 p.
1031	24-48	Determining Scour Depth around Structures in Gravel-Bed Rivers, 116 p.
1032	25-47	How to Measure and Communicate the Value of Access Management (& WOD 339), 112 p.
1033	17-43	Long-Term Roadside Crash Data Collection Program (& WOD 341), 108 p.
1034	23-02	Guidelines on Collaboration and Information Security for State DOTs, 76 p.
1035	23-07	Guide to Effective Methods for Setting Transportation Performance Targets (& WOD 358), 148 p.
1036	15-78	Roadway Cross-Section Reallocation: A Guide (& WOD 342), 160 p.
1037	20-07/ Task 358	Reducing Risks to Worker Safety in Work Zones Due to Distracted Drivers, 44 p.
1038	07-26	Update of <i>Highway Capacity Manual</i> : Merge, Diverge, and Weaving Methodologies (& WOD 343), 126 p.
1039	10-102	Risk-Based Construction Inspection: A Guide (& WOD 344), 110 p.
1040	14-39	Achieving Highway Runoff Volume and Pollutant Reduction Using Vegetated Compost Blankets: A Guide, 230 p.
1041	20-126(03)	Nondestructive Evaluation of Highway System Asset Foundational Condition and Capability, 176 p.
1042	20-126(02)	State Transportation Agency Decision-Making for System Performance: Practitioner's Guide (& WOD 345), 76 p.
1043	03-130	Guide for Roundabouts (& WOD 347), 426 p.
1044	17-81	Development and Application of Quantitative Macro-Level Safety Prediction Models (& WOD 348), 136 p.
1045	12-113	Improved Cross-Frame Analysis and Design: Wide-Flange T-Shape Sections, 76 p.
1046	13-08	Decision Making for Repair Versus Replacement of Highway Operations Equipment, 136 p.
1047	17-85	Development and Application of Crash Severity Models for Highway Safety: User Guidelines (& WOD 351), 70 p.
1048	12-117	Corrosion Protection of Steel Bridges Using Duplex Coating Systems, 74 p.
1049	20-102(27)	Realistic Timing Estimates for Automated Vehicle Implementation, 74 p.
1050	03-135	Wrong-Way Driving Solutions Handbook (& WOD 357), 150 p.
1051	20-102(28)	Preparing Transportation Agencies for Connected and Automated Vehicles in Work Zones, 128 p.
1052	08-129	Integrating Resilience Concepts and Strategies in Transportation Planning: A Guide, 202 p.
1053	15-70	Valuation and Compensation Approaches in Utility Accommodation: A Guide (& WOD 359), 48 p.
1054	11-08	Acquiring Utility Property Interests and Reimbursing Utility Relocation Costs: A Guide (& WOD 360), 336 p.
1055	03-134	Addressing Encroachment-Related Safety Issues in Work Zones: A Guide (& WOD 361), 40 p.
1056	10-95A	Toughness Requirements for Heat-Affected Zones of Welded Structural Steels for Highway Bridges, 98 p.
1057	10-106	Enhancement of the Practice for Certification of Inertial Profiling Systems, 54 p.
1058	25-55	Assessing Air Pollution Dispersion Models for Emissions Regulation, 68 p.
1059	08-131	Access to Jobs, Economic Opportunities, and Education in Rural Areas, 158 p.
1060	09-56A	Ignition Furnace Correction Factors: Identifying Influences and Minimizing Variability, 52 p.
1061	07-27	Highway and Street Design Vehicle Requirements, 152 p.
1062	07-28(01)	Assessing the Impacts of Right-Turn Lanes on Rural and Suburban Highways, 166 p.
1063	03-140	Applications of RFID and Wireless Technologies in Highway Construction and Asset Management: A Guide (& WOD 364), 150 p.
1064	17-84	Pedestrian and Bicycle Safety Performance Functions: An Update, 306 p.
1065	02-26	Life-Cycle Planning Analysis in a Transportation Asset Management Framework (& WOD 365), 100 p.
1066	08-118	Risk Assessment Techniques for Transportation Asset Management: Conduct of Research (& WOD 366), 156 p.
1067	25-62	Postwar Commercial Properties and Section 106: A Methodology for Evaluating Historic Significance (& WOD 367), 106 p.
1068	03-136	Right-Turn-on-Red Site Considerations and Capacity Analysis: Practitioner's Guide (& WOD 368), 52 p.
1069	17-86	Estimating Effectiveness of Safety Treatments in the Absence of Crash Data: A Guide (& WOD 369), 70 p.
1070	20-50(20)	Tools for Assuring WIM Data Quality: Practical Guide (& WOD 370), 162 p.
1071	03-138	Application of Big Data Approaches for Traffic Incident Management, 106 p.
1072	23-13(01)	Telecommuting, Remote Work, and Hybrid Schedules: Managing the Shift to a Flexible Work Future, 68 p.

No.	Proj. No.	Title and Pages
1073	22-48	Development of Crash Prediction Models for Short-Term Durations, 214 p.
1074	13-09	Maximizing Proceeds from the Fleet Asset Disposal Sales Process, 100 p.
1075	08-127	Becoming a Tech-Savvy DOT of Tomorrow (& WOD 371), 56 p.
1076	23-08	A Guide to Incorporating Maintenance Costs into a Transportation Asset Management Plan (& WOD 372), 84 p.
1078	12-119	MASH Railing Load Requirements for Bridge Deck Overhang, 268 p.
1079	23-04	Shared-Risk Insurance Pools for Transit Agencies: A Guide (& WOD 374), 70 p.
1082	10-108	Incorporating Nondestructive Testing in Quality Assurance of Highway Pavement Construction: Manual (& WOD 375), 74 p.
1083	10-103	Alkali-Silica Reactivity Potential and Mitigation: Test Methods and State of Practice, 80 p.
1088	20-128	State DOT Models for Organizing and Operating Emergency Response: A Guide (& WOD 378), 54 p.

## Syntheses of Highway Practice (Project 20-05)

No.	Topic No.	Title and Pages
598	53-07	Curing Practices for Concrete Pavements, 94 p.
599	53-05	Practices for Bioretention Stormwater Control Measures, 106 p.
600	53-04	Practices for the Collection, Use, and Management of Utility As-Built Information, 102 p.
601	53-06	Practices for Local Calibration of LRFD Geotechnical Resistance Factors, 108 p.
602	53-11	Resilient Design with Distributed Rainfall-Runoff Modeling, 120 p.
603	53-13	Practices for Steel Bridge Fabrication and Erection Tolerances, 116 p.
604	53-12	Practices for Adding Bicycle and Pedestrian Access on Existing Vehicle Bridges, 92 p.
605	53-08	Electric Vehicle Charging: Strategies and Programs, 112 p.
606	53-17	Integrating Freight and Active Transportation into Policies, Programs, Plans, and Project Development, 10 p.
607	53-16	Critical Findings for Tunnel Functional Systems, 86 p.
608	53-02	Practices to Motivate Safe Behaviors with Highway Construction and Maintenance Crews, 214 p.
609	53-09	Use of Unmanned Aerial Systems for Inspection of Stormwater Best Management Practices, 104 p.
610	53-03	Leveraging Social Media Data for Emergency Preparedness and Response, 76 p.
611	53-14	Use of Probe Data for Freight Planning and Operations, 68 p.
612	53-18	Moisture Measurement for Pavement Foundations and Slopes, 90 p.
613	53-10	Contrast Pavement Markings Practices, 70 p.

## Research Results Digests

No.	Proj. No.	Title and Pages
404	20-24(138)	Collective and Individual Actions to Envision and Realize the Next Era of America's Transportation Infrastructure: Phase 1, 20 p.

## Legal Research Digests (Project 20-06)

No.	Topic No.	Title and Pages
89	25-07	Planning and Environment Linkages: Review of Statutory Authority and Case Law, 28 p.
90	25-06	Best Value Procurement for Highway Construction: Legal Issues and Strategies, 60 p.

## Web-Only Documents

No.	Proj. No.	Title and Pages
337	23-05	Training and Certification of Construction Inspectors for Transportation Infrastructure: Conduct of Research Report (& Rep. 1027), 165 p.
339	25-47	Developing a Toolkit to Measure and Communicate the Value of Access Management (& Rep. 1032), 122 p.
341	17-43	Roadside Database Coding Manual (& Rep. 1033), 188 p.
342	15-78	Roadway Cross-Section Reallocation: Conduct of Research Report (& Rep. 1036), 361 p.
343	07-26	Traffic Modeling Document (& Rep 1038), 437 p.
344	10-102	Risk-Based Construction Inspection: Conduct of Research Report, 253 p.
345	20-126(02)	State Transportation Agency Decision-Making for System Performance: Conduct of Research Report (& Rep. 1042), 309 p.
347	03-130	Background and Summary of a Guide for Roundabouts, 139 p.
348	17-81	Macro-Level Analysis of Safety Planning and Crash Prediction Models: A Guide (& Rep. 1044), 30 p.
350	14-41	Long-Term Vegetation Management Strategies for Roadsides and Roadside Appurtenances, 120 p.
351	17-85	Development and Application of Crash Severity Models for Highway Safety: Conduct of Research Report (& Rep. 1047), 252 p.
352	17-72	Crash Modification Factors in the <i>Highway Safety Manual</i> : Resources for Evaluation (& Rep. 1029), 516 p.
353	12-115	Risk-Based Inspection and Strength Evaluation of Suspension Bridge Main Cable Systems, 166 p.
354	03-132	Safe and Effective Temporary Traffic Control for Mobile Operations on Two-Lane Roadways, 148 p.

No.	Proj. No.	Title and Pages
355	23-03	Cybersecurity Issues and Protection Strategies for State Transportation Agency CEOs, Volume 1: Program Summary Report, 108 p.
355	23-03	Cybersecurity Issues and Protection Strategies for State Transportation Agency CEOs, Volume 2: Transportation Cyber Risk Guide, 31 p.
356	20-123(06)	Development of a Guide for Accommodating Utilities within Highways and Freeways, 115 p.
357	03-135	Wrong-Way Driving Solutions, Policy, and Guidelines (& Rep. 1050), 178 p.
358	23-07	Developing a Guide to Effective Methods for Setting Transportation Performance Targets (& Rep.1035), 79 p.
359	15-70	Valuation and Compensation for Accommodating Utility and Communications Installations in Public Rights-of-Way (& Rep. 1053), 221 p.
360	11-08	Acquisition of Utility Property Interests and Compensation Practices for Utility Relocations (& Rep. 1054), 180 p.
361	03-134	Determination of Work Zone Encroachments, (& Rep. 1055), 167 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 1: Alaska, 331 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 2: California, 389 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 3: Florida, 353 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 4: Great Basin, 337 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 5: Great Lakes, 337 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 6: Hawaii, 359 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 7: Inland Northwest, 331 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 8: Maritime Northwest, 353 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 9: Mid-Atlantic, 349 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 10: Midwest, 355 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 11: Northeast, 343 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 12: Northern Plains, 363 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 13: Rocky Mountains, 343 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 14: Southeast, 343 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 15: Southern Plains, 341 p.
362	25-59	Pollinator Habitat Conservation Along Roadways, Volume 16: Southwest, 345 p.
363	14-43	Construction Guidelines for Cold Central Plant Recycling and Cold In-Place Recycling, 52 p.
364	03-140	Applications of RFID and Wireless Technologies in Highway Construction and Asset Management: Conduct of Research Report (& Rep. 1063), 77 p.
365	02-26	Implementation of Life-Cycle Planning Analysis in a Transportation Asset Management Framework (& Rep. 1065), 307 p.
366	08-118	Risk Assessment Techniques for Transportation Asset Management: Appendices (& Rep. 1066), 392 p.
367	25-62	Postwar Commercial Properties and Section 106: Piloting the Methodology for Evaluating Historic Significance (& Rep. 1067), 313 p.
368	03-136	Right-Turn-on-Red Operation at Signalized Intersections with Single and Dual Right-Turn Lanes: Evaluating Performance (& Rep. 1068), 128 p.
369	17-86	Estimating Effectiveness of Safety Treatments in the Absence of Crash Data: Conduct of Research Report (& Rep. 1069), 135 p.
370	20-50(20)	LTTP Data Analysis: Practical Tools and Procedures to Improve WIM Data Quality (& Rep. 1070), 208 p.
371	08-127	Impact of New Disruptive Technologies on the Performance of DOTs (& Rep. 1075), 101 p.
372	23-08	Incorporating Maintenance Costs into a Transportation Asset Management Plan (& Rep. 1076), 69 p.
373	08-134	Integrating Freight Movement into Twenty-First-Century Communities' Land Use, Design, and Transportation Systems, 56 p.
374	23-04	Developing a Guide to Shared-Risk Insurance Pools for Transit Agencies: Conduct of Research Report (& Rep. 1079), 30 p.
375	10-108	Incorporating Nondestructive Testing in Quality Assurance of Highway Pavement Construction: Conduct of Research Report (& Rep. 1082), 186 p.
376	09-62	Rapid Tests and Specification Language for Construction of Asphalt-Treated Cold Recycled Pavements, 57 p.
378	20-128	Emergency Response: Organizational and Operational Models Used by State DOTs (& Rep. 1088), 123 p.
379	20-124	Deploying Transportation Security Practices in State DOTs, 219 p.
380	08-132	Accessing America's Great Outdoors: Forecasting Recreational Travel Demand, 103 p.
381	09-64	Developing Laboratory Methods and Specification Language to Test Tack Coat Materials, 185 p.
384	20-116	Developing an Emergency Response Playbook for State Transportation Agencies (& Rep. 1093), 136 p.
385	20-127	Business Case and Communications Strategies for State DOT Resilience Efforts, 133 p.
387	17-89A	Safety Prediction Model for Freeway Facilities with High Occupancy Lanes, 144 p.
388	10-99	Framework for Implementing Constructability throughout Project Development from NEPA to Final Design, 481 p.
389	09-57A	Ruggedness of Laboratory Tests to Assess Cracking Resistance of Asphalt Mixtures, 234 p.

## WebResources

No.	Topic No.	Title
2	19-18	Road Usage Charge Guide

Notes: Publications in parentheses with an ampersand (&) are companion publications. See Table 2 for project titles. See inside back cover for ordering information.

**TABLE 2. STATUS (AS OF 12/31/2023) OF PROJECTS ACTIVE OR PENDING DURING 2023**

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
<b>Research Area 1: Design—Pavements</b>							
NCHRP 01-54A: Guidelines for Limiting Damage to Flexible and Composite Pavements Due to the Presence of Water	2014	Applied Pavement Technology	\$203,699	6/4/19	12/31/21	Completed	Publication decision pending
NCHRP 01-57B: Validating Proposed Definitions for Comparable Pavement Cracking Data	2022	Georgia Tech Research Corporation	\$500,000	4/12/23	4/10/26	Research in progress	
NCHRP 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	2018	Arizona State University	\$500,000	8/15/18	8/1/23	Completed	To be published as <i>NCHRP Research Report 1096</i>
NCHRP 01-60: Measuring the Characteristics of Pavement Surface Images and Developing Standard Practices for Calibration, Certification, and Verification of Imaging Systems	2018	Georgia Tech Research Corporation	\$593,633	9/10/18	1/31/23	Completed	Publication decision pending
NCHRP 01-62: Impact of Flooding on the Resiliency of Pavement Systems	2023		\$650,000			Contract pending	
NCHRP 01-63: Development of Pavement Structural Metrics/Indices from Continuous Measurement for Pavement Management and Pavement Design Applications	2024		\$500,000			In development	
<b>Research Area 2: Administration—Economics</b>							
NCHRP 02-26: Implementation of Life-Cycle Planning Analysis in a Transportation Asset Management Framework	2019	WSP USA Inc.	\$499,998	4/5/19	9/30/22	Completed	Published as <i>NCHRP Research Report 1065</i> and <i>NCHRP Web-Only Document 365</i>
<b>Research Area 3: Traffic—Operations and Control</b>							
NCHRP 03-78C: Training and Technology Transfer for Accessibility Guidelines for Roundabouts and Channelized Turn Lanes	2016	Kittelson & Associates	\$250,000	1/4/17	9/30/20	Completed	Agency final report posted on the project web page
NCHRP 03-114(01): Planning and Evaluating Active Traffic Management Strategies	2014	Texas A&M Transportation Institute	\$334,796	2/25/21	12/22/23	Research in progress	
NCHRP 03-119: Application of MASH Test Criteria to Breakaway Sign and Luminaire Supports and Crashworthy Work Zone Traffic Control Devices	2015	George Mason University	\$879,134	9/28/15	1/31/23	Expired	The research team failed to meet the project's objective despite extensions; work will continue under a new contract
NCHRP 03-119(01): Application of MASH Test Criteria to Breakaway Sign and Luminaire Supports and Crashworthy Work Zone Traffic Control Devices	2015		\$315,000			In development	
NCHRP 03-125: Evaluation of Change and Clearance Intervals Prior to the Flashing Yellow Arrow Permissive Left-Turn Indication	2016	University of Wisconsin–Madison	\$300,000	9/21/16	1/31/23	Completed	Publication decision pending
NCHRP 03-126: Transportation Operations Manual	2017	WSP USA Inc.	\$749,964	8/2/19	2/6/23	Completed	Combined with NCHRP Project 20-123(15); managed by NCHRP Project 03-126. Final deliverables posted on NCHRP project web page and sent to AASHTO
NCHRP 03-128: Business Intelligence Techniques for Transportation Agency Decision Making	2018	Applied Engineering Management Corporation	\$395,940	6/20/18	1/27/23	Completed	To be published as <i>NCHRP Research Report 1099</i>
NCHRP 03-129: Essential Communications: A Guide to Land Mobile Radio (LMR)	2018	CommDEX Consulting LLC	\$536,433	8/1/18	12/31/21	Completed	See NCHRP Project 03-129A for follow-on activity

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 03-129A: Update of Essential Communications: A Guide to Land Mobile Radio (LMR)	2023		\$57,183			In development	
NCHRP 03-130: Guide for Roundabouts	2018	Kittelson & Associates, Inc.	\$750,000	6/1/18	9/30/22	Completed	Published as <i>NCHRP Research Report 1043</i> and <i>NCHRP Web-Only Document 347</i>
NCHRP 03-134: Determination of Encroachment Conditions in Work Zones	2019	Texas A&M Transportation Institute	\$428,073	6/20/19	11/30/22	Completed	Published as <i>NCHRP Research Report 1055</i> and <i>NCHRP Web-Only Document 361</i>
NCHRP 03-135: Wrong-Way Driving Prevention Solutions and Guidance	2019	Auburn University	\$600,000	7/22/19	12/23/22	Completed	Published as <i>NCHRP Research Report 1050</i> and <i>NCHRP Web-Only Document 357</i>
NCHRP 03-136: Evaluating the Performance of Right-Turn-On-Red Operation at Signalized Intersections (with single and dual right-turn lanes)	2019	Iowa State University	\$300,000	8/13/19	9/30/22	Completed	Published as <i>NCHRP Research Report 1068</i> and <i>NCHRP Web-Only Document 368</i>
NCHRP 03-138: Application of Big Data Approaches for Traffic Incident Management (TIM)	2020	Applied Engineering Management Corporation	\$489,998	7/28/20	3/28/23	Completed	Published as <i>NCHRP Research Report 1071</i>
NCHRP 03-139: Next Generation of the USLIMITS2 Speed Limit Setting Expert System	2020	University of North Carolina - Chapel Hill	\$450,000	8/1/20	2/1/23	Expired	The research team failed to meet the project's objective within the original contract time; work will continue under a new contract
NCHRP 03-139(01): Next Generation of the USLIMITS2 Speed Limit Setting Expert System	2020		\$306,184			In development	Includes \$100,000 from FHWA
NCHRP 03-140: Applications of RFID and Wireless Technologies for Highway Construction	2020	University of Kentucky Research Foundation	\$370,000	8/5/20	2/6/23	Completed	Published as <i>NCHRP Research Report 1063</i> and <i>NCHRP Web-Only Document 364</i>
NCHRP 03-141: Guidance on Midblock Pedestrian Signals	2021	Texas A&M Transportation Institute	\$125,000	6/16/21	4/14/23	Completed	Published as <i>NCHRP Research Report 1030</i>
NCHRP 03-142: Evaluating the Impacts of Real-Time Warnings and Variable Speed Limits on Safety and Travel Reliability during Weather Events	2022	University of Connecticut	\$400,000	8/4/22	8/4/25	Research in progress	
NCHRP 03-143: Warrants for a Pedestrian Traffic Control Signal and for Other Pedestrian Traffic Control Devices	2022		\$600,000			Contract pending	
NCHRP 03-144: Leveraging Existing Traffic Signal Assets to Obtain Quality Traffic Counts and Enhance Transportation Monitoring Programs	2022	Texas A&M Transportation Institute	\$450,000	9/29/22	3/28/25	Research in progress	
NCHRP 03-145: National Traffic Sensor System Evaluation Program	2023		\$600,000			Contract pending	
NCHRP 03-146: Transportation Operations Manual Best Practices Guide	2023		\$350,000			Contract pending	
NCHRP 03-147: LED Applications on Traffic Control Devices	2023		\$500,000			Contract pending	
NCHRP 03-148: Capabilities, Requirements, Planning, and Preparing to Virtually Operate Traffic Management Systems (TMS)	2023		\$600,000			Contract pending	
NCHRP 03-149: Signal Timing Manual: Development of the Third Edition	2023		\$750,000			Contract pending	
NCHRP 03-150: Update to Procedure for Determining Work Zone Speed Limits	2024		\$600,000			In development	

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 03-151: Data Management Plans, Practices, and Data Subsystems for Traffic Management Systems	2024		\$500,000			In development	
<b>Research Area 5: Traffic—Illumination and Visibility</b>							
NCHRP 05-22A: Gaps and Emerging Technologies in the Application of SSL in Roadway Lighting	2019	Virginia Polytechnic Institute & State University	\$300,000	9/3/20	9/2/23	Completed	Publication decision pending
NCHRP 05-24: Guidelines for Vehicle and Equipment Color, Marking, and Lighting	2018	Texas A&M Transportation Institute	\$600,000	6/1/18	12/31/22	Completed	Publication decision pending
NCHRP 05-25: Guide to the Contextual Application of Overhead Lighting on Highways	2021	WSP USA	\$649,548	10/11/23	4/10/26	Research in progress	
NCHRP 05-26: Development of an Updated Warranting System for Roadway Lighting	2023		\$350,000			Contract pending	
NCHRP 05-27: Best Practices for Roundabout and Alternative Intersection/Interchange Lighting	2023		\$500,000			Contract pending	
<b>Research Area 6: Maintenance—Snow and Ice Control</b>							
NCHRP 06-18: Guide for Snow and Ice Control Operations	2019	Texas A&M Transportation Institute	\$300,000	7/1/19	3/31/21	Completed	Final deliverables posted on NCHRP project web page and final deliverables sent to AASHTO
NCHRP 06-19: Guidebook for Mechanical Methods for Snow and Ice Control Operations	2021	Wilfrid A. Nixon & Associates LLC	\$264,269	6/2/21	12/31/23	Completed	Publication decision pending
<b>Research Area 7: Traffic—Traffic Planning</b>							
NCHRP 07-26: Update of Highway Capacity Manual: Merge, Diverge, and Weaving Methodologies	2019	Kittelson & Associates	\$400,000	6/10/19	12/31/22	Completed	Published as <i>NCHRP Research Report 1038</i> and <i>NCHRP Web-Only Document 343</i>
NCHRP 07-27: An Update of the Green Book Design Vehicles	2019	MRIGlobal	\$400,000	5/8/19	9/30/22	Completed	Published as <i>NCHRP Research Report 1061</i>
NCHRP 07-28(01): Assessing the Safety Impacts of Right-Turn Lanes on Rural and Suburban Highways	2019	MRIGlobal	\$250,000	5/6/19	7/31/22	Completed	Published as <i>NCHRP Research Report 1062</i>
NCHRP 07-28(02): Assessing the Multi-Modal Safety Performance of Turn Lanes	2019		\$400,000			Contract pending	
NCHRP 07-29: Development of the 8th Edition of AASHTO's A Policy on the Geometric Design of Highways and Streets (Green Book)	2021	Texas A&M Transportation Institute	\$1,000,000	5/10/21	5/10/24	Research in progress	
NCHRP 07-30: Methods for Assigning Short-Duration Traffic Volume Counts to Adjustment Factor Groups for Estimating AADT	2021	Texas A&M Transportation Institute	\$500,000	6/1/21	4/30/24	Research in progress	
NCHRP 07-31: State DOT and Tribal Use of Active Transportation Data: Practices, Sources, Needs, and Gaps	2021	Portland State University	\$800,000	12/18/23	6/18/26	Research in progress	
NCHRP 07-32: Future-Proofing Automatic Traffic Signal Performance Measurement Systems for Scalability, Transferability, and CAV Integration.	2022		\$500,000			Contract pending	
NCHRP 07-33: Evaluate the Benefits of Increasing Clear Zone at Higher Speed/Traffic Volume/Crash Locations	2023		\$450,000			Contract pending	
NCHRP 07-34: Toward AI-Enabled Decision Support Systems for TSMO Applications	2023		\$450,000			Contract pending	
NCHRP 07-35: Improving Crash Data for Active Transportation Users	2024		\$1,250,000			In development	
NCHRP 07-36: Self-Explaining Roads in the Safe System: Addressing Target Speeds within Context	2024		\$700,000			In development	



Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
<b>Research Area 8: Transportation Planning—Planning Methods and Processes</b>							
NCHRP 08-115: Guidebook for Data and Information Systems for TAM	2018	Spy Pond Partners	\$700,000	8/1/18	12/31/22	Completed	Final deliverables posted on NCHRP project web page
NCHRP 08-118: Risk Assessment Techniques for Transportation Asset Management	2019	Starris Corporation	\$600,000	6/24/19	6/30/22	Completed	Published as NCHRP Research Report 1066 and NCHRP Web-Only Document: 366
NCHRP 08-119: Data Integration, Sharing, and Management for Transportation Planning and Traffic Operations	2019	Applied Engineering Management Corporation	\$1,349,990	9/16/19	12/31/23	Research in progress	
NCHRP 08-123: Census Transportation Data Field Guide for Transportation Applications	2019	Cambridge Systematics	\$499,859	6/1/19	2/6/23	Completed	Publication decision pending
NCHRP 08-124: Quantifying the Impacts of Corridor Management	2018	Metro Analytics PLLC	\$449,427	6/17/19	1/31/22	Completed	Publication decision pending
NCHRP 08-127: Emerging Issues: Impact of New Disruptive Technologies on the Performance of DOTs	2020	Cambridge Systematics	\$249,731	9/1/20	8/31/22	Completed	Published as <i>NCHRP Research Report 1075</i> and <i>NCHRP Web-Only Document 371</i>
NCHRP 08-128: Snapshots of Planning Practices	2020	Cambridge Systematics	\$200,000	8/1/23	2/1/25	Research in progress	
NCHRP 08-129: Incorporating Resilience Concepts and Strategies in Transportation Planning Efforts	2020	Applied Engineering Management Corporation	\$299,979	9/10/20	6/30/22	Completed	Published as <i>NCHRP Research Report 1052</i>
NCHRP 08-130: Best Practices in Coordination of Public Transit and Ride Sharing	2020	Texas A&M Transportation Institute	\$250,000	9/1/22	8/31/24	Research in progress	
NCHRP 08-131: Access to Jobs, Economic Opportunities, and Education in Rural Areas	2020	EBP US Inc.	\$249,951	9/1/20	5/31/22	Completed	Published as <i>NCHRP Research Report 1059</i>
NCHRP 08-132: Accessing America's Great Outdoors: Understanding Recreational Travel Patterns, Demand, and Future Investment Needs for Transportation Systems	2020	Resource Systems Group, Inc.	\$449,978	8/5/20	3/30/23	Completed	Published as <i>NCHRP Web-Only Document 380</i>
NCHRP 08-133: Development and Implementation of the National Intercity Bus Atlas	2020	Resource Systems Group, Inc.	\$599,994	2/5/21	2/1/24	Completed	See NCHRP Project 03-133(01) for follow-on activity
NCHRP 08-133(01): Implementing the National Intercity Bus Atlas	2020	Resource Systems Group, Inc.	\$319,533	10/23/23	9/22/24	Research in progress	
NCHRP 08-134: Integrating Freight Movement into 21st Century Communities' Land Use, Design, and Transportation Systems	2020	Cambridge Systematics	\$489,998	12/7/20	3/7/23	Completed	Published as <i>NCHRP Web-Only Document 373</i>
NCHRP 08-135: Reliability and Quality of Service Evaluation Methods for Rural Highways	2020	University of Florida	\$399,960	12/8/20	9/8/23	Completed	Publication decision pending
NCHRP 08-136: Guidance on Using Performance-Based Management Approaches for Maintenance	2021	Applied Pavement Technology, Inc.	\$500,000	11/17/22	11/16/24	Research in progress	
NCHRP 08-137: Updates to the Digital Edition of the AASHTO Transportation Asset Management Guide	2021	Spy Pond Partners	\$450,000	8/22/22	6/22/24	Research in progress	
NCHRP 08-138: Guide to the Integration of Transportation Systems Management and Operations into Transportation Asset Management	2021	WSP	\$499,951	8/22/23	12/22/25	Research in progress	
NCHRP 08-139: Guide for Preventing and Mitigating the Risk of Bridge and Tunnel Strikes by Motor Vehicles	2021	University of Wisconsin - Milwaukee	\$500,000	10/1/21	4/1/24	Research in progress	Includes \$400,000 from FHWA
NCHRP 08-140: Guide for Truck Parking Information Management Systems	2021	Cambridge Systematics	\$499,911	8/17/22	6/16/24	Research in progress	
NCHRP 08-141: A Guidebook for Local Truck Parking Regulations	2021	Fehr and Peers	\$450,000	10/26/22	4/26/25	Research in progress	

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 08-142: Virtual Public Involvement: A Manual for Effective, Equitable, and Efficient Practices for Transportation Agencies	2021	Rutgers, The State University of New Jersey	\$650,000	9/21/21	3/20/24	Research in progress	
NCHRP 08-143: Guide to the Application of Spatial Segmentation on Travel Time Reliability Measures	2021	Cambridge Systematics	\$150,000	10/18/23	10/17/25	Research in progress	
NCHRP 08-144: Rural Transit Fleet Mix and Vehicle Size Decision Trees	2021	North Dakota State University	\$250,000	12/4/23	12/4/25	Research in progress	
NCHRP 08-145: Utilizing Cooperative Automated Transportation (CAT) Data to Enhance the Use of Freeway Operational Strategies	2021	Noblis, Inc.	\$500,000	7/14/21	2/9/24	Completed	To be published as <i>NCHRP Research Report 1080</i>
NCHRP 08-146: Integrating Resiliency into Transportation System Operations	2021	Metro Analytics, PLLC	\$350,000	12/14/22	10/14/24	Research in progress	
NCHRP 08-147/TCRP B-49: Improving Public Transportation in Rural Areas and Tribal Communities	2021	KFH Group Inc.	\$749,504	8/27/21	2/27/24	Research in progress	Jointly funded with TCRP Project B-49. Initially, TCRP funds were \$100,000. Additional \$149,585 TCRP funds added 09/9/22 to expand project scope. Project is managed by NCHRP Project 08-147
NCHRP 08-148: Utility Abandonment, Out of Service Plant, and Decommissioning without Removal on Public Right of Way	2021	Texas A&M Transportation Institute	\$300,000	1/17/23	1/16/25	Research in progress	
NCHRP 08-149: Estimating Benefits of Closing Gaps in Active Transportation Networks	2021	Alta Planning and Design, Inc.	\$450,000	9/19/22	7/18/24	Research in progress	
NCHRP 08-150: Valuation of Transportation Equity in Active Transportation and Safety Investments	2022		\$650,000			Contract pending	
NCHRP 08-151: Risk Management at State DOTs: Building Momentum and Sustaining the Practice	2022	Jacobs Engineering Group, Inc.	\$350,000	6/21/22	6/20/24	Research in progress	
NCHRP 08-152: Strategies for Improving Diversity, Equity, and Inclusion in the Transportation Planning Profession	2022	Canete-Medina Consulting	\$350,000	5/1/23	12/31/24	Research in progress	
NCHRP 08-153: A Guide for the Development and Use of Truck Traffic Forecasts in Design	2022		\$425,000			Contract pending	
NCHRP 08-154: Guidance for Agencies to Incorporate Uncertainty into Long-Range Transportation Planning	2022	EBP US Inc.	\$600,000	8/31/22	8/30/25	Research in progress	
NCHRP 08-155: Handbook for Addressing Racial Disparities in the Project Delivery Process	2022	High Street Inc.	\$400,000	6/8/23	6/8/25	Research in progress	
NCHRP 08-156: Planning for Innovative and Emerging Mobility Futures at Intermodal Passenger Facilities	2022	Nelson/Nygaard	\$200,000	4/6/22	7/14/24	Research in progress	Jointly funded with TCRP Project D-21 \$100,000 and ACRP Project 03-64 \$150,000; managed by TCRP Project D-21
NCHRP 08-157: Best Practices for Data Fusion of Probe and Point Detector Data	2022	Michael L Pack, LLC	\$200,000	9/7/22	3/7/24	Research in progress	
NCHRP 08-158: Communicating the Value, Interactions, and Impacts of Freight to Stakeholders	2022		\$350,000			Contract pending	
NCHRP 08-159: How to Assess and Address Equity of Access to Essential Goods and Services	2022		\$500,000			Contract pending	
NCHRP 08-160: Guide to Identify and Mitigate the Negative Effects of Gentrification Cause by Transportation Investment	2022		\$400,000			Contract pending	

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 08-161: Cultivating Accountability Through Meaningful Public Engagement	2022		\$500,000			Contract pending	
NCHRP 08-162: Guidance for Implementing Equitable Transportation Decision-Making	2022	Thrivance Group LLC	\$750,000	8/24/22	12/24/24	Research in progress	
NCHRP 08-163: Defining Appropriate Design and Accommodation Thresholds for Active Transportation in a Context-Driven Approach	2023		\$550,000			Contract pending	
NCHRP 08-164: Institutional Integration of Active Transportation	2023		\$600,000			Contract pending	
NCHRP 08-165: Use of Active Transportation Data in Decision-Making	2023		\$550,000			Contract pending	
NCHRP 08-166: Racial and Socioeconomic Inequities in Active Transportation Safety	2023		\$750,000			Contract pending	
NCHRP 08-167: A Guide for Creating Effective Visualizations	2023		\$375,000			Contract pending	
NCHRP 08-168: Analysis and Assessment of the National Performance Management Data	2023		\$550,000			Contract pending	
NCHRP 08-169: Valuing Diversity, Equity, and Inclusion in Transportation Asset Management	2023		\$500,000			Contract pending	
NCHRP 08-170: Closing the Loop: Post-Implementation Evaluation of Transportation Projects	2023		\$600,000			Contract pending	
NCHRP 08-171: Institutionalizing the Safe System Approach in Transportation Planning and Programming	2023	Fehr & Peers	\$400,000	10/30/23	10/29/25	Research in progress	
NCHRP 08-172: Benefit Analysis of Private Health Sector Investments in Non-Emergency Medical Transportation	2023		\$400,000			Contract pending	
NCHRP 08-173: Impacts of E-Commerce on Travel and Land Use Patterns	2023		\$400,000			Contract pending	
NCHRP 08-174: Development of a Surveying and Mapping Guide for Transportation Projects	2023		\$600,000			In development	
NCHRP 08-175: Understanding Travel Behavior Impacts of Transportation Systems Management and Operations (TSMO)	2024		\$500,000			In development	
NCHRP 08-176: Balancing Freight and Goods Delivery Needs into Designing Complete Streets of the Future	2024		\$500,000			In development	
NCHRP 08-177: Digitizing Bicycle and Pedestrian Treatments for Promoting Active Transportation Equity and Safety	2024		\$500,000			In development	
NCHRP 08-178: Identifying and Evaluating Divided, Overburdened, and Underrepresented Communities	2024		\$500,000			In development	
NCHRP 08-179: Strategies and Actions for Collaboration: A Guide for DOTs, MPOs, and Partners	2024		\$500,000			In development	
NCHRP 08-180: Streamlining Tools for Cultural Resources Compliance in Response to Federally Mandated Timeframes	2024		\$300,000			In development	
NCHRP 08-181: Understand How Climate Change and Extreme Weather Impacts the Mobility of Socially Vulnerable Populations	2024		\$500,000			In development	
NCHRP 08-182: Using System Performance Data to Communicate Benefits of Transportation Systems Management and Operations (TSMO) Strategies	2024		\$400,000			In development	
NCHRP 08-183: Volunteer Driver Programs (VDPs) Serving Rural and Low Density Communities	2024		\$350,000			In development	

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 08-184: Induced Demand Assessment Framework: A Guide	2024		\$450,000			In development	
<b>Research Area 9: Materials and Construction—Bituminous Materials</b>							
NCHRP 09-56A: Identifying Influences on and Minimizing the Variability of Ignition Furnace Correction Factors: Phase II	2016	Auburn University	\$250,000	5/12/17	2/28/22	Completed	Published as <i>NCHRP Research Report 1060</i>
NCHRP 09-57A: Ruggedness of Laboratory Tests to Assess Cracking Resistance of Asphalt Mixture	2018	Texas A&M Transportation Institute	\$750,000	6/15/18	10/31/22	Completed	To be published as <i>NCHRP Web-Only Document 389</i>
NCHRP 09-57B: Field Validation of Laboratory Cracking Tests of Asphalt Mixtures	2023		\$250,000			Contract pending	
NCHRP 09-60: Addressing Impacts of Changes in Asphalt Binder Formulation and Manufacture on Pavement Performance through Changes in Asphalt Binder Specifications	2016	Western Research Institute	\$1,650,000	7/6/16	7/31/24	Research in progress	
NCHRP 09-62: Rapid Tests and Specifications for Construction of Asphalt-Treated Cold Recycled Pavements	2017	Virginia Department of Transportation	\$999,751	6/1/17	8/31/22	Completed	Phase IV Report published as <i>NCHRP Web-Only Document 376</i>
NCHRP 09-63: A Calibrated and Validated National Performance-Related Specification for Emulsified Asphalt Binder	2019	Asphalt Institute	\$1,000,000	5/1/19	3/20/27	Research in progress	Includes continuation funding of \$500,000
NCHRP 09-64: Developing Laboratory Methods and Specifications to Test Tack Coat Materials	2020	University of Nevada, Reno	\$500,000	4/15/20	1/31/23	Completed	Published as <i>NCHRP Web-Only Document 381</i>
NCHRP 09-65: Capturing Durability of High Recycled Binder Ratio (RBR) Asphalt Mixture	2021	Texas A&M Transportation Institute	\$750,000	3/26/21	3/26/24	Research in progress	
NCHRP 09-66: Performance Properties of Laboratory Produced Recycled Plastic Modified (RPM) Asphalt Binders and Mixtures	2021	Auburn University	\$500,000	4/30/21	8/30/24	Research in progress	
NCHRP 09-67: New Materials & Technology Deployment in Asphalt Pavement Structural Design	2021		\$400,000			In development	
NCHRP 09-68: Recycled Asphalt Materials: Binder Availability and Its Impact on Mix Performance	2022	Auburn University	\$500,000	8/18/22	2/17/25	Research in progress	
NCHRP 09-69: Verifying Quantities of Materials Used in Asphalt Mixtures at Production Facilities	2022	University of Nevada, Reno	\$350,000	6/28/22	10/28/24	Research in progress	
NCHRP 09-70: Feasibility Evaluation and Guidance Development for Implementing Practical Aging Protocols for Balanced Mix Design (BMD) Verification and Acceptance	2024		\$1,000,000			In development	
NCHRP 09-71: Guidance to Develop Optimized Framework of Asphalt Mixture Performance Testing for Balanced Mix Design and Acceptance (BMD&A)	2024		\$850,000			In development	
NCHRP 09-72: Sensitivity Evaluation of Balanced Mix Design Performance Tests to Binder Properties and Mix Design Variables	2024		\$500,000			In development	
<b>Research Area 10: Materials and Construction—Specifications, Procedures, and Practices</b>							
NCHRP 10-95A: Toughness Requirements for Heat-Affected Zones of Welded Structural Steels for Highway Bridges	2014	University of Kansas	\$425,000	9/19/16	1/30/23	Completed	Published as <i>NCHRP Research Report 1056</i>
NCHRP 10-99: Guidebook for Implementing Constructability Across the Entire Project Development Process: NEPA to Final Design	2017	University of Florida	\$450,000	5/24/18	2/25/22	Completed	To be published as <i>NCHRP Web-Only Document 388</i>
NCHRP 10-102: A Guidebook for Risk-Based Construction Inspection	2019	HKA Global Inc.	\$415,719	6/18/19	7/17/22	Completed	Published as <i>NCHRP Research Report 1039</i> and <i>NCHRP Web-Only Document 344</i>

Name	FY	Subcontractor	Contract Amount	Contract		Status	Status Comments
				Start Date	Contract End Date		
NCHRP 10-103: Improving Guidance of AASHTO R 80/ASTM C 1778 for Alkali-Silica Reactivity (ASR) Potential and Mitigation	2019	University of Texas - Austin	\$648,500	6/15/19	6/14/23	Completed	Published as <i>NCHRP Research Report 1083</i>
NCHRP 10-104: Recommendations for Revision of AASHTO M 295 Standard Specification to Include Marginal and Unconventional Source Coal Fly Ashes	2019	South Dakota School of Mines and Technology	\$600,000	8/1/19	3/31/23	Completed	Publication decision pending
NCHRP 10-105: Verification of Traffic Speed Deflection Devices' (TSSD) Measurements	2020	Wood Environment & Infrastructure Solutions, Inc.	\$399,989	8/3/20	5/31/23	Completed	Final deliverables posted on NCHRP project web page
NCHRP 10-106: Update of AASHTO Standard Practice for Certification of Inertial Profiling Systems (R 56)	2020	Wood Environment & Infrastructure Solutions, Inc.	\$249,984	8/3/20	12/16/22	Completed	Published as <i>NCHRP Research Report 1057</i>
NCHRP 10-107: Guide for Implementing Performance Specifications	2020	Applied Research Associates	\$600,000	3/5/20	10/31/22	Expired	The project failed to meet the expected progress within the contract time
NCHRP 10-108: Manual for Incorporating NDT in Quality Assurance	2020	Applied Research Associates	\$250,000	10/1/20	3/31/23	Completed	Final deliverables published as <i>NCHRP Research Report 1082</i> and <i>NCHRP Web-Only Document 375</i>
NCHRP 10-109: Modern Solutions to Safe and Efficient Work Zone Travel	2021	Virginia Polytechnic Institute & State University	\$600,000	5/4/21	5/4/24	Research in progress	
NCHRP 10-110: 3D Modeling Guide for Construction Inspection	2021	Greenman-Pedersen, Inc.	\$299,748	6/24/21	6/24/23	Expired	The research team failed to meet the project's objective within the original contract time; work will continue under a new contract
NCHRP 10-111: Evaluation and Selection of 3D Model Viewers for Construction Inspection	2022	Iowa State University	\$400,000	2/21/23	8/21/25	Research in progress	
NCHRP 10-112: Guidelines for Digital Technologies and Systems for Remote Construction Inspection for Highway Infrastructure Projects	2022	Oregon State University	\$500,000	11/23/22	5/22/25	Research in progress	
NCHRP 10-113: Quality Management for 3D Model-Based Project Development and Delivery	2022	HDR Engineering, Inc.	\$450,000	8/18/22	2/18/25	Research in progress	
NCHRP 10-114: Developing Performance and Safety Specifications for Rejuvenating Seals	2022	Auburn University	\$300,000	8/4/22	8/4/25	Research in progress	
NCHRP 10-115: Guidebook on Progressive Design-Build for Transportation Projects: Project Planning through Project Implementation	2023		\$300,000			Contract pending	
NCHRP 10-116: Quantifying Variability in Quality Characteristics of Pavements	2023		\$500,000			Contract pending	
NCHRP 10-117: Design and Repair of Glass Fiber Reinforced Polymer Concrete Bridge Barriers	2023		\$850,000			Contract pending	
NCHRP 10-118: Effective Timelines and Contractual Strategies for Accelerated Bridge Construction Projects	2023		\$275,000			Contract pending	
NCHRP 10-119: Guidance for Implementing Utility Investigations in Alignment with Project Delivery	2023	Iowa State University	\$400,000	10/16/23	10/15/26	Research in progress	
NCHRP 10-120: Guidance for Including Right-of-Way and Utilities in Value Engineering Studies	2023		\$400,000			Contract pending	
NCHRP 10-121: Guidelines for the Application of Ground Modification Methods for Highway Structures	2023		\$450,000			Contract pending	

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 10-122: Update of the AASHTO Practical Guide to Cost Estimating (PGCE)	2023		\$250,000			Contract pending	
NCHRP 10-123: Incorporating Quality Assurance into Green Public Procurement Practices	2023		\$350,000			Contract pending	
NCHRP 10-124: Development of Field Test to Determine Actual Percent Embedment of Chip Seal Aggregate	2023		\$400,000			Contract pending	
NCHRP 10-125: Update Bridge Construction Requirements	2023		\$700,000			Contract pending	
NCHRP 10-126: Field-Cured Products and Water Quality: A Guide for Screening and Risk Mitigation	2024		\$350,000			In development	
NCHRP 10-127: Impact of Tension Flange Holes on the Strength and Ductility of Composite Steel Girders	2024		\$250,000			In development	
NCHRP 10-128: Advancing Multi-sensor Weigh-in-Motion (WIM) Technology for Improving Weight Data Accuracy and Reliability	2024		\$450,000			In development	
NCHRP 10-129: Field Studies of Steel Girder Fit-up	2024		\$300,000			In development	
NCHRP 10-130: Guidebook for Using Alternative Contracting Methods for Small Highway Projects	2024		\$400,000			In development	
NCHRP 10-131: Implementation of Full-Scale Laboratory Tests to Determine Performance Properties of Geosynthetic- Reinforced Pavements	2024		\$750,000			In development	
NCHRP 10-132: Improving Bridge Resiliency Through Understanding the Interaction Between Pier and Contraction Scour, Total Scour Components, and Developing Scour Profiles.	2024		\$800,000			In development	
NCHRP 10-133: Pavement Marking Friction Levels and Testing Methods Needed for Road Users (Vehicular and Vulnerable Ssers, i.e., Motorcycles and Bicycles)	2024		\$410,000			In development	
NCHRP 10-134: Performance-Based Tests for Asphalt Emulsion Treatments as part of Agency Acceptance and Incentive Programs	2024		\$400,000			In development	
NCHRP 10-135: Removing Barriers to Sharing Subsurface Utility Engineering (SUE) and Digital As-Built Data (DAB) between Utility Companies and State Departments of Transportation (DOTs)	2024		\$600,000			In development	
NCHRP 10-136: Right-of-Way and Utility Risk Identification and Management	2024		\$700,000			In development	
NCHRP 10-137: Specifications for New Construction and Rehabilitation of Movable Bridges	2024		\$500,000			In development	
NCHRP 10-138: Strategies for Earlier, More Effective Right of Way Engineering Involvement in Project Delivery	2024		\$450,000			In development	
NCHRP 10-139: Update the AASHTO Pavement Management Guide	2024		\$500,000			In development	
NCHRP 10-140: Managing Transportation Rights-of-Way with a Utility Awareness	2024		\$500,000			In development	
<b>Research Area 12: Design—Bridges</b>							
NCHRP 12-113: Proposed Modification to AASHTO Cross-Frame Analysis and Design	2017	University of Texas - Austin	\$749,950	6/1/17	6/30/22	Completed	Phase I published as <i>NCHRP Research Report 96</i> ; Phase II published as <i>NCHRP Research Report 1045</i>

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 12-114: Guidance on Seismic Site Response Analysis with Pore Water Pressure Generation	2018	GeoLogic Associates Inc.	\$639,989	11/8/18	1/31/23	Completed	
NCHRP 12-114A: Guidance on Seismic Site Response Analysis with Pore Water Pressure Generation [Final Report Enhancement]	2018	GeoLogic Associates Inc.	\$10,000	7/17/23	9/17/23	Completed	To be published as <i>NCHRP Research Report 1092</i> and <i>NCHRP Web-Only Document 383</i>
NCHRP 12-115: Guidelines for Risk-Based Inspection and Strength Evaluation of Suspension Bridge Main Cable Systems	2018	Modjeski & Masters	\$365,899	8/14/18	10/31/22	Completed	Published as <i>NCHRP Web-Only Document 353</i> and final deliverables sent to AASHTO
NCHRP 12-116A: Design Specifications for the Static and Seismic Design of Piles for Downdrag	2019	University of Arkansas	\$419,999	10/15/20	12/31/23	Research in progress	
NCHRP 12-117: Guidelines for Corrosion Protection of Steel Bridges Using Duplex Coating Systems	2019	Elzly Technology Corporation	\$397,854	5/16/19	10/30/22	Completed	Published as <i>NCHRP Research Report 1048</i> and final deliverables sent to AASHTO
NCHRP 12-118: Design and Construction Specifications for Bonded and Unbonded Post-Tensioned Concrete Bridge Elements	2019	Purdue University	\$800,000	9/1/19	12/29/23	Research in progress	
NCHRP 12-119: Bridge Deck Overhangs with MASH-Compliant Railings	2020	University of Nebraska - Lincoln	\$440,000	8/17/20	5/31/23	Completed	To be published as <i>NCHRP Research Report 1078</i>
NCHRP 12-120: Stainless Steel Strands for Prestressed Concrete Bridge Elements	2020	University of Houston	\$600,000	9/1/20	5/15/24	Research in progress	
NCHRP 12-121: Guidelines for the Design of Prestressed Concrete Bridge Girders Using FRP Auxiliary Reinforcement	2021	University of Houston	\$540,000	4/19/21	4/19/24	Research in progress	
NCHRP 12-122: Proposed AASHTO Guidelines for Applications of Unmanned Aerial Systems Technologies for Element-Level Bridge Inspection	2021	Michael Baker International	\$340,000	5/11/21	11/11/23	Completed	Publication decision pending
NCHRP 12-123: Proposed AASHTO Guideline for Load Rating of Segmental Bridges	2021	Auburn University	\$300,000	4/30/21	4/30/24	Research in progress	
NCHRP 12-124: Design of Stud Shear Connectors in Composite Steel Bridges	2022	University of Arkansas	\$800,000	8/4/22	8/3/26	Research in progress	
NCHRP 12-125: Earthquake-Induced Bridge Displacements	2023		\$400,000			Contract pending	
NCHRP 12-126: Design Method for High-Load Multi-Rotational Disc Bearings for Bridges	2024		\$600,000			In development	
NCHRP 12-127: Load Rating and Posting of Long-Span Bridges	2024		\$500,000			In development	
<b>Research Area 13: Maintenance—Equipment</b>							
NCHRP 13-09: Maximizing Proceeds from the Fleet Asset Disposal Sales Process	2021	The Kercher Group Inc.	\$299,991	8/16/21	6/15/23	Completed	Published as <i>NCHRP Research Report 1074</i>
<b>Research Area 14: Maintenance—Maintenance of Way and Structures</b>							
NCHRP 14-36(01): Implementation of Bridge Preservation Actions	2011	Greenman-Pedersen, Inc.	\$300,000	6/23/23	12/8/24	Research in progress	
NCHRP 14-42: Determining the Impact of Connected and Automated Vehicle Technology on State DOT Maintenance Programs	2019	Iowa State University	\$300,000	6/6/19	12/31/23	Completed	Publication decision pending
NCHRP 14-44: Guide Specifications for the Construction of Slurry Seals, Scrub Seals, and Tack Coats	2020	University of Arkansas	\$175,000	9/2/20	3/1/22	Completed	Final deliverables posted on NCHRP project web page
NCHRP 14-45: Guidelines for Response Planning, Assessment, and Rapid Restoration of Service of Bridges in Extreme Events	2020	Oregon State University	\$400,000	8/6/20	6/30/23	Completed	Publication decision pending
NCHRP 14-46: Guidelines for the Maintenance and Construction of Rumble Strips	2021	Texas A&M Transportation Institute	\$449,441	6/1/21	9/30/24	Research in progress	

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 14-47: Tools and Technology for Roadside Landscape Asset Management	2022	Davey Resource Group, Inc.	\$350,000	11/14/22	11/14/24	Research in progress	
NCHRP 14-48: Guidance for the Construction of Sand Seals and Ultra-thin Bonded Wearing Courses	2022	University of Arkansas	\$175,000	10/10/22	4/9/24	Research in progress	
<b>Research Area 15: Design—General Design</b>							
NCHRP 15-61A: Updates to the Design Practices Guide for Applying Climate Change Information to Hydrologic and Coastal Design of Transportation Infrastructure	2020		\$400,000			Contract pending	
NCHRP 15-66: Arterial Weaving on Conventional and Alternative Intersections	2017	University of Florida	\$749,922	11/16/20	9/16/23	Completed	Publication decision pending
NCHRP 15-68(01): Effective Low-Noise Rumble Strips	2018	Illingworth & Rodkin, Inc.	\$330,359	8/19/21	1/31/23	Canceled	See NCHRP Project 15-68(02) for follow-on activity
NCHRP 15-68(02): Effective Low-Noise Rumble Strips	2018		\$45,215			Contract pending	
NCHRP 15-69: Utility Conflict Impacts During Highway Construction	2020	Texas A&M Transportation Institute	\$600,000	6/19/20	1/31/24	Research in progress	
NCHRP 15-70: Valuation of Permitting Utility and Communications Installations in Public ROW	2020	Iowa State University	\$330,748	8/17/20	8/17/22	Completed	Published as <i>NCHRP Research Report 1053</i> and <i>NCHRP Web-Only Document 359</i>
NCHRP 15-73: Design Options to Reduce Turning Motor Vehicle–Bicycle Conflicts at Intersections	2020	Toole Design Group	\$600,000	10/2/20	6/3/24	Research in progress	
NCHRP 15-74: Safety Evaluation of On-Street Bicycle Facility Design Features	2020	Texas A&M Transportation Institute	\$600,000	9/1/20	8/31/23	Research in progress	
NCHRP 15-75: Update of the Policy on Geometric Design of Highways and Streets Guidance on Acceleration/Deceleration and Stopping Sight Distance Criteria	2020	Michigan State University	\$500,000	9/1/20	6/30/23	Completed	To be published as <i>NCHRP Research Report 1081</i>
NCHRP 15-76: Designing for Target Speed	2020	Texas A&M Transportation Institute	\$750,000	7/16/20	1/16/23	Expired	Work will continue under a new contract
NCHRP 15-76(01): Designing for Target Speed	2020		\$411,000			In development	
NCHRP 15-78: Trade-offs for Cross-sectional Reallocation on Urban and Suburban Roads	2020	Kittelson & Associates	\$600,000	3/25/20	9/30/22	Completed	Published as <i>NCHRP Research Report 1036</i> and <i>NCHRP Web-Only Document 342</i>
NCHRP 15-79: Development of Guidance for Non-Standard Roadside Hardware Installations	2021	Texas A&M Transportation Institute	\$400,000	9/22/23	3/22/26	Research in progress	
NCHRP 15-80: Design Guidance and Standards for Resilience	2021	ICF Incorporated LLC	\$734,960	6/17/21	8/17/24	Research in progress	
NCHRP 15-81: Guideline for Depicting Existing and Proposed Utility Facilities in Design Plans	2022	Iowa State University	\$550,000	10/20/22	10/20/25	Research in progress	
NCHRP 15-82: Effects of Operating Speed and Posted Speed Limit in Conjunction with Roadway Geometric Design on Safety Performance for High-Speed Rural Highways and Freeways	2023		\$950,000			Contract pending	
<b>Research Area 17: Traffic—Safety</b>							
NCHRP 17-71A: Proposed Highway Safety Manual, Second Edition	2015	Texas A&M Transportation Institute	\$709,705	1/21/21	1/21/24	Research in progress	



Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 17-83: Briefings and Training Materials for Implementation of the Highway Safety Manual, Second Edition	2017	Univeristy of North Carolina-Chapel Hill	\$500,000	12/12/17	9/15/23	Canceled	
NCHRP 17-84: Pedestrian and Bicycle Safety Performance Functions for the Highway Safety Manual	2017	MRIGlobal	\$820,000	3/27/17	8/26/22	Completed	Published as <i>NCHRP Research Report 1064</i>
NCHRP 17-86: Estimating Effectiveness of Safety Treatments in the Absence of Crash Data	2018	Vanasse Hangen Brustlin, Inc.	\$599,567	10/22/18	12/31/22	Completed	Published as <i>NCHRP Research Report 1069</i> and <i>NCHRP Web-Only Document 369</i>
NCHRP 17-88: Roadside Encroachment Database Development and Analysis	2018	Virginia Polytechnic Institute & State University	\$675,000	6/19/18	9/30/23	Completed	Publication decision pending
NCHRP 17-89A: HOV/HOT Freeway Crash Prediction Method for the Highway Safety Manual	2018	Vanasse Hangen Brustlin, Inc.	\$299,998	7/10/18	12/31/21	Completed	To be published as <i>NCHRP Web-Only Document 387</i>
NCHRP 17-89B: Safety Performance of Part-Time Shoulder Use on Freeways	2018		\$125,000			Canceled	
NCHRP 17-90: Evaluation of Roadside Crash Injury Metrics in MASH	2019	Virginia Polytechnic Institute & State University	\$400,000	7/8/19	12/31/22	Completed	To be published as <i>NCHRP Research Report 1095</i>
NCHRP 17-92: Developing Safety Performance Functions for Rural Two-Lane Highways that Incorporate Speed Measures	2019	Texas A&M Transportation Institute	\$500,000	4/24/19	6/30/23	Completed	Publication decision pending
NCHRP 17-93: Updating Safety Performance Functions for Data-Driven Safety Analysis	2019	University of North Carolina - Chapel Hill	\$500,000	7/1/19	12/31/23	Canceled	
NCHRP 17-95: Crash Modification Factors for Intelligent Transportation Systems (ITS) Applications	2020	University of North Carolina - Chapel Hill	\$400,000	6/1/20	3/1/23	Expired	Partial deliverables will be made available
NCHRP 17-96: Traffic Safety Culture Research Roadmap	2021	University of North Carolina - Chapel Hill	\$374,589	8/31/21	8/31/23	Completed	To be published as <i>NCHRP Research Report 1091</i>
NCHRP 17-97: Strategies to Improve Pedestrian Safety at Night	2021	Toole Design Group, LLC	\$500,000	10/1/21	9/30/24	Research in progress	Phase II research in progress
NCHRP 17-98: Guide for Intersection Control Evaluation	2021	Kittelson & Associates	\$400,000	5/17/21	7/31/23	Completed	To be published as <i>NCHRP Research Report 1087</i> and <i>NCHRP Web-Only Document 377</i>
NCHRP 17-99: Assessing Safety Effectiveness of Treatments and Technologies at Highway-Rail Grade Crossings	2021	Oklahoma State University	\$399,968	8/31/22	2/28/25	Research in progress	
NCHRP 17-100: Leveraging Artificial Intelligence and Big Data to Enhance Safety Analysis	2021	University of Washington	\$650,000	2/3/22	8/2/24	Research in progress	
NCHRP 17-101: Applying the Safe System Approach to Transportation Planning, Design, and Operations in the United States	2021	University of North Carolina - Chapel Hill	\$450,000	8/25/22	8/25/24	Research in progress	
NCHRP 17-102: Safety Performance for Active Transportation Modes Using Exposure Models	2022	Texas A&M Transportation Institute	\$700,000	6/27/23	6/26/26	Research in progress	
NCHRP 17-103: A Guide and Toolkit for Strategic Decision-Making to Improve Traffic Safety	2022		\$500,000			Contract pending	
NCHRP 17-104: Enhancement of Roadside Design Safety Prediction Models for the Highway Safety Manual	2022	Univeristy of North Carolina-Chapel Hill	\$500,000	9/6/22	3/5/25	Research in progress	
NCHRP 17-106: Motorist Behavior and Safety Impacts on Bicyclists from Centerline and Shoulder Rumble Strips on High-Speed Two-Lane Highways	2022	University of Wisconsin-Madison	\$400,000	1/1/23	6/20/25	Research in progress	
NCHRP 17-107: Work Zone Intrusion Frequency and Characteristics	2022		\$600,000			Contract pending	

Name	FY	Subcontractor	Contract Amount	Contract		Status	Status Comments
				Start Date	End Date		
NCHRP 17-108: Develop Crash Modification Factors (CMFs) for Alternative Intersections, Including Displaced Left-Turn (DLT), Median U-Turn (MUT), and Restricted Crossing U-Turn (RCUT).	2022	University of North Carolina - Chapel Hill	\$600,000	8/25/22	8/25/25	Research in progress	
NCHRP 17-109: Crash Modification Factors (CMFs) for Automated Traffic Signal Performance Measures (ATSPMs)	2022	Kittelson & Associates, Inc.	\$400,000	4/28/23	10/27/25	Research in progress	
NCHRP 17-110: Template for Gathering and Disseminating Telemetric Data for Safety and Operational Uses by State DOTs (Phase 1: State of the Practice Survey and Synthesis)	2022		\$200,000			Contract pending	
NCHRP 17-11(03): Development of Clear Recovery Area Guidelines	2020	Texas A&M Transportation Institute	\$132,571	8/4/21	10/4/23	Completed	Publication decision pending
NCHRP 17-111: Speed Management Solutions and Strategies to Improve Pedestrian and Bicyclist Safety on Arterial Roadways	2023		\$550,000			Contract pending	
NCHRP 17-112: Enhancing Highway Safety Manual Guidance on Pedestrian and Bicyclist Countermeasures (CMF/SPF Development)	2023		\$600,000			Contract pending	
NCHRP 17-113: Incorporating Safe System Approach into the NCHRP 500 Series	2023		\$700,000			Contract pending	
NCHRP 17-114: Integrated Strategies for Managing High Travel Speeds	2023		\$500,000			Contract pending	
NCHRP 17-115: Pedestrian Crosswalk Spacing and Placement Guidance to Improve Safety	2023		\$500,000			Contract pending	
NCHRP 17-116: Practical Approaches to Quantifying Safe System Concepts	2023		\$450,000			Contract pending	
NCHRP 17-117: Safety Performance Functions for Horizontal Curves	2023		\$350,000			Contract pending	
NCHRP 17-118: Understanding the Impacts of Operational Changes on Safety Performance	2023		\$450,000			Contract pending	
NCHRP 17-119: Conflict-Based Crash Prediction Method for Intersections	2023		\$550,000			Contract pending	
NCHRP 17-120: Improved Method to Link Crash, Emergency Medical Service, and Trauma Registry Data to Expand Safety Data Analyses and Safety Program Development	2023		\$400,000			Contract pending	
NCHRP 17-121: Using Advanced Technologies to Reduce Commercial Motor Vehicle Crashes in Work Zones	2023		\$500,000			Contract pending	
NCHRP 17-122: Strategies and Technologies for Warning, Detection, and Prevention of Trespassing in the Vicinity of Highway-Rail Grade Crossings: State of the Practice and Research Needs	2023		\$125,000			Contract pending	
NCHRP 17-123: Light, Medium, and Heavy Rail and Roadway Interface Safety Performance Functions and Crash Modification Factors Development	2024		\$500,000			In development	
NCHRP 17-124: Effectiveness of Speed Reduction in Work Zones	2024		\$350,000			In development	
NCHRP 17-125: Incorporating the Safe System Approach into Road Safety Audits	2024		\$425,000			In development	
NCHRP 17-126: Intersection Crash Prediction Models for Future Editions of the Highway Safety Manual	2024		\$750,000			In development	
NCHRP 17-127: Practitioner's Application Guide to the Highway Safety Manual	2024		\$500,000			In development	

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 17-128: Reducing Adverse Driving Behaviors in Work Zones	2024		\$600,000			In development	
NCHRP 17-129: Safety Performance of Complex Interchanges	2024		\$700,000			In development	
<b>Research Area 18: Materials and Construction—Concrete Materials</b>							
NCHRP 18-19: Rating Concrete Water Permeability Based on Resistivity Measurements	2019	University of Florida	\$600,000	8/12/19	7/31/23	Completed	To be published as <i>NCHRP Research Report 1086</i>
NCHRP 18-20: Structural Design Methodology for Cured-in-Place Pipe (CIPP) Liners in Gravity Stormwater Conveyance Conduits	2020	Golder Associates Inc.	\$370,000	8/21/20	1/22/24	Research in progress	
NCHRP 18-20A: AASHTO LRFD Design, Installation, and Standard Practice of Testing for Cured In-Place Pipe Liners	2020		\$30,000			In development	
NCHRP 18-21: Utilization of Alternative Supplementary Cementitious Materials (SCMs) for Concrete in Highway Applications Through Durability based Performance Evaluation	2024		\$750,000			In development	
<b>Research Area 19: Administration—Finance</b>							
NCHRP 19-18: Transitioning Fuel Tax Assessments to a Road Usage Charge	2021	Milestone CDM Smith	\$599,932	5/25/21	7/25/23	Completed	Published as <i>NCHRP WebResource 2</i>
NCHRP 19-19: Sustaining Zero-Fare Public Transit in a Post COVID-19 World: A Guide for State DOTs	2022	Texas A&M Transportation Institute	\$300,000	9/19/22	6/18/24	Research in progress	
NCHRP 19-20: Interdependence of Federal, State, and Local Transportation Funding and Ownership	2022	WSP USA, Inc.	\$450,000	9/25/22	1/29/25	Research in progress	
NCHRP 19-21: Selecting Revenue Models for Electric Vehicle Charging	2022	Cadmus Group	\$500,000	12/11/23	12/11/25	Research in progress	
NCHRP 19-22: Future Equity Impacts of Existing Fuel Taxes	2023		\$450,000			Contract pending	
NCHRP 19-23: Revenue-Related Strategies for New Mobility Options	2023	EcoNorthwest	\$450,000	7/12/23	7/11/25	Research in progress	
NCHRP 19-24: Guide for Implementing Price Escalation to Balance Risk Sharing in DOT Construction Projects	2024		\$450,000			In development	
NCHRP 19-25: Identifying Funding Needs for Maintenance and Preservation of Existing Transportation Assets and System Infrastructure Additions	2024		\$450,000			In development	
NCHRP 19-26: Impact of Fuel Economy Standards and Vehicle Ownership Trends on Federal Gas Tax Receipts	2024		\$450,000			In development	
<b>Research Area 20: Special Projects</b>							
NCHRP 20-06/Topic 25-06: Legal Aspects and Strategies of Best-Value Procurement for Highway Construction (Update)	2018	Colorado State University	\$100,000	1/14/21	7/8/22	Completed	Published as <i>NCHRP Legal Research Digest 90</i>
NCHRP 20-06/Topic 26-01: Effects of Indian Treaties on Development and Operation of Transportation Facilities	2021	Kaplan Kirsch Rockwell, LLP	\$100,000	6/27/22	1/30/24	Research in progress	
NCHRP 20-06/Topic 26-02: Analysis of Arbitration and Holdings in Construction Disputes	2021	Capital Project Strategies	\$100,000	9/1/22	12/25/23	Completed	Publication decision pending
NCHRP 20-06/Topic 26-03: Multistate Coordination and Harmonization for AV Legislation	2021	The University of Texas at Austin	\$100,000	7/25/22	7/25/23	Completed	To be published as <i>NCHRP Legal Research Digest 91</i>
NCHRP 20-06/Topic 26-04: Pandemics and Contractual Issues	2021	Conner Gwyn Schenck, PLLC	\$100,000	7/7/22	1/7/24	Research in progress	
NCHRP 20-06/Topic 27-01: Transportation Agency Liability for Roadside Safety Hardware	2022		\$100,000			In development	

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 20-06/Topic 27-02: Status of State and Local Suspension and Debarment Programs and Barriers to Creation and Implementation for State and Local Programs	2022		\$100,000			In development	
NCHRP 20-06/Topic 27-03: Rewrite of Volume 3 Selected Studies in Transportation Law Environmental Law and Transportation	2022		\$200,000			In development	
NCHRP 20-06/Topic 27-04: Managing Performance for Innovative Technology Contracts	2022		\$100,000			In development	
NCHRP 20-06/Topic 27-05: Liability Arising from Proactive Safety Improvements	2022		\$150,000			In development	
NCHRP 20-07/Task 383: Review and Update of the AASHTO Roadside Design Guide	2016	Leidos Inc.	\$220,000	6/27/16	8/1/23	Canceled	Final deliverables posted on NCHRP project web page
NCHRP 20-24(138): Collective and Individual Actions for State Departments of Transportation Envisioning and Realizing the Next Era of America's Transportation Infrastructure	2021	Cambridge Systematics, Inc.	\$400,000	10/12/21	12/30/22	Completed	Published as <i>NCHRP Research Result Digest 404</i>
NCHRP 20-24(138)A: Collective and Individual Actions to Envision and Realize the Next Era of America's Transportation Infrastructure – Phase 2	2021		\$400,000			Contract pending	
NCHRP 20-24(139): Into the 2020s: A Peer Exchange Series for State DOT CEOs	2022	High Street Consulting Group	\$900,000	3/1/22	8/30/24	Research in progress	
NCHRP 20-24(141): Advancing the Art and Science of Decision-Making	2021	High Street Consulting Group	\$300,000	5/22/23	1/21/25	Research in progress	
NCHRP 20-24(144): Agile Project Delivery in Multi-Modal Transportation	2023		\$350,000			In development	
NCHRP 20-24(145): Harnessing the Safe System Approach to Meaningfully Improve Traffic Safety	2023		\$600,000			In development	
NCHRP 20-24(146): Guide to Supporting and Sustaining Transportation Grant Programs for Local Governments and Tribes	2023		\$500,000			In development	
NCHRP 20-24(147): Peer Exchange and Research to Identify Best Practices for Testing, Monitoring and Deployment of Automated Transportation Solutions to Support Safety, Equity and Operational Efficiency	2023		\$400,000			In development	
NCHRP 20-44(26): Implementing Guide Specifications for the Construction of Chip Seals, Micro Surfacing, and Fog Seals	2020	Michigan State University	\$200,000	9/24/20	9/25/23	Completed	Publication decision pending
NCHRP 20-44(28): Development of a Technology Transfer Plan for State Departments of Transportation Research Programs		CTC & Associates LLC	\$159,960	11/30/20	11/29/22	Completed	Final deliverables to be posted on NCHRP project web page
NCHRP 20-44(31): Implementation of NCHRP Research Report 923 & the Electronic Workforce Optimization Workbook (e-WOW) for Transportation Projects			\$200,000			Contract pending	
NCHRP 20-44(32): Guidelines for Selecting Travel Forecasting Methods and Techniques (NCHRP 08-94)		Resource Systems Group, Inc.	\$375,878	9/21/20	5/31/23	Completed	Final deliverables to be posted on NCHRP project web page
NCHRP 20-44(33): Evaluating the suitability of roadway corridors for use by monarch butterflies (NCHRP 20-119)		Monarch Joint Venture	\$162,800	2/10/21	8/10/23	Completed	Final deliverables posted on NCHRP project web page
NCHRP 20-44(35): Implementation of NCHRP Research Report 948: Guide for Pedestrian and Bicycle Safety at Alternative and Other Intersections and Interchanges	2020	Kittelson & Associates	\$250,000	6/1/22	12/1/23	Completed	Final deliverables posted on NCHRP project web page

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 20-44(36): Workshops on Long-Range Strategic Issues Affecting Preservation, Maintenance, and Renewal of Highway Infrastructure	2020	WSP USA Inc.	\$279,999	4/6/22	12/5/23	Expired	The project failed to meet the expected progress; work will continue under NCHRP Project 20-44(36)A
NCHRP 20-44(36)A: Workshops on Long-Range Strategic Issues Affecting Preservation, Maintenance, and Renewal of Highway Infrastructure	2020		\$280,000			Contract pending	
NCHRP 20-44(37): Workshops on Performance Measures in Snow and Ice Control Operations	2020	ICF Incorporated, LLC	\$225,000	3/23/22	9/23/24	Research in progress	
NCHRP 20-44(39): Guidebook for Managing Data from Emerging Technologies for Transportation (NCHRP 08-116)	2020	Applied Engineering Management Corporation	\$365,700	4/21/21	12/20/22	Completed	Final deliverables posted on NCHRP project web page
NCHRP 20-44(40): Implementing the Agency Capability Building Framework to Activate Organizational Change	2020	Spy Pond Partners, LLC	\$300,000			Research in progress	
NCHRP 20-44(41): Deploying Transportation Resilience Practices in State DOTs	2021		\$180,000			Contract pending	
NCHRP 20-44(42): Agency Implementation of the Design-Build and Contract Manager/ General Contractor Guidebooks for Post-Award Contract Administration	2021	Arizona State University	\$250,000	2/1/22	2/1/24	Research in progress	
NCHRP 20-44(43): Implementing the Benefits of Green Infrastructure for Effective Roadside Water Management	2021		\$150,000			Contract pending	
NCHRP 20-44(44): Implementation of the Research Results of NCHRP Project 15-61, "Applying Climate Change Information to Hydrologic and Hydraulic Design of Transportation Infrastructure"	2022		\$130,000			Contract pending	
NCHRP 20-44(45): Supporting State DOT Adoption of Knowledge Management Practices	2022		\$200,000			Contract pending	
NCHRP 20-44(46): Implementing the Asset Valuation Guide Developed through NCHRP Project 23-06, "A Guide to Computation and Use of System Level Valuation of Transportation Assets"	2022		\$300,000			Contract pending	
NCHRP 20-44(47): UAS Flight Proficiency Certification Pilot Program for State DOTs	2022		\$200,000			Contract pending	
NCHRP 20-44(48): Peer Exchanges on Data Management and Governance Practices	2022		\$150,000			Contract pending	
NCHRP 20-44(49): Research Implementation Barriers and Guidance for Overcoming Barriers	2022		\$325,000			Contract pending	
NCHRP 20-44(50): Implementation of Asphalt Pavement Raveling Detection Algorithm	2022		\$225,000			Contract pending	
NCHRP 20-44(51): Training on AASHTO Context Classifications	2022		\$200,000			Contract pending	
NCHRP 20-44(52): Implementing a Guidebook for Urban and Suburban Roadway Cross Section Reallocation	2023		\$330,000			In development	
NCHRP 20-44(53): Implementing a Proposed Macro-Level Safety Planning Analysis Chapter for the Highway Safety Manual	2023		\$250,000			In development	
NCHRP 20-44(54): Implementing An Emergency Management Playbook for State Transportation Agencies	2023		\$212,000			In development	
NCHRP 20-50(20): LTPP Data Analysis: Develop Practical Tools and Procedures to Improve WIM Data Quality	2018	Applied Research Associates	\$469,998	10/1/18	12/30/22	Completed	Published as <i>NCHRP Research Report 1070</i> and <i>NCHRP Web-Only Document 370</i>

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 20-50(21): Enhancements of Climatic Inputs and Related Models for Pavement ME Using LTPP Climate Tool (MERRA-2)	2018	Applied Research Associates	\$350,000	8/24/18	11/30/23	Research in progress	
NCHRP 20-50(22)A: LTPP Data Analysis: Guidelines to Improve Use of FWD and Longitudinal Profile Measurements	2019	Nichols Consulting Engineers, Chtd	\$350,000	11/16/21	2/15/24	Research in progress	
NCHRP 20-59(30)A: Incident Command System Training for Field Level Transportation Supervisors and Staff	2017	San Jose State University	\$450,000	7/11/17	9/30/24	Research in progress	
NCHRP 20-59(53)A: A Guide to Flood Forecasting for Transportation Resilience	2014	Dewberry Engineers Inc.	\$650,000	6/27/19	3/31/24	Research in progress	
NCHRP 20-68D: U.S. Domestic Scan Program	2020	Arora and Associates, P.C.	\$1,800,000	4/3/19	12/31/24	Research in progress	
NCHRP 20-102(16): Impacts of Connected, Automated Vehicle Technologies on Traffic Incident Management Response	2018	Gannett Fleming	\$249,584	2/7/22	11/13/23	Research in progress	
NCHRP 20-102(20): Preparing the Transportation Workforce for the Deployment of Emerging Technology	2019		\$299,926	10/25/23	10/24/25	Research in progress	
NCHRP 20-102(21): Infrastructure Modifications to Improve the Operational Domain of Automated Vehicles	2019		\$0			Combined	Combined with NCHRP Project 20-102(24), managed by NCHRP Project 20-102(24)
NCHRP 20-102(24): Infrastructure Modifications to Improve the Operational Conditions of Automated Vehicles	2019		\$800,000			Contract pending	
NCHRP 20-102(25): Readiness and Effectiveness of Freeway-Based Corridor V2X Applications for Improving Congestion and Safety	2020		\$500,000			Canceled	
NCHRP 20-102(27): Realistic Timing Estimates for Automated Vehicle Implementation	2020	WSP USA Inc.	\$149,874	6/29/21	9/29/22	Completed	Published as <i>NCHRP Research Report 1049</i>
NCHRP 20-102(28): Best Practices in Work Zones for AVs and CVs	2020	Virginia Polytechnic Institute & State University	\$250,000	10/21/20	11/21/22	Completed	Published as <i>NCHRP Research Report 1051</i>
NCHRP 20-102(29): Incorporating New Mobility Options into Travel Demand Forecasting and Modeling	2020	University of Central Florida Board of Trustees	\$125,000	8/22/22	12/22/23	Completed	Publication decision pending
NCHRP 20-102(34): Toolbox for Navigating the Land Use Impacts of the Automated Vehicle Ecosystem	2020	Urban Institute	\$450,000	10/26/22	8/26/24	Research in progress	
NCHRP 20-116: An Emergency Management Playbook for State Transportation Agencies	2017	Louis Berger U.S. Inc.	\$750,000	1/28/20	7/27/22	Completed	To be published as NCHRP Research Report 1093 and NCHRP Web-Only Document 384
NCHRP 20-121A: Countering Human Trafficking: A Toolkit for State DOTs	2018	Texas A&M Transportation Institute	\$450,000	9/25/23	7/22/25	Research in progress	
NCHRP 20-123(08): Scoping Study to Update the AASHTO User and Non-User Benefit Analysis for Highways	2022		\$200,000			Contract pending	
NCHRP 20-123(10): AASHTO Committee on Bridges and Structures Strategic Plan, Operating Guidelines, and Research Roadmap Development	2020	Clough, Harbor & Associates LLP	\$119,940	6/7/21	10/7/22	Completed	Final deliverables sent to AASHTO
NCHRP 20-123(12): System Mobility and Emerging Technologies (SMET): Strategic Planning Session and Research Roadmap Development	2021	Stantec Consulting Services, Inc.	\$225,000	6/16/22	11/16/23	Completed	Publication decision pending
NCHRP 20-123(13): Strategic Plan and Research Roadmap for AASHTO Committee on Planning	2021	Spy Pond Partners	\$250,000	8/4/22	3/3/24	Research in progress	

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 20-123(14): Scoping study for the development of a platform for AASHTO Committee Surveys	2021	Spy Pond Partners	\$200,000	3/24/22	9/23/23	Completed	Final deliverables posted on NCHRP project web page
NCHRP 20-123(15): Support for AASHTO Approval of the Transportation Operations Manual	2021	Combined	\$0			Combined	Combined with NCHRP Project 03-126, managed by NCHRP Project 03-126
NCHRP 20-123(16): Roadmap for AASHTO Bridge Railing MASH Updates to Support Future Vehicle Fleet Transformation	2021		\$150,000			Contract pending	
NCHRP 20-123(17): Highway Safety Manual Development and Research Roadmap	2022		\$150,000			Contract pending	
NCHRP 20-123(18): Development of a New Transportation System Operations Strategic Plan	2022	Gannett Fleming	\$225,000	4/6/23	4/5/24	Research in progress	
NCHRP 20-123(19): A Research Roadmap for Institutionalizing Transportation Equity	2022	Portland State University	\$250,000	9/15/23	3/15/25	Research in progress	
NCHRP 20-123(20): Roadmap to Update Section 9 of the AASHTO LRFD Bridge Design Specifications	2023		\$200,000			In development	
NCHRP 20-124: Deploying Transportation Security Practices in State DOTs	2019	Critical Ops LLC	\$797,636	1/22/20	7/21/24	Completed	Published as <i>NCHRP Web-Only Document 379</i>
NCHRP 20-125: Strategies for Incorporating Resilience into Transportation Networks	2019	Metro Analytics PLLC	\$599,679	12/30/19	10/26/22	Completed	Publication decision pending
NCHRP 20-126(02): State Transportation Agency Multifaceted Decision Making for Future System Performance	2020	Metro Analytics PLLC	\$348,929	1/27/21	8/1/22	Completed	Published as <i>NCHRP Research Report 1042</i> and <i>NCHRP Web-Only Document 345</i>
NCHRP 20-127: Development of Business Case and Communication Strategies for a State DOT Resilience Program	2020	Cambridge Systematics Inc.	\$349,704	12/15/20	2/15/23	Completed	Published as <i>NCHRP Web-Only Document 385</i>
NCHRP 20-128: Organizational and Operational Models Used by State DOTs for Emergency Response	2020	WSP USA Inc.	\$400,000	2/1/21	3/1/23	Completed	Published as <i>NCHRP Research Report 1088</i> and <i>NCHRP Web-Only Document 378</i>
NCHRP 20-129: Guide for Addressing Encampments on State Transportation Rights-of-Way	2022	Portland State University	\$349,594	3/1/23	2/28/25	Research in progress	
NCHRP 20-130: Incorporation of the Human Factors Guide into Transportation Agency Practices	2024		\$450,000			In development	
<b>Research Area Synthesis</b>							
NCHRP 20-05/Topic 53-02: Practices to Motivate Safe Behaviors with Highway Construction and Maintenance Crews	2022	Blue Hardhat Consulting LLC	\$45,000	2/23/22	8/23/23	Completed	Published as <i>NCHRP Synthesis 608</i>
NCHRP 20-05/Topic 53-03: Leveraging Social Media Data for Emergency Preparedness and Response	2022	Board of Regents of the University of Nebraska for University of Nebraska - Lincoln	\$45,000	3/9/22	9/9/23	Completed	Published as <i>NCHRP Synthesis 610</i>
NCHRP 20-05/Topic 53-04: Practices for the Collection, Use, and Management of Utility As-Built Information	2022	University of Kentucky Research Foundation	\$45,000	11/1/21	5/2/23	Completed	Published as <i>NCHRP Synthesis 600</i>
NCHRP 20-05/Topic 53-05: Practices for Bioretention Stormwater Control Measures	2022	University Enterprises, Inc.	\$45,000	3/2/22	9/1/23	Completed	Published as <i>NCHRP Synthesis 599</i>
NCHRP 20-05/Topic 53-06: Local Calibration of LRFD Geotechnical Resistance Factors	2022	Dan Brown and Associates, P.C.	\$45,000	11/10/21	5/10/23	Completed	Published as <i>NCHRP Synthesis 601</i>
NCHRP 20-05/Topic 53-07: Curing Practices for Concrete Pavement	2022	Global Sustainable Solutions, LLC	\$45,000	12/13/21	6/13/23	Completed	Published as <i>NCHRP Synthesis 598</i>
NCHRP 20-05/Topic 53-08: DOT Strategies and Programs For Electric Vehicle Charging	2022	BluCyclone LLC	\$45,000	1/13/22	7/13/23	Completed	Published as <i>NCHRP Synthesis 605</i>

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 20-05/Topic 53-09: Use of Unmanned Aerial Systems for Highway Stormwater Inspections	2022	Maple Consulting LLC	\$45,000	2/14/22	8/14/23	Completed	Published as <i>NCHRP Synthesis 609</i>
NCHRP 20-05/Topic 53-10: Contrast Pavement Markings Practices	2022	Omar Smadi dba Omar Smadi Consulting	\$45,000	2/17/22	7/31/23	Completed	Published as <i>NCHRP Synthesis 613</i>
NCHRP 20-05/Topic 53-11: Resilient Design with Distributed Rainfall-Runoff Modeling	2022	Auburn University	\$45,000	1/4/22	7/4/23	Completed	Published as <i>NCHRP Synthesis 602</i>
NCHRP 20-05/Topic 53-13: Practices for Steel Bridge Fabrication and Erection Tolerances	2022	Medlock LLC	\$45,000	11/1/21	4/30/23	Completed	Published as <i>NCHRP Synthesis 603</i>
NCHRP 20-05/Topic 53-14: Use of Probe Data for Freight Planning and Operations	2022	CPCS Transcom Inc.	\$45,000	1/20/22	7/20/23	Completed	Published as <i>NCHRP Synthesis 611</i>
NCHRP 20-05/Topic 53-16: Critical Findings for Tunnel Functional Systems	2022	Gannett Fleming Inc.	\$45,000	12/6/21	6/6/23	Completed	Published as <i>NCHRP Synthesis 607</i>
NCHRP 20-05/Topic 53-17: Integrating Freight and Active Transportation into Policies, Programs, Plans, and Project Development	2022	University of Texas at Arlington	\$45,000	1/19/22	7/19/23	Completed	Published as <i>NCHRP Synthesis 606</i>
NCHRP 20-05/Topic 53-18: Moisture Measurement for Pavement Foundations and Slopes	2022	Arizona State University	\$45,000	2/22/22	8/22/23	Completed	Published as <i>NCHRP Synthesis 612</i>
NCHRP 20-05/Topic 53-19: State DOT Product Evaluation Processes	2022	Black Dog Consultants, LLC	\$45,000	9/15/22	3/15/24	Completed	To be published as <i>NCHRP Synthesis 616</i>
NCHRP 20-05/Topic 54-01: Practices to Identify PFAS Impacts on Highway Construction Projects and Maintenance Operations	2023	Iowa State University	\$55,000	10/10/22	4/10/24	Completed	Publication decision pending
NCHRP 20-05/Topic 54-02: Outsourcing Post-Construction Stormwater Best Management Practice Inspection and Maintenance Activities	2023	Maple Consulting LLC	\$55,000	10/13/22	4/12/24	Completed	To be published as <i>NCHRP Synthesis 614</i>
NCHRP 20-05/Topic 54-03: DOT Practices on Road Safety Audits	2023	The Curators of the University of Missouri	\$55,000	11/17/22	5/17/24	Completed	To be published as <i>NCHRP Synthesis 615</i>
NCHRP 20-05/Topic 54-04: Mobile Devices as a Tool for Digitalized Project Documentation and Inspection	2023	University of Kentucky	\$55,000	6/20/23	12/20/24	Research in progress	
NCHRP 20-05/Topic 54-05: Practices for Statewide and MPO Coordination	2023	University of South Florida	\$55,000	12/2/22	6/3/24	Completed	Publication decision pending
NCHRP 20-05/Topic 54-06: Ancillary Asset Data Stewardship and Data Models	2023	University of Kentucky	\$55,000	1/18/23	7/18/24	Research in progress	
NCHRP 20-05/Topic 54-07: Visualization for Public Involvement	2023	WSP USA Inc.	\$55,000	11/29/22	5/29/24	Research in progress	
NCHRP 20-05/Topic 54-08: Practices for Integrating Performance-Based Plans with Long-Range Transportation Plans and Statewide Transportation Investment Programs	2023	ICF Incorporated, L.L.C.	\$55,000	10/25/22	4/25/24	Completed	Publication decision pending
NCHRP 20-05/Topic 54-09: Hydraulic and Hydrologic Engineering Considerations and Practices for Design and Construction of Temporary Facilities in Streams and Rivers	2023	Ohio University	\$55,000	12/9/22	6/10/24	Research in progress	
NCHRP 20-05/Topic 54-10: State Customization of Highway Safety Manual Methods	2023	Pennsylvania State University	\$55,000	4/23/23	10/25/24	Research in progress	
NCHRP 20-05/Topic 54-11: Quality Control Checks for Bridge and Structure Analysis Models	2023	The University of Toledo	\$55,000	11/28/22	5/28/24	Completed	Publication decision pending
NCHRP 20-05/Topic 54-12: Programmatic Implementation of Alternative Delivery Methods	2023	Dai Tran dba Tran and Associates, LLC	\$55,000	11/10/22	5/10/24	Research in progress	
NCHRP 20-05/Topic 54-13: Truck Emergency Escape Ramp Design and Operation	2023	The Curators of the University of Missouri	\$55,000	11/18/22	5/21/24	Completed	Publication decision pending
NCHRP 20-05/Topic 54-14: Artificial Intelligence Applications for Automated Pavement Condition Evaluation	2023	Nichols Consulting Engineers	\$55,000	5/4/23	11/4/24	Research in progress	



Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 20-05/Topic 54-15: Prevention and Mitigation of Surficial Slope Failures on Highway Embankment Slopes	2023	Landline Technology	\$55,000	11/30/22	5/30/24	Research in progress	
NCHRP 20-05/Topic 54-16: Post-Construction Evaluation Practices for Highway Projects Delivered Using Alternative Contracting Methods	2023	Black Dog Consultants, LLC	\$55,000	10/25/22	4/25/24	Completed	Publication decision pending
NCHRP 20-05/Topic 54-17: State DOT Innovation Programs and Practices	2023	CTC & Associates LLC	\$55,000	2/9/23	8/9/24	Research in progress	
NCHRP 20-05/Topic 54-18: Wintertime Pavement Maintenance Strategies	2023	CTC & Associates LLC	\$55,000	10/19/22	4/19/24	Completed	Publication decision pending
NCHRP 20-05/Topic 54-19: Practice for Controlling Tunnel Leaks	2023	Gannett Fleming Engineers and Architects, P.C.	\$55,000	11/28/22	5/28/24	Completed	Publication decision pending
NCHRP 20-05/Topic 54-20: Advancing Gender Equity in the DOT Workforce	2023	The University of Memphis	\$55,000	12/20/22	6/20/24	Completed	Publication decision pending
NCHRP 20-05/Topic 54-21: Practices in the Transportation Planning Process to Address Climate Resilience and GHG Emission Quantification and Reduction	2023	Zamurs and Associates, LLC	\$55,000	10/20/22	4/19/24	Completed	Publication decision pending
NCHRP 20-05/Topic 54-22: Practices for Capturing and Integrating Cost Data in Maintenance Systems	2023	Mott MacDonald I&E, LLC	\$55,000	1/5/23	7/5/24	Completed	Publication decision pending
NCHRP 20-05/Topic 55-01: State DOT Policies and Practices on the Use of Corrosion Resistant Reinforcing Bars	2024		\$55,000			Contract pending	
NCHRP 20-05/Topic 55-02: Practices for Collecting, Managing, and Using Light Detection and Ranging (LiDAR) Data	2024	Oregon State University	\$55,000			Contract pending	
NCHRP 20-05/Topic 55-03: Asset Management Practices for Mechanically Stabilized Earth Walls	2024	Landslide Technology Inc.	\$55,000			Contract pending	
NCHRP 20-05/Topic 55-04: Current Practices and Guidelines for Full-Depth Reclamation (FDR)	2024	Jo Ellen Sias (Sole Proprietor)	\$55,000			Contract pending	
NCHRP 20-05/Topic 55-05: Use and Availability of Supplementary Cementitious Materials for Concrete	2024	Global Sustainable Solutions, LLC	\$55,000	10/25/23	4/25/25	Research in progress	
NCHRP 20-05/Topic 55-06: State DOT Certification Programs for Materials Sampling and Testing Personnel	2024		\$55,000			Contract pending	
NCHRP 20-05/Topic 55-07: Complying with Stormwater Retrofit Permit Requirements Through Third-Party Partnerships	2024		\$55,000			Contract pending	
NCHRP 20-05/Topic 55-08: Construction Strategies and Techniques for Planned Bridge Replacements in Complex Scenarios	2024		\$55,000			Contract pending	
NCHRP 20-05/Topic 55-09: Open-books Pricing Practices for Construction Manager/General Contractor and Progressive Design-Build Projects	2024		\$55,000			Contract pending	
NCHRP 20-05/Topic 55-10: Implementation of the Federal Highway Administration (FHWA) Proven Safety Countermeasures	2024		\$55,000			Contract pending	
NCHRP 20-05/Topic 55-11: Construction Stormwater Program Management, Tracking, Reporting, and Compliance	2024	Black Dog Consultants, LLC	\$55,000	10/23/23	4/23/25	Research in progress	
NCHRP 20-05/Topic 55-12: Bridge Construction Inspection Training Resources and Practices	2024		\$55,000			Contract pending	
NCHRP 20-05/Topic 55-13: Practices for Operational Traffic Simulation Models	2024	University of Missouri	\$55,000			Contract pending	

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 20-05/Topic 55-14: Maintenance Practices for Wide Cracks and Joints in Flexible and Composite Pavements	2024		\$55,000			Contract pending	
NCHRP 20-05/Topic 55-15: Tracking Safety Leading Indicators to Improve DOT Employee Safety Performance	2024	Blue Hardhat Consulting LLC	\$55,000	10/25/23	5/25/25	Research in progress	
NCHRP 20-05/Topic 55-16: Use of Sustainable Materials for Erosion and Sediment Control Practices	2024	Maple Consulting LLC	\$55,000			Contract pending	
NCHRP 20-05/Topic 55-17: Practices to Enhance Resiliency of Existing Roadway and Embankment Culverts	2024		\$55,000			Contract pending	
NCHRP 20-05/Topic 55-18: Design, Construction, and Monitoring Practices for Aquatic Organism Passage	2024	WSP USA Inc.	\$55,000	10/19/23	4/19/23	Research in progress	
NCHRP 20-05/Topic 55-19: Documenting the State of Practice in Managing Ancillary Transportation Assets	2024		\$55,000			Contract pending	
NCHRP 20-05/Topic 55-20: Traffic Capacity Level of Service Adaptations and Usage	2024		\$55,000			In development	
NCHRP 20-05/Topic 55-21: Funding and Maintenance of Complete Streets	2024		\$55,000			In development	
<b>Research Area IDEA</b>							
NCHRP 20-30/IDEA 221: Development of In-Situ Cyclic Borehole Shear Soil Test Device	2019	Iowa State University	\$130,000	1/1/20	9/30/22	Completed	Final deliverables posted on NCHRP project web page
NCHRP 20-30/IDEA 222: Mixed Reality Infrastructure Inspections	2019	University of Central Florida Board of Trustees	\$135,000	4/1/20	12/31/22	Completed	Final deliverables posted on NCHRP project web page
NCHRP 20-30/IDEA 224: Development of an Automated and Rapid Conditioning and Testing Device for Cracking and Rutting	2019	Texas A&M Transportation Institute	\$135,000	1/1/21	6/30/23	Completed	Final deliverables posted on NCHRP project web page
NCHRP 20-30/IDEA 226: A Smart IoT Proximity System for Highway Work Zone Safety	2020	Georgia Institute of Technology	\$100,000	1/19/21	1/18/24	Research in progress	Phase II research in progress
NCHRP 20-30/IDEA 227: Adjustable Cross-frames for the Erection of Steel Girder Bridges	2020	University of Notre Dame	\$135,000	7/1/21	6/30/24	Research in progress	Phase II research in progress
NCHRP 20-30/IDEA 230: Automated Data and Feature Extraction from Bridge Plans	2020	Iowa State University	\$134,638	7/1/21	12/31/23	Research in progress	Phase II research in progress
NCHRP 20-30/IDEA 231: AI analyzer for revealing insights of traffic crashes	2020	University of Nevada-Las Vegas	\$82,899	7/1/21	6/30/23	Completed	Final deliverables posted on NCHRP project web page
"NCHRP 20-30/IDEA 232: Measuring Concrete Permeability with CHIP"	2020	Oklahoma State University	\$100,000	7/1/21		Completed	Final deliverables posted on NCHRP project web page
NCHRP 20-30/IDEA 233: Development of an Innovative Bio-Mediated Self-Healing Concrete Technology	2020	Case Western Reserve University	\$135,000	10/1/21	9/30/23	Completed	Final deliverables posted on NCHRP project web page
NCHRP 20-30/IDEA 234: Field Test & Evaluation of A Solar Snow Fence	2021	Longboard Power, LLC	\$99,430	10/1/21	5/31/23	Completed	Final deliverable posted on NCHRP project web page
NCHRP 20-30/IDEA 236: A Practical Method to Determine Reclaimed Asphalt Pavement Binder Availability	2021	North Carolina State University	\$134,995	10/1/21	12/31/23	Research in progress	
NCHRP 20-30/IDEA 237: Machine Learning-Based Tool to Predict the Retroreflectivity of Pavement Markings in the U.S.	2021	Sam Houston State University A&M College	\$100,000	1/1/22	1/15/25	Research in progress	Phase II research in progress
NCHRP 20-30/IDEA 238: Low-Cost Sensing System for the Detection and Classification of Super Single Wheel Types and Distribution at the Network Level	2021	Michigan State University	\$135,000	7/1/22	6/30/24	Research in progress	Phase II research in progress

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 20-30/IDEA 239: A Real-Time Ice Warning System Empowered by Dielectric Ice Sensors for Bridges	2021	University of Texas at Arlington	\$135,000	7/1/22	6/30/24	Research in progress	Phase II research in progress
NCHRP 20-30/IDEA 240: Stainless Steel Coated Rebar: High Corrosion Resistance and Low Cost	2021	Allium Engineering, Inc.	\$138,750	4/1/22	6/30/23	Completed	Final deliverables posted on NCHRP project web page
NCHRP 20-30/IDEA 241: Producing DynaSignal: A Novel Aerodynamic Solution for Traffic Signal Lights to Mitigate Large Vibrations and Fatigue-Related Issues in Structural Supports of Traffic Signals	2021	Iowa State University	\$100,000	10/1/22	9/30/24	Research in progress	Phase II research in progress
NCHRP 20-30/IDEA 242: Development of an AI-Powered Dynamic Modulus Test with a Low-Cost Loading Frame	2021	Texas Transportation Institute	\$135,000	1/1/23	12/31/24	Research in progress	Phase I research in progress
NCHRP 20-30/IDEA 243: Establishing NDE Protocols for Use in Early Age Bridge Deck Preservation Strategies	2021	Infatek Solutions, Inc.	\$137,850	1/1/23	6/30/24	Research in progress	Phase I research in progress
NCHRP 20-30/IDEA 244: Development of a Compaction Quality Control Standard for the Small Diameter Pressuremeter	2021	Florida Institute of Technology	\$100,000	1/1/23	6/30/24	Research in progress	Phase I research in progress
NCHRP 20-30/IDEA 245: Simple and Rapid Tests for Assessing Quality and Consistency of Reclaimed Asphalt Pavement (RAP) for Recycled Asphalt Mixture Applications	2022	Virginia Department of Transportation	\$140,000	7/1/23	6/30/25	Research in progress	
NCHRP 20-30/IDEA 246: Developing a Method for Selecting Low-Energy Mixing and Compaction Temperatures for Asphalt Mixtures Considering Asphalt Lubrication and Aggregate Characteristics	2022	The Board of Regents of the University of Wisconsin System	\$140,000	10/1/23	3/31/25	Research in progress	
NCHRP 20-30/IDEA 247: Augmenting the Hearing of Safety-Critical Sounds for Highway Workers using Artificial Intelligence	2022	Clemson University	\$140,000	10/1/23	9/30/25	Research in progress	
NCHRP 20-30/IDEA 248: An Enhanced Network-level Curve Safety Assessment and Monitoring Using Low-cost Mobile Devices – Refinement and Field Evaluation	2022	Georgia Tech Research Corporation	\$100,000	6/1/23	11/30/24	Research in progress	
<b>Research Area 22: Design—Vehicle Barrier Systems</b>							
NCHRP 22-29B: Evaluating the Performance of Longitudinal Barriers on Curved, Superelevated Off-Ramps	2018	George Mason University	\$325,000	1/29/19	8/31/23	Completed	Publication decision pending
NCHRP 22-32: Development of Methods to Evaluate Side Impacts with Roadside Safety Features	2017	Roadsafe LLC	\$500,000	1/2/18	5/2/21	Canceled	See NCHRP Project 22-32A for follow-on activity
NCHRP 22-32A: Development of Methods to Evaluate Side Impacts with Roadside Safety Features	2017		\$534,031			Contract pending	
NCHRP 22-35: Evaluation of Bridge Rail Systems to Confirm AASHTO MASH Compliance	2018	Texas A&M Transportation Institute	\$500,000	6/1/18	6/1/22	Completed	Published as <i>NCHRP Research Report 1024</i>
NCHRP 22-37: Development of a MASH Barrier to Shield Pedestrians, Bicyclists, and Other Vulnerable Users from Motor Vehicles	2019	Texas A&M Transportation Institute	\$644,819	5/3/19	7/31/23	Research in progress	Publication decision pending
NCHRP 22-38: Development of MASH TL-3 Deflection Reduction Guidance for 31-inch Guardrail	2019	Texas A&M Transportation Institute	\$499,429	7/8/19	9/15/23	Completed	Publication decision pending
NCHRP 22-39: Guardrail Performance at Various Offsets from Curb for MASH TL-3 Applications	2019	University of Nebraska - Lincoln	\$600,000	6/3/19	9/2/23	Completed	To be published as <i>NCHRP Research Report 1089</i>
NCHRP 22-40: Update to AASHTO M 180-18 and Associated Highway Guardrail Specification	2019	Roadsafe LLC	\$550,000	7/1/19	7/8/24	Continuing project	Published as <i>NCHRP Research Report 1020</i> , includes continuation funding of \$250,000


Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 22-41: Proposed Modification to AASHTO LRFD Bridge Design Specifications, Section 13—Railing	2019	Modjeski & Masters	\$229,996	6/6/19	8/31/23	Completed	Publication decision pending
NCHRP 22-42: Impact Performance Assessment of Barrier Performance at High Speeds	2020		\$600,000			Contract pending	
NCHRP 22-43: Developing Testing Protocol for a Family of Devices—Signs, Breakaway Poles, and Work Zone Devices	2020	University of Nebraska - Lincoln	\$1,099,208	8/13/20	6/30/26	Research in progress	Combined with NCHRP Project 17-105; managed by NCHRP Project 22-43
NCHRP 22-44: A Transportation Agency Data Collection Practice for Use with In-Service Performance Evaluations (ISPEs)	2020	Roadsafe LLC	\$400,000	8/3/20	2/2/24	Research in progress	
NCHRP 22-45: Understanding and Analyzing the Crash—Contributing Factors (joint project with BTSCR-14)	2020	Exponent Inc.	\$689,900	10/5/20	1/4/24	Research in progress	
NCHRP 22-46: Human Factors Guidelines for Road Systems, Proposed 4th Edition.	2020	Exponent Inc.	\$549,963	6/1/21	5/31/24	Research in progress	
NCHRP 22-47: Incorporating Driver Behavior Considerations in Safety Performance Estimates of Infrastructure Improvements	2020	University of North Carolina - Chapel Hill	\$600,000	9/1/20	3/1/23	Canceled	See NCHRP Project 22-47A for follow-on activity
NCHRP 22-47A: Incorporating Driver Behavior and Characteristics into Safety Prediction Methods	2020		\$465,000			Contract pending	
NCHRP 22-48: Development of Crash Prediction Models for Short-Term Durations	2020	University of Central Florida Board of Trustees	\$650,000	7/15/20	1/16/23	Completed	Published as <i>NCHRP Research Report 1073</i>
NCHRP 22-49: The Effect of Vehicle Mix on Crash Frequency and Crash Severity	2020	University of Central Florida Board of Trustees	\$400,000	9/3/20	9/4/23	Completed	Publication decision pending
NCHRP 22-50: Crashworthiness of Roadside Hardware on Curbed Roadways	2021	RoadSafe, LLC	\$400,000	10/1/23	10/1/26	Research in progress	
NCHRP 22-51: Evaluation of MASH 2016 soil specifications and procedures	2021		\$250,000			Contract pending	
NCHRP 22-52: Development of a Crashworthy Tangent End Treatment for Low-Speed and Curbed Roadways	2022		\$750,000			Contract pending	
NCHRP 22-53: Delineation of Linear Roadside Hardware Systems and Roadside Obstacles	2022	Texas A&M Transportation Institute	\$400,000	8/23/22	2/22/25	Research in progress	
NCHRP 22-54: MASH Hardware Evaluation with New Proposed Test Vehicles	2022		\$1,000,000			Contract pending	
NCHRP 22-55: Implementation of MASH Surrogate Test Vehicles for Sign Supports, Breakaway Poles, and Work Zone Traffic Control Devices	2022	University of Nebraska - Lincoln	\$750,000	8/19/22	10/19/26	Research in progress	
NCHRP 22-56: Development of Non-proprietary Prefabricated Solutions for Concrete Barrier Systems for Accelerated Bridge Construction	2022		\$900,000	10/6/22	10/5/25	Research in progress	
NCHRP 22-57: Development of MASH Full-Scale Test Matrices for Additional Roadside Safety Devices	2023		\$500,000			Contract pending	
NCHRP 22-58: National Guidance for Defining Acceptable Roadside Hardware Field Performance through In-Service Performance Evaluations (ISPEs)	2023		\$400,000			Contract pending	
NCHRP 22-59: Safety Risks of Occupant Compartment Damage During Crashes	2023		\$750,000			In development	
NCHRP 22-60: Development of MASH Test Procedures for Motorcycles	2024		\$500,000			In development	
NCHRP 22-61: Evaluation of Electrical Vehicle Compatibility with MASH Roadside Hardware	2024		\$1,000,000			In development	

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 22-62: Reduced Impact Angles with Temporary Barriers in Work Zones	2024		\$400,000			In development	
NCHRP 22-63: Updating Finite Element Analysis (FEA) Verification and Validation (V&V) Procedures and Reporting	2024		\$500,000				
<b>Research Area 23: Administration—Agency Administration</b>							
NCHRP 23-04: Statewide Insurance Pooling for Public Transit	2020	AECOM Technical Services Inc.	\$300,000	8/31/21	8/30/23	Completed	Published as <i>NCHRP Research Report 1079</i> and <i>NCHRP Web-Only Document 374</i>
NCHRP 23-08: Guidelines for Incorporating Maintenance Costs into a Transportation Asset Management Plan	2020	Applied Pavement Technology	\$349,976	8/20/20	2/19/22	Completed	Published as <i>NCHRP Research Report 1076</i> and <i>NCHRP Web-Only Document 372</i>
NCHRP 23-11: Transportation Emergency/ Security Summit and Exchange	2020	Critical Ops	\$250,000	7/18/23	1/18/24	Research in progress	
NCHRP 23-12: Artificial Intelligence Opportunities for State and Local DOTs – A Research Roadmap		Virginia Polytechnic Institute & State University	\$200,000	11/2/21	12/31/23	Completed	Publication decision pending
NCHRP 23-13(01): Telecommuting, Remote Work, and Hybrid Schedules: Managing the Shift to a Flexible Work Future	2021	ICF Incorporated	\$150,000	5/5/22	6/4/23	Completed	Published as NCHRP Research Report 1072
NCHRP 23-13(02): Employee Safety during COVID-19	2021	Combined	\$350,000	5/3/22	5/31/24	Research in progress	Combined with TCRP Project F-30; managed by TCRP Project F-30
NCHRP 23-13(03): Guide on Truck Rest and Service Areas for Critical Supply Chain Delivery	2021		\$180,000			Contract pending	
NCHRP 23-13(04): Scoping Supply Chain Challenges and Solutions amid COVID-19	2021		\$150,000			Contract pending	
NCHRP 23-13(05): Regulatory Relief of Commercial Vehicle Weight Requirements for Emergency Transportation of Critical Commodities	2021	Texas A&M Transportation Institute	\$180,000	9/9/22	1/9/24	Research in progress	
NCHRP 23-13(06): Assessing the Equity and Workforce Mobility Implications of the Expansion of E-Commerce and Direct-to-Consumer Delivery Services	2021	Canete Medina Consulting Group, Inc.	\$250,000	12/20/22	10/20/24	Research in progress	
NCHRP 23-14: Research Roadmap for Knowledge Management	2021	Spy Pond Partners	\$300,000	8/9/22	8/9/24	Research in progress	
NCHRP 23-15: Guidance on Risks Related to Emerging and Disruptive Transportation Technologies	2021	The RAND Corporation	\$500,000	10/1/21	11/22/24	Research in progress	
NCHRP 23-16: Implementing and Leveraging Machine Learning at Departments of Transportation	2021	Old Dominion University Research Foundation	\$348,585	3/24/22	3/23/24	Research in progress	
NCHRP 23-17: Assessing and Measuring the Business Value of Knowledge Management	2021	IKnow LLC	\$350,000	6/13/23	6/13/25	Research in progress	
NCHRP 23-18: Incorporating Knowledge Management into DOT Business Practices	2020		\$200,000			Combined	Combined with NCHRP Projects 23-17 and 23-21; managed by NCHRP Project 23-17
NCHRP 23-19: Practices for Transportation Agency Procurement and Management of Advanced Technologies	2020	Simplar Sourcing	\$225,000	11/1/22	10/31/23	Research in progress	
NCHRP 23-20: Guidebook for Implementation of UAS Operational Capabilities	2020	WSP USA Inc.	\$279,918	10/14/22	10/13/24	Research in progress	
NCHRP 23-22: Alternative Project Delivery Methods: Assessing and Allocating Risk to Increase Competition	2022	HKA Global, Inc.	\$500,000	10/5/22	4/5/25	Research in progress	

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 23-23: Data Governance Design and Implementation - Links Between Governance Approaches and Performance Effects in DOTs	2022	Spy Pond Partners, LLC	\$350,000	7/25/22	7/24/24	Research in progress	
NCHRP 23-24: Methods to Allow Agencies to Incorporate Quantitative Risk Assessment at Project and Network Level	2022	Regents UCLA	\$500,000	3/14/23	12/14/25	Research in progress	
NCHRP 23-25: Architecture for an Information System for Reporting and Sharing Truck Regulatory Requirements Data	2022	Transpo Group USA, Inc.	\$399,937	6/7/23	9/6/25	Research in progress	
NCHRP 23-26: Measuring Impacts and Performance of State DOT Resilience Efforts	2022	Cambridge Systematics	\$300,000	10/26/22	12/26/24	Research in progress	
NCHRP 23-27: Strategies for Developing and Using Data Ontologies for Data-Driven Decision-Making	2022	WSP USA, Inc.	\$300,000	11/3/23	9/2/25	Research in progress	
NCHRP 23-28: Planning for 4.9 GHz Spectrum Changes — What Transportation Agencies Need to Know	2022	Blue Wing Services	\$250,000	9/23/23	1/22/25	Research in progress	
NCHRP 23-29: Enterprise Data Warehouse Implementation Guide	2023		\$350,000			Contract pending	
NCHRP 23-30: Strategies to Improve Application of Research Results in the Research Life Cycle	2023		\$400,000			Contract pending	
NCHRP 23-31: Strategies to Foster the Implementation of Knowledge Management	2023		\$250,000			Contract pending	
NCHRP 23-32: Transportation Asset Risk and Resilience	2023		\$4,000,000			Contract pending	Includes \$500,000 from U.S. DOT Office of the Assistant Secretary for Research and Technology
NCHRP 23-33: Guidance in Planning for Managed Retreat as an Extreme Weather and Climate Adaptation Strategy	2023		\$500,000			Contract pending	
NCHRP 23-34: Performance Measures for Community-Centered Transportation Outcomes: A Guide	2024		\$400,000			In development	
NCHRP 23-35: Developing New Performance Metrics for Risk Management	2024		\$400,000			In development	
NCHRP 23-36: Development of a Knowledge Capture Toolkit for State DOTs	2024		\$225,000			In development	
NCHRP 23-37: Guide for Effectively Linking Performance Measures, Risk Management, and Process Improvement	2024		\$400,000			In development	
NCHRP 23-38: Incorporating Risk Management into Maintenance Practice	2024		\$500,000			In development	
NCHRP 23-39: Strategies for Construction Inspector Career Paths in State Transportation Agencies (STAs) for Retaining and Advancing Capabilities	2024		\$350,000			In development	
NCHRP 23-40: Tools for Decision Making and Establishing Maintenance Technician Staffing Levels for Modern Public Highway Maintenance Equipment Fleets	2024		\$300,000			In development	
NCHRP 23-41: Using Emerging Technologies to Capture, Process, and Optimize Asset Inventory and Condition Data	2024		\$500,000			In development	
<b>Research Area 24: Soils and Geology—Mechanics and Foundations</b>							
NCHRP 24-49: Guidance on the Selection and Use of Flow Resistance Values in Two-Dimensional (2D) Hydraulic Models	2020	Pennsylvania State University	\$495,254	8/21/20	2/21/23	Completed	To be published as <i>NCHRP Research Report 1077</i>
NCHRP 24-50: Rewrite of the AASHTO Drainage Manual	2021	Ayres Associates Inc.	\$600,000	8/9/21	8/9/24	Research in progress	

Name	FY	Subcontractor	Contract Amount	Contract Start Date	Contract End Date	Status	Status Comments
NCHRP 24-51: Effects of Construction Installation Methods on the Design and Performance of Drilled Shaft Foundations	2021		\$600,000			Contract pending	
NCHRP 24-52: Design Guidance for Resilient Erosion and Sediment Control Technologies	2024		\$750,000			In development	
<b>Research Area 25: Transportation Planning—Human and Natural Environment</b>							
NCHRP 25-47: How to Measure and Communicate the Value of Access Management	2014	University of South Florida	\$600,000	5/17/18	3/31/21	Completed	Published as <i>NCHRP Research Report 1032</i> and <i>NCHRP Web-Only Document 339</i>
NCHRP 25-55: Assessment of Regulatory Air Pollution Dispersion Models to Quantify the Impacts of Transportation Sector Emissions	2018	ICF Incorporated	\$700,000	6/4/18	9/30/22	Completed	Published as <i>NCHRP Research Report 1058</i>
NCHRP 25-61: Effective On-Bridge Treatment of Stormwater	2020	GeoSyntec Consultants	\$495,724	9/14/20	3/14/24	Research in progress	
NCHRP 25-62: Improving the Efficiency and Consistency of Section 106 Compliance for State DOTs: Strategies for Project-Level Programmatic Agreements and Postwar Commercial Properties	2020	Mead & Hunt Inc.	\$499,896	4/15/20	4/14/23	Completed	Phase I published as <i>NCHRP Web-Only Document 311</i> ; Phase II published as <i>NCHRP Research Report 1067</i> and <i>NCHRP Web-Only Document 367</i>
NCHRP 25-63: Handbook on Deterring and Excluding Bats from Transportation Structures	2021	Environmental Solutions & Innovations, Inc.	\$499,965	11/15/21	1/14/25	Research in progress	
NCHRP 25-64: Considering Greenhouse Gas Emissions and Climate Change in Environmental Reviews: Resources for State DOTs	2021	Cambridge Systematics Inc.	\$375,000	7/27/21	1/26/24	Research in progress	
NCHRP 25-65: Preparing Successful No-Effect and No-Adverse-Effect Section 106 Determinations: A Handbook for Transportation Cultural Resource Practitioners	2022	WSP USA, Inc.	\$149,980	9/14/22	6/14/24	Research in progress	
NCHRP 25-66: Reviewing the REMEL Noise Database to Accommodate the Current Vehicle Fleet	2023		\$1,000,000			Contract pending	
NCHRP 25-67: Cultural Resources Mitigation: What Works and What Doesn't?	2023		\$500,000			In development	
NCHRP 25-68: Successful Practices in Tracking and Implementing Environmental Commitments	2023		\$350,000			In development	
NCHRP 25-69: Cost-Effective Methods to Increase Wildflower Diversity in Existing Roadside Vegetation	2024		\$375,000			In development	
NCHRP 25-70: Developing a Framework for Evaluation of Decarbonization Outcomes	2024		\$500,000			In development	
NCHRP 25-71: Roadside Vegetation Management Guidelines for Prevention and Management of Wildfire	2024		\$300,000			In development	

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To find specific projects, use the "Find a Project" option in the navigation bar at [www.trb.org/NCHRP](http://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, strategic highway, and behavioral traffic safety 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.

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## ITEMS FOR SALE

1. NCHRP Reports, Syntheses, Research Results Digests, Legal Research Digests, and CD-ROMs.
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