

TR NEWS

The background of the cover is a photograph of the Golden Gate Bridge in San Francisco. In the foreground, a long, yellow oil spill containment boom curves across the water. The sky is blue with some light clouds. The bridge's towers and cables are clearly visible in the distance.

July–September 2024 NUMBER 350

LESS TROUBLED WATERS

Transportation as a Source of Oil in the Sea

PLUS

Preserving Postwar Properties
Inspector Shortage Strategies
Federal Funding Uncertainty

NATIONAL
ACADEMIES *Sciences*
Engineering
Medicine

TRB TRANSPORTATION RESEARCH BOARD

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Kirsi Tikka, Dagmar Schmidt Etkin, and Kelly Oskvig

Where does oil in the sea come from? A consensus study concludes that scientific, regulatory, and production advances since the 2010 *Deepwater Horizon* disaster—the largest marine oil spill in U.S. history—have spurred significant reductions in harmful releases from tankers, pipelines, and other transportation-related sources.

8 NCHRP RESEARCH REPORT 1067 AND NCHRP WEB-ONLY DOCUMENT 367 Roadside Relics: Preserving Postwar Commercial Properties

Emily Pettis and Christina Slattery

Two National Cooperative Highway Research Program publications help transportation project planners evaluate the potential historic significance of ubiquitous post–World War II commercial properties, along with project impacts.

13 NCHRP RESEARCH REPORT 1027 Recruiting, Developing, and Retaining Construction Inspectors

Chris Harper

Construction inspections ensure that expected quality and functionality is achieved or exceeded, but a growing shortage of inspectors is threatening this process while the need for inspections is rising. A National Cooperative Highway Research Program research report presents a systematic process to aid agencies in establishing and maintaining the career development of this vital workforce component.



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Benjamin Perez and Simon Mosbah

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Brocken Inaglor, Wikimedia Commons

COVER A yellow boom stretches toward the Golden Gate Bridge, protecting the San Francisco, California, shore from a 2007 oil spill. Scientific, regulatory, and safety advances over the past two decades have helped reduce the volume of oil entering the marine environment from spills, vessel operations, pipelines, and other transport.

Coming Next Issue

TR News 351 (October–December 2024) is a theme issue on the framework and processes to effectively implement transportation research. Authors look at engagement between the public and private sectors, a pooled fund dedicated to sharing transportation innovations, a technology transfer program, and more.



Courtesy of the University of California, Davis, Institute of Transportation Studies

A family unloads groceries from an electric vehicle used by residents of their affordable housing development in California's Central Valley. Rural carshare services—such as this one—are among the spate of innovations emerging from university transportation centers nationwide.

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TR NEWS

features articles on innovative and timely research and development activities in all modes of transportation. Brief news items of interest to the transportation community are also included, along with profiles of transportation professionals, meeting announcements, summaries of new publications, and news of Transportation Research Board activities.

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LESS TROUBLED WATERS

Transportation as a Source of Oil in the Sea

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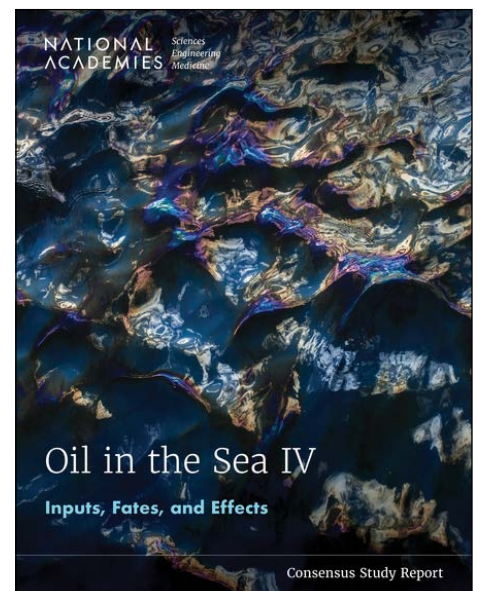
and Medicine's Ocean Studies Board.

Smoke billows above the Gulf of Mexico, where oil from the *Deepwater Horizon* blowout is corralled and burned to halt its spread. Scientific and regulatory advances since the 2010 disaster have helped reduce the volume of oil entering the marine environment from spills, vessel operations, pipelines, and other transport.

It has been more than two decades since the National Academies of Sciences, Engineering, and Medicine (National Academies) last conducted a consensus study on the inputs, fates, and effects of petroleum-based hydrocarbon mixtures in the sea and 14 years since the *Deepwater Horizon* oil spill devastated the Gulf of Mexico. Over this time, significant advances have been made in scientific methods to study the detection, fates, and effects of oil in marine environments. All of these areas are critical for informing oil-spill response decisions.

In fall 2020, a National Academies' committee was convened to document the state-of-knowledge of oil entering the marine environment and identify gaps in research and understanding. Like its three predecessors published in 1975, 1985, and 2003, *Oil in the Sea IV: Inputs, Fates, and Effects* makes recommendations for improvement in oil-spill science, prevention, and mitigation of the impact of harmful discharges on the

environment. The 2022 consensus study, which was sponsored by the American Petroleum Institute, the U.S. Department



Read *Oil in the Sea IV: Inputs, Fates, and Effects* at <https://doi.org/10.17226/26410>.

of the Interior's Bureau of Ocean Energy Management and Bureau of Safety and Environmental Enforcement, Fisheries and Oceans Canada, the Gulf of Mexico Research Initiative, and the National Academies' Presidents' Circle Fund, also includes recommendations for reducing inputs from operational and accidental discharges. This article focuses on several transportation-specific contributors to oil in the sea.

Commercial Vessels

Aircraft, pipelines, rail, and different types of vessels can—in the process of routine operation or during an emergency—intentionally or unintentionally release oil into the marine environment. Routine machinery operations on ships generate oily residues, which are discharged either to shore-based facilities or to the sea. The 1973 International Convention for the Prevention of Pollution from Ships (MARPOL, short for “marine pollution”), as modified by the Protocol of 1978, prohibits any discharge of oily mixtures from ships into the sea except when certain conditions are satisfied. These conditions include a limit to the oil content in the effluent, which is processed through approved equipment when the vessel is underway between ports.

Oil residues and oily mixtures that cannot be discharged in compliance with the regulations must be retained onboard for subsequent discharge to reception facilities (i.e., waste collection and treatment sites). Ports and terminals are required to have facilities with adequate capacity to receive and process such oily wastes from any vessel calling in.

In estimating operational discharges from machinery operations on commercial vessels, including tankers, the consensus study report assumed full compliance with MARPOL regulations but acknowledged that illegal discharges and spills still occur. The 2003 estimate for compliantly discharged machinery bilge oil worldwide was 240 tons per year, corresponding to a total capacity of 86,817 vessels greater than 100 gross tons (a measure of a ship's overall internal volume). The comparable estimate



Corey Seeman, Flickr, CC BY-NC-SA 2.0

Crude oil tanker *Velos Forza* cruises into New York City's busy harbor. Since 2003, double hulls, segregated ballast tanks, slop tanks to store oily cleaning water, and international restrictions on discharges have helped to cut the amount of cargo oil entering the sea from tankers by 75 percent annually.

for North American waters was eight tons per year for vessels greater than 100 gross tons. By extrapolation from the increased number of ships (7), the study estimated that machinery bilge oil discharges worldwide in 2020 were 270 tons per year, corresponding to the capacity of 98,140 vessels greater than 100 gross tons. Based on the same rate of increase, the estimate for machinery bilge oil discharges in North American waters came to nine tons per year.

Other operational oil leakage can occur from oil-lubricated stern tubes—hollow, watertight tubes that contain the shaft that connects the engine and the propeller—and other lubricated equipment with oil-to-sea interfaces, such as controllable pitch propellers, rudder bearings, and on-deck equipment—water interfaces.

On oil tankers, pump room bilges and cargo tank cleaning operations can generate additional oily residues. MARPOL regulations allow discharges of oily waters from the cargo area of an oil tanker if the tanker has a slop tank (which stores oily wastewater from cargo tank washing) and an oil discharge monitoring and control system. Additionally, discharges are allowed only if the tanker is between ports and at least 50 nautical miles from

the nearest land, and the instantaneous rate of discharge of oil content does not exceed 30 liters per nautical mile.

In 2003, there were still pre-MARPOL tankers without segregated ballast tanks in operation. These vessels have been phased out and today all ballast water is segregated from the cargo. Consequently, the estimated oily discharges from the cargo area of tankers worldwide has fallen significantly. If noncompliant discharges are excluded, the worldwide 2003 cargo oil discharge from tankers was estimated at 7,400 tons per year. That compares with the 2020 estimate of 1,730 tons per year—a decrease of more than 75 percent. The regulations do not allow any discharges of oily waters from the cargo area of tankers within or in the zone contiguous to North American territorial waters.

A component of petroleum, volatile organic compounds (VOCs) are released into the air from tankers during loading operations and during the voyage. At loading, the pressure in the cargo tank increases with the rising cargo level and VOCs are vented into the atmosphere unless the terminal and vessel have a vapor control system. During the voyage, evaporation from the cargo surface increases the pressure in the tank and

VOCs may be released to the atmosphere. VOC releases from tankers are characterized as methane and nonmethane. Methane and other lighter components contribute to the greenhouse effect, whereas the heavier components have negative human health effects such as respiratory ailments and lung cancer. Since 2010, MARPOL has required crude oil tankers to implement a VOC management plan to prevent or minimize the release of VOC emissions.

Oil in the Sea III estimated the atmospheric deposition of VOC emissions from tankers in North American waters at five tons per year and concluded that the input is significant only with regard to its impact on local air quality (2). No studies are available on the impact of International Maritime Organization regulations on VOC emissions, but a reduction since 2010 can be assumed. Although VOC emissions from ships remain a concern, the input into the sea is not considered significant.

Recreational Vessels

Oil in the Sea III recommended accounting for the considerable emissions from then widespread conventional two-stroke outboard engines of recreational vessels operating in coastal waters in calculations for total inputs of oil into the sea. The report concluded that the number of recreational two-stroke outboards—the predominant engine type and one that emits more pollutants into the environment than other engine designs—had increased significantly within the previous decades. It also determined that the amount of fuel, lubricating oil, and additives they emitted was contributing approximately 6 percent of the total load of petroleum into North American waters—the fourth highest source. In 2002, EPA issued regulations that prescribed a 75 percent reduction of emissions from small marine engines sold starting in 2005. This was to be done through new design features, such as direct injection and four-stroke technologies.

The recreational boating market continues to increase worldwide. Although two-stroke outboard motors are no longer



W. Carter, Wikimedia Commons

Moored speedboats line a harbor jetty in Lysekil, Sweden. While cleaner engines—such as the four-stroke in the foreground—have become pervasive, the worldwide growth in recreational boating and continued dominance of two-stroke outboard motors (second and fourth boats from the left) seem likely to propel an increase in oily emissions.

sold in the United States, they continue to hold a sizeable share of the global market. The pervasiveness of newer cleaner four-stroke and direct injection engines has produced much cleaner recreational engines that emit far less oil directly into the marine ecosystem. In the United States, however, many of the older technology engines still exist and continue to contribute oil to those waters. Many other countries, particularly the developing nations, continue to utilize the older technology systems because of lower costs, weight, and operational constraints.

Aircraft Fuel Jettison

Some commercial jet aircraft have the capability to deliberately dump, or jettison, fuel to reduce its weight in emergency situations and allow the aircraft to land safely without sustaining structural damage. Such situations can include a return to the airport shortly after takeoff, compromised aircraft performance, and an emergency landing at an unintended destination. In the United States and Canada, regulations on fuel jettison are aligned with the standards and recommended practices of the International Civil Aviation Organization (ICAO)—a United Nations agency aiming to foster

international consensus on aviation activities. ICAO recommendations include advising air traffic control regarding the onset of dumping and requiring air traffic control to coordinate the route, altitude, and duration of dumping with the flight crew to prioritize unpopulated areas—preferably over water and away from expected or reported storms.

FAA describes the frequency of emergency jettisoning as “extremely rare,” and has neither required nor routinely recorded incidents of commercial aircraft fuel jettisons as they occur (3). *Oil in the Sea III* estimated that 1,500 tons of petroleum per year are released over the open ocean in North America and 7,500 tons per year worldwide from this activity (2). With the assumption that U.S.—system air traffic has tended to increase since the completion of the *Oil in the Sea III* report, which estimated an approximate 1,000 flights per day for its calculations, an input of 1,500 tons of petroleum per year to North American waters may be an underestimate (3).

Spills from Oil and Gas Transportation

Crude oil, whether for use as fuel or for the production of chemicals, is

transported and handled by pipeline, tanker, tank barge, rail, or tanker truck. At each step of the journey from wellhead to temporary storage, refinery, or retailer, there is the potential for spillage to occur.

PIPELINES

Pipelines are a vital part of North America's oil transportation infrastructure. Crude oil is carried through offshore pipelines to terminals, as well as to coastal and inland pipeline systems that connect production sites in the United States and Canada with terminals for distribution by tank vessel, rail, or tanker truck. Of the tens of thousands of pipeline spills reported in the United States and Canada in the past 50 years, only a fraction has affected North American marine waters and estuaries (4, 5).

The amount of oil spilled from offshore pipelines has declined significantly, falling 68 percent between 1990–1999 (the period examined in *Oil in the Sea III*) and the 2010–2019 time frame of *Oil in the Sea IV*. More than 99 percent of the spillage occurred in nearshore or coastal waters. The significant reduction in coastal and offshore pipeline spillage mirrors the trend seen in inland U.S. pipelines over the past 50 years (5).

Offshore and coastal pipelines have incorporated many of the safety improvements made to inland pipeline operations. These measures include replacing older lines and increasing inspections and monitoring. The Gulf of Mexico's aging offshore pipeline infrastructure remains a concern, however. More than one-third of its 15,000-plus miles of oil and gas conduits are at least 30 years old. Pipeline spill prevention measures that would address cracks, ruptures, and other types of incidents include regular inspections and maintenance as well as clearly marking pipeline locations on navigational and coastal maps.

TANK VESSELS

The category of "tank vessels" includes the array of ships and barges that carry crude oil or petroleum products as cargo. These vessels also carry oil as fuel and for lubrication, as do all



Roy Luck, Flickr, CC BY 2.0

The *Atlantic Mirage* oil tanker is moored at the Kinder Morgan terminal in Houston, Texas. Replacing older pipelines and improved safety measures have greatly reduced spills from transporting crude oil from production sites in the United States and Canada to coastal terminals.



Pvalerio, Wikimedia Commons, CC BY 3.0

A tug-propelled barge loaded with fuel oil navigates under one of three bridge spans straddling the Cape Cod Canal in Massachusetts. Accident prevention measures leading to fewer collisions, groundings, and other incidents have helped to reduce tank vessel spillage in North American waters by nearly 95 percent over the past two decades.

nontank vessels. While tankers were of the greatest concern as spill sources in the *Oil in the Sea III* study and other risk assessments at that time, the picture is considerably different now. There was a nearly 95 percent reduction in the overall volume of tank vessel spillage in North American waters during

2010–2019, compared with the *Oil in the Sea III* time frame.

This reduction in tank vessel spillage mirrors international trends. The International Tanker Owners Pollution Federation reported that the number and total volume of worldwide tanker spills has decreased significantly over

five decades (6). The reduction can be attributed to several factors, including an increase in accident prevention measures and fewer major impact accidents (e.g., groundings, collisions, and allisions, the latter of which occurs when a moving ship hits a stationary object such as a pier, pipeline, or vessel), reflecting increased implementation and establishment of vessel traffic systems.

RAIL TANK CARS

Transporting large quantities of crude oil by train is a relatively new phenomenon that—so far—is limited to the United States and Canada. Both countries began using trains of up to 120 tank cars as moving pipelines or crude-by-rail conveyance to refineries and terminals in the early 2010s, when rapidly expanding inland shale oil production exceeded the capacity and availability of pipelines. Movement on existing rail lines made it easier to change routes and enabled efficient loading and unloading of the oil at either end.

The greatest concern about crude-by-rail trains is the possibility of an accident causing a deadly explosion, such as the 2013 Lac-Mégantic, Quebec, derailment that killed 47 people. The *Oil in the Sea IV* study found no reports of spillage to marine and estuarine waters that warranted inclusion in estimating rail transportation-related oil inputs. However, this type of spillage remains a possibility.

Concluding Thoughts

Oil entering the sea as a result of transportation has decreased significantly in the past 20 years. This positive trend can largely be attributed to regulatory changes from government and international organizations, industrywide attention to safety, improved emergency response to oil leakage and spills, and greater public awareness of the environmental effects of oil in the sea. New risks for oil spills are emerging, however, and old risks persist. These include aging infrastructure, extreme storms, sea-level rise, new shipping routes in Arctic regions, and threats from militant actions. Therefore,



Courtesy of the Bureau of Safety and Environmental Enforcement

An oil spill response crew deploys an inclined belt skimmer with side arm collection system during a training session off Galveston, Texas. Advances in preparedness, monitoring, and techniques such as this—which involves herding oil into the skimmer-lined pocket of an outrigger-extended boom and removing it—have helped mitigate or prevent environmental harm.

industry, governmental and nongovernmental organizations, and the general public should remain vigilant.

Oil in the Sea IV was carried out by the Ocean Studies Board within the National Academies of Sciences, Engineering, and Medicine's Division on Earth and Life Studies. To learn more about the division, visit <https://www.nationalacademies.org/dels/division-on-earth-and-life-studies>. Learn more about the Ocean Studies Board at <https://www.nationalacademies.org/osb/ocean-studies-board>.

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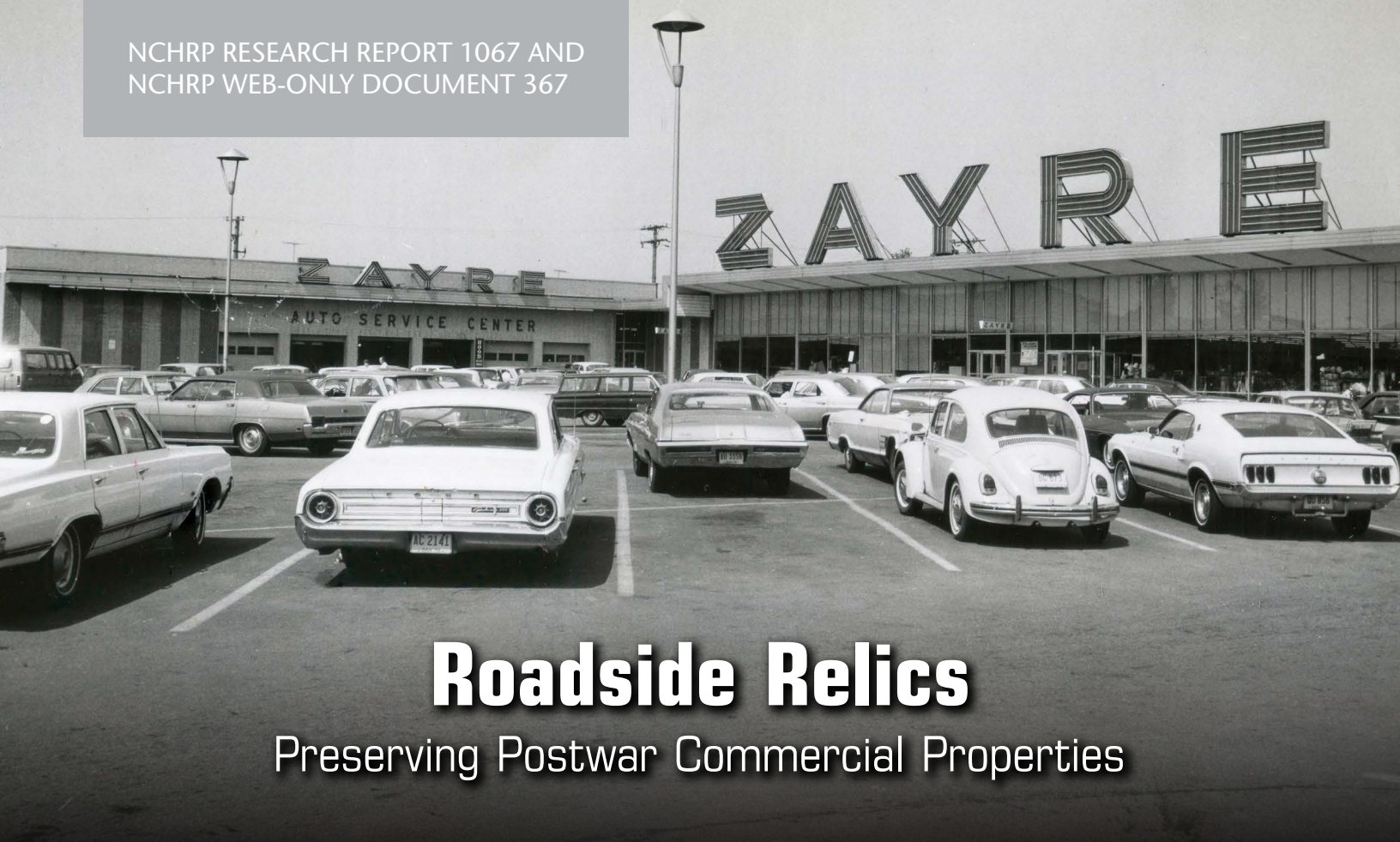
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ADDITIONAL RESOURCE

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Roadside Relics

Preserving Postwar Commercial Properties

Courtesy of Phillip Pessar, Flickr, CC BY 2.0

EMILY PETTIS AND CHRISTINA SLATTERY

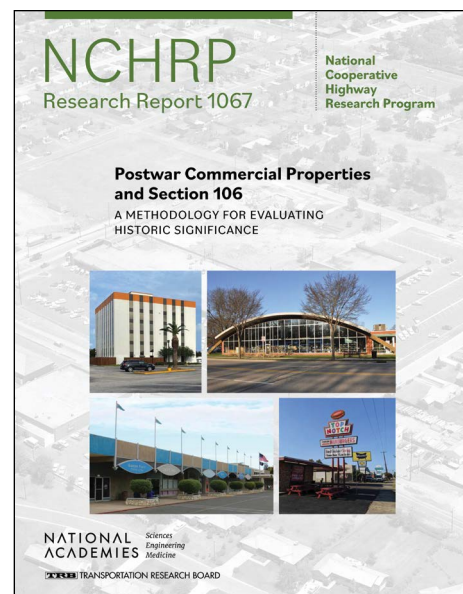
Pettis is the cultural resources department manager and Slattery is the cultural resources business unit leader at Mead & Hunt in Middleton, Wisconsin.

A packed parking lot circa 1970 in suburban Warrensville Heights, Ohio, attests to the popularity of Zayre, a discount department store chain. New guidance can help transportation planners evaluate the historic significance of—and impact of projects on—such ubiquitous postwar commercial properties.

Does the former 1950s grocery store building you drive by have an important story to tell? What about that 1970s office building that houses your dentist? Project planners at state departments of transportation (DOTs) are asking such questions as they consider the possible effects of their transportation projects on adjacent vintage structures, as federal historic preservation regulations require. Guidance outlined in two recent National Cooperative Highway Research Program (NCHRP) publications—*NCHRP Research Report 1067: Postwar Commercial Properties and Section 106: A Methodology for Evaluating Historic Significance* and *NCHRP Web-Only Document 367: Postwar Commercial Properties and Section 106: Piloting the Methodology for Evaluating Historic Significance*—provide practitioners with new tools to evaluate these and other commercial properties from the post–World War II period (1, 2).

After the war ended in 1945, large numbers of city dwellers moved to the

suburbs. There was a similar shift in commercial development away from traditional downtowns. Commercial properties, including retail stores,



Read the report and web-only document at <https://dx.doi.org/10.17226/27140>.

shopping centers, and office buildings, sprang up in record numbers along highways and transportation corridors to serve residents in the rapidly expanding postwar subdivisions and suburbs. This development played out over and over throughout the country in large metropolitan areas, smaller cities, and formerly rural areas that became new suburban communities.

These widespread commercial properties pose a challenge for today's transportation project planners. According to Section 106 of the National Historic Preservation Act, agencies seeking federal dollars or permits must consider the potential effects of a project on properties eligible for listing in the National Register of Historic Places. A general qualifier is buildings with distinctive architecture or engineering that are at least 50 years old. Despite the large number of postwar commercial properties, however, very little guidance has been available for state DOTs, state historic preservation offices, and cultural resource professionals struggling to evaluate their significance and integrity efficiently and consistently.

Developing Guidance

To solve this problem, *NCHRP Research Report 1067* provides guidance on how to develop National Register eligibility evaluations for postwar commercial buildings and commercial strips. The cultural resources team at Mead & Hunt, a nationwide architectural and engineering firm, formulated and tested the methodology with assistance from consulting companies NV5, Dovetail Cultural Resource Group, and Painter Preservation to bring a national perspective to this research project. The objective was to guide the evaluation of individual commercial buildings and commercial strips for eligibility for listing in the National Register. In consultation with the NCHRP research panel, it was determined that the methodology would focus on the following five property types:

- Retail stores—standalone buildings with a single storefront that house a retail service, such as a grocery store,



Courtesy of Mead & Hunt

Dedicated parking and cohesive design characterize this 1975 office park near NASA's Johnson Space Center in Houston, Texas. Such complexes sprang up to ease suburban commutes and typically lie adjacent to main transportation corridors and within short driving distances of downtown areas and airports.

hardware store, drugstore, dry cleaner, clothing store, or specialty store;

- Shopping centers—a connected series of separate commercial businesses located in a single building or grouping of buildings with separate storefronts (not indoor shopping malls);
- Office buildings—standalone buildings that house professional service companies or practices, such as a medical or dental office, law office, architecture firm, or accountant;
- Office parks—a collection of individual office buildings developed together that house multiple businesses and professional practices; and
- Commercial strips—a series of closely spaced commercial buildings along a roadway that may stretch from one to several blocks to form a unified entity evaluated as a historic district.

The selection of property types included in the guidance was informed by a survey of agencies and practitioners to identify those that posed some of the biggest challenges in evaluation and, thus, would be of most benefit to state DOTs.

Framework for Gauging Eligibility

A methodology was developed to assist with evaluating the historic significance of postwar commercial properties. The project team organized the methodology into three sections to guide the evaluation process. The first section describes commercial property types and provides guidelines for identifying the physical features that convey their historic character. These character-defining features are organized into categories addressing the building and its siting and site features, with photographic examples of each property type.

The second section includes guidance for researching and developing a historic context for use in evaluating National Register eligibility of individual properties and commercial strips. As outlined in the methodology, the historic context identifies relevant postwar commercial development trends and provides information with which to understand how they may or may not be represented at the local level in individual properties or potential historic districts. The methodology provides guidance for research, including lists of suggested repositories,



Courtesy of Mead & Hunt

Prominent signage and street-facing display windows help define the character of a 1969 retail store in Maplewood, Minnesota. Distinctive architectural elements are among the criteria for determining whether a commercial property may be eligible for listing in the National Register of Historic Places.

online sources, primary and secondary resources (local tax records, for instance), and groups and individuals to be consulted. Additionally, there are suggestions for public engagement.

Several research tools for practitioners were developed as part of this project. The online Application Worksheet¹, for example, provides a list of useful research materials and allows for annotation, including detailed notes on the available materials and their relevance. Another tool developed for the project is a bibliography² that identifies a wealth of sources on postwar commercial properties to get practitioners started on their research. The bibliography includes resources related to specific types of postwar commercial properties; postwar development trends, such as consumerism; and regional contexts, studies, and National Register evaluations and nominations for postwar properties across the country. Local and site-specific research, including

¹ Access the Application Worksheet at <https://tinyurl.com/2kypkqjx>.

² Download the bibliography at <https://tinyurl.com/37b5nvsv>.

exploring newspaper archives, is suggested to develop an appropriate context within which to evaluate the significance of a particular property (see Clues in Old News, Page 11.)

The methodology also provides information to assist in identifying historic trends that influenced postwar suburbanization and the associated commercial development that occurred in communities across the country. These trends will ideally be considered when evaluating significance and developing an appropriate historic context for postwar commercial properties. Within each trend, some of the predominant factors that influenced commercial development were identified, including the following:

- Suburbanization,
- Automobile culture,
- Social and cultural trends,
- Commercial design and setting, and
- Architecture.

The third section of the methodology focuses on how to apply the National Register Criteria for Evaluation to individual properties and potential historic

districts, including assessing historic integrity. Specifically, guidance is provided on how to consider and apply Criterion A: History and Criterion C: Architecture to postwar commercial properties. Under each criterion, the areas of significance—such as a property’s association with an important event or distinctive style—that are most likely to apply are discussed, with photographs of examples from across the country that have been identified as meeting the criteria and are eligible or listed in the National Register. Areas of significance discussed in the evaluation section include commerce, community planning and development, and social history under Criterion A, and architecture, community planning and development, and landscape architecture under Criterion C. Additional guidance focuses on defining periods of significance (i.e., the time frame during which the property was associated with the identified area of significance) and assessing historic integrity to understand how alterations and changes to an individual property or group of properties within a commercial strip can affect its ability to convey significance. Alterations are especially common for commercial properties, which frequently undergo modernization and remodeling to attract customers.

Collectively, the methodology provides resource-specific guidance on the National Register evaluation of individual commercial properties and commercial strips, including input on research, historic context development, and application of the National Register criteria to assess significance, integrity, and eligibility.

Pilot Studies

The research project included an opportunity to test and revise the draft evaluation methodology for postwar commercial properties prior to publication of the final report. The project team identified five pilot study locations for testing: two office buildings in Seattle, Washington, and Mobile, Alabama; two shopping centers in Sacramento,

California, and Fredericksburg, Virginia; and a commercial strip with multiple commercial properties in Tulsa, Oklahoma. In identifying the pilot study locations and properties, the team selected diverse geographic locations that would represent the United States broadly with regard to socioeconomic, development, and architectural trends. This resulted in evaluations of properties that state DOTs and practitioners across the country could commonly encounter.

For each pilot study property, the project team conducted a site visit and intensive research. The team also developed a local and property-specific historic context and prepared a National Register eligibility evaluation in accordance with the project methodology. Each property was evaluated for potential eligibility, focusing on Criterion A: History and Criterion C: Architecture. Although the pilot studies were only a test and no official determination of

eligibility or ineligibility was completed under Section 106, they provided useful information to refine the methodology and serve as examples to practitioners on research, historic context development, and application of National Register criteria for typical commercial properties (see Case Example: MacPherson Realty Company, Page 12.)

Practical Applications

NCHRP Research Report 1067 focuses on the methodology intended to guide National Register eligibility evaluations and includes an overview of the pilot studies, along with a discussion of the challenges posed by the postwar commercial property type. *NCHRP Web-Only Document 367* contains the complete pilot study reports.

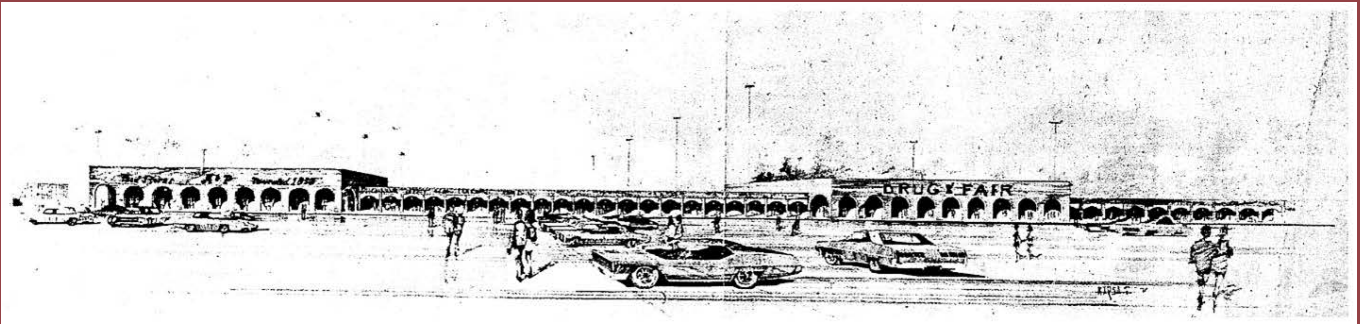
Application of the methodology could lead to more effective and efficient practices in addressing postwar commercial resources during transportation project

development. “Postwar commercial properties are everywhere,” observed David Clarke, FHWA Federal Preservation Officer and the agency’s liaison to the NCHRP project. “The evaluation of their eligibility has been posing challenges for state DOTs and FHWA in completing Section 106 and fulfilling their missions to deliver transportation projects.” The new methodology, he added, “provides first-of-its-kind guidance to assist with the evaluation of commercial buildings and commercial strips.”

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Clues in Old News



Courtesy of *The Free Lance-Star*

Targeted online newspaper searches using the building’s name, address, developer, builder, architect, and occupants may yield specific information about postwar commercial properties, as they appeared in advertisements and feature stories that reported on grand openings and other events. For example, researching the history of the Greenbrier Shopping Center in Fredericksburg, Virginia, for the pilot study unearthed several related articles in the local

newspaper, *The Free Lance-Star*. One story, from 1970, shows Greenbrier’s conceptual design, which includes expansive parking (above). Another piece, from 1971, included photographs of the recently opened shopping center. A 1973 article highlighted the construction of the Woolco department store as an addition to the complex. Collectively, these articles and accompanying images helped to illuminate the development and evolution of this property.

Case Example: MacPherson Realty Company

The MacPherson Realty Company building in Seattle, Washington, served as one of five pilot study sites to test the methodology. Constructed in 1960 as a branch office for a local real estate business, the distinctive curtain wall commercial office building was determined to be eligible under Criterion C for listing in the National Register of Historic Places. This evaluation was completed for demonstration purposes only.



Courtesy of Painter Preservation

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“Postwar commercial properties are everywhere. The evaluation of their eligibility has been posing challenges for state DOTs and FHWA in completing Section 106 and fulfilling their missions to deliver transportation projects. The new methodology provides first-of-its-kind guidance to assist with the evaluation of commercial buildings and commercial strips.”

—DAVID CLARKE

FHWA Federal Preservation Officer and
liaison for the NCHRP project



Recruiting, Developing, and Retaining Construction Inspectors

Washington State DOT, Flickr, CC BY-NC-ND 2.0 DEED

CHRIS HARPER

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The rebar on this northbound I-5 flyover ramp that will connect drivers to the new SR-509 Expressway near the community of SeaTac, Washington, requires numerous construction inspections to ensure its safety. To counter a dwindling supply of inspectors, agencies can refer to a recent NCHRP research report with helpful strategies for recruiting, training, and retaining inspectors.

Construction inspectors are the frontline workforce. They ensure that the work on transportation infrastructure projects meets the design and contract requirements, and the finished product meets or exceeds the quality standards set forth. The difficulties in finding, hiring, recruiting, and developing well-trained and experienced construction inspectors are a growing risk to the quality of transportation construction projects.

The challenge presented by the limited number of transportation construction inspectors highlights a much larger issue: workforce shortages. Since the 2008–2011 Great Recession, nearly all sectors of the construction industry have identified significant workforce shortages, training challenges, and the need to attract new and diverse employees. The need for construction inspectors for transportation infrastructure projects is no exception. In 2019, the Bureau of Labor Statistics projected that the employment of construction inspectors would increase 7 percent faster

than other transportation construction careers from 2018 to 2028 (1). Shortly before this projection, many state departments of transportation (DOTs) had already observed an increase in the construction inspection and testing workload (2). The 2021 enactment of the Infrastructure Investment and Jobs Act is expected to further exacerbate these workforce demands.

State DOTs have not seen a sufficient increase in the number of qualified inspectors who can manage the increasing transportation construction projects. Simultaneously, the experience level of inspectors has declined over the past several years as workers have retired and transportation agencies have downsized.¹ Addressing these challenges requires hiring, retaining, and developing construction inspectors who possess the

¹ See *Developing and Maintaining Construction Inspection Competence* at https://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-68A_15-01.pdf.



Washington State DOT, Flickr, CC BY-NC-ND 2.0 DEED

Working throughout the night in January 2024, a crew sets concrete girders on a new bridge that will carry eastbound US-12 over a stream between Montesano and Elma, Washington. By checking the work put in place for adherence to the plans and specifications, inspectors make sure the bridge is safe for motorists to use once it is complete.

relevant education, experience, and competencies, as well as providing training to enable construction inspectors to perform inspection tasks efficiently.

However, it has been difficult for state DOTs to recruit young talent for construction inspection roles and to retain high-performing inspectors. To aid state DOTs, the National Cooperative Highway Research Program (NCHRP) managed Project 23-05, “Guidance for Training and Certification of Construction Inspectors for Transportation Infrastructure.” This project produced *NCHRP Research Report 1027: Guide to Recruiting, Developing, and Retaining Transportation Infrastructure Construction Inspectors* to help state DOTs and their consultant inspection partners develop an efficient and effective transportation construction inspection workforce.²

Developing the Guide

The research team consisted of members of academia from Colorado State University, the University of Kansas, and the University of Kentucky, as well as transportation professionals with decades of state DOT experience—including familiarity with all aspects of the inspection process.

² Read about NCHRP Project 23-05, “Guidance for Training and Certification of Construction Inspectors for Transportation Infrastructure,” at <https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4786>.

Phase I of the project included collecting data from past relevant research studies, administering questionnaire surveys to state DOTs and consultant inspection firms, and conducting focus groups and individual interviews. Phase II included the development and vetting of construction inspector suggestions during four virtual sessions with industry professionals and state DOTs. The resultant *NCHRP Research Report 1027* provides the following information to state DOTs:

- Need for and recruitment of construction inspectors;
- Core competencies and assessment of knowledge, skills, and abilities (KSAs);
- Training and certification; and
- Retention and career development.

Needs and Recruitment

A state DOT’s need for construction inspectors depends on the quantity of current inspection staff, their associated experience and knowledge, and the projected workload. Knowing the projected workload helps a state DOT to assess staffing quantity requirements and required skill sets, as well as to determine the need to hire inspectors (see Strategies: Needs and Recruitment, Page 17).

Core Competencies and KSA Assessment

Core competencies are a combination of KSAs that contribute to improved employee performance and organizational success. Transportation construction inspectors need to be proficient in specific KSAs to inspect transportation infrastructure projects, including roadways, bridges, and drainage. Additionally, state DOTs and consultants often cross-train their construction inspection workforce to perform inspections in all areas of transportation infrastructure construction projects.

Therefore, the expectation is that construction inspectors need to be proficient in a range of KSAs to inspect different aspects of transportation construction, such as earthwork, at-grade construction (e.g., pavement systems), structures, lighting, guardrails, signage, and coatings.

As shown in Table 1, the competencies and associated KSAs relevant to construction inspection are divided among four categories: academic, technical, personal effectiveness, and workplace. Required KSAs are directly

TABLE 1 Construction Inspection Core Competencies and Associated KSAs

Competency Category	Construction Inspection KSAs
Academic	Computer skills, critical thinking, math, reading, science, written and oral communication
Technical	Construction materials, contract requirements, inspecting and testing, means and methods, plans and specifications, performance measures, project development, quality control—quality assurance, regulations and policies, risk, safety, tools and technologies, verification
Personal Effectiveness	Adaptability, dependability, desire to learn, initiative, integrity, interpersonal skills, leadership, professionalism
Workplace	Attention to detail, building relationships, expectation focus, following directions, planning and organizing, problem solving and decision making, teamwork



Washington State DOT, Flickr, CC BY-NC-ND 2.0 DEED

After this crew member completes working on the street lighting conduit, this project's lighting—like many other project components—will require inspection. Construction inspectors must be well versed in a wide array of construction disciplines to perform needed inspections.

tied to the construction inspection position level, project scope of work (e.g., paving, bridge, or grade and drain), and the construction inspector's responsibilities (see Strategies: Core Competencies and KSA Assessment, Page 17.)

Training and Certification

Several training options exist for construction inspectors. The most effective

approach for delivering inspection training utilizes a combination of internal and external sources. Training developed by state DOTs is usually tailored to agency-specific inspection duties and processes, but third-party training also is used. Determining the appropriate balance between internal and external training based on specific needs and available resources is an important step for each state DOT. Figure 1 provides the frequency of training types, sorted by AASHTO region and consultant responses. This information is from a survey of 46 state DOTs and 26 consultant inspection firms.

The method of inspection training is another factor to be carefully considered, whether internal or external sources are used. A robust inspector training program utilizes on-the-job training, formal training, online training, and self-paced learning. State DOTs typically use on-the-job training for construction inspectors to gain knowledge of the state DOT-specific processes and practices required to perform inspections. However, challenges exist for inspectors to attend long-duration training. Instructor-led online training and self-paced online learning opportunities can help overcome these challenges, allowing inspectors to obtain required training based on their work schedules (see Strategies: Training, Page 17).

A construction inspector must obtain formal certifications to fulfill the

transportation agency's quality assurance program requirements. Certifications ensure that a construction inspector possesses the necessary KSA proficiencies to perform agency oversight during construction. The requisite knowledge required to pass a construction inspector certification test is obtained from education, training, and experience. Most construction inspector certifications require recertification after a period of three to five years. In some cases, recertifications require completing refresher training before an individual can take an exam.

Construction inspector certification requirements vary among transportation agencies. State DOTs have the following options for construction inspection certification requirements:

- In-house certifications that utilize internally developed, agency-specific certifications or certification programs. Most certifications are in-house certifications gained through the state DOT.
- External certifications that adopt certification programs from third-party certification organizations. Third-party certifications can be from national and regional organizations that cover a specific geographic region of the United States.
- A combination of in-house and external certifications.

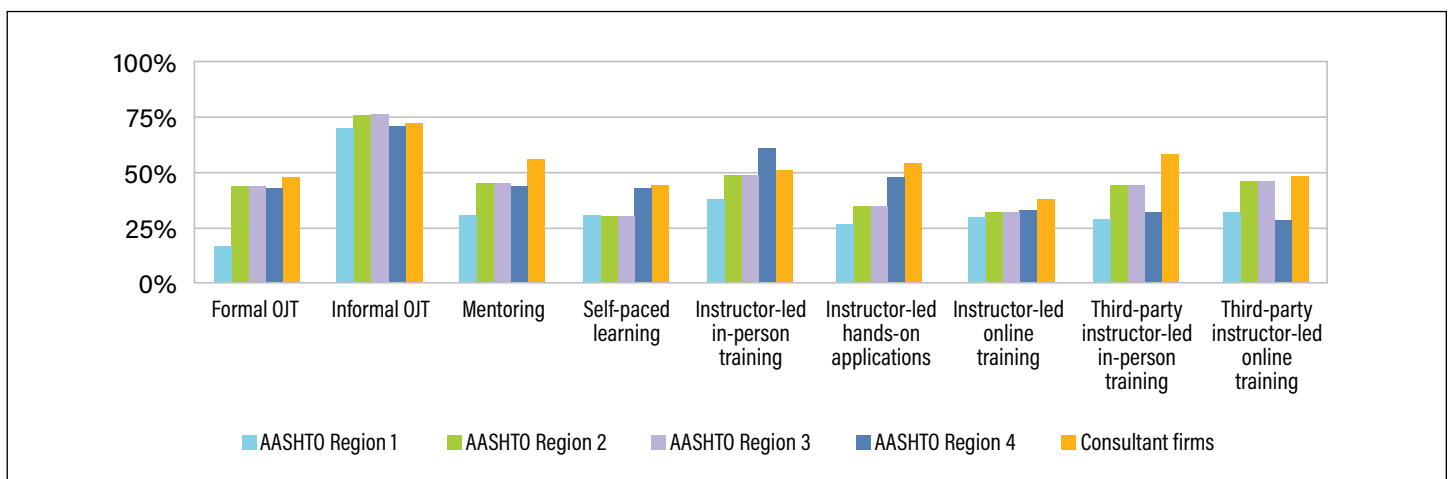


FIGURE 1 Type and frequency of construction inspector training. (OJT = on-the-job training; AASHTO Regions 1–4 include the U.S. Northeast, Southeast, Midwest, and West, respectively.)

State DOTs commonly use in-house certifications for construction materials and types of construction. Then, state DOTs use national or regional certifications for general construction topics such as concrete pavements. However, once the certification program is developed and established, state DOTs are responsible for clearly communicating the program and requirements to all construction inspectors, whether those inspectors are full-time or seasonal state DOT employees or third-party consultants (see Strategies: Certification and Qualification, Page 17.)

Retention and Career Development

Retention is the process of maintaining an adequate and high-performing workforce to meet the commitments of the state DOT. Development is the process of advancing individuals through a career progression that benefits the individual and the agency. Retention and development entail job-specific opportunities for construction inspectors to gain and sustain the KSAs needed to excel in their

inspection career through subsequent promotions. Retention and development are key to obtaining consistent and efficient inspections on transportation construction projects by inspectors who are experienced, skilled, and want to be career inspectors. Table 2 presents retention and development opportunities and strategies for construction inspectors.

Filling the Workforce Gap

NCHRP Research Report 1027 presents a systematic process to establish and maintain the career development of construction inspectors as an integral asset to the transportation infrastructure sector. Practitioners and sponsors are encouraged to use this guide to improve the development of transportation construction inspectors.

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TABLE 2 Strategies to Retain and Develop Construction Inspectors

Strategy	Description
Continuing education	Opportunities to continuing learning include peer-to-peer exchanges, new job duties or project assignments, self-paced learning, advanced certification and management education, and obtaining a college degree.
Cross-training and rotational programs	Rotation programs help state DOTs to cross-train their construction inspectors to create more bench strength in various areas of transportation construction inspection. Inspectors become more well-rounded and experienced, and they understand the operations of the state DOT better through rotation programs.
Knowledge management	State DOTs need to develop knowledge management practices for construction inspection that can glean important information from experienced inspectors and third-party consultants. Knowledge resources that state DOTs can provide to inspectors are standards and specifications, construction manuals, knowledge books, memorandums, and staff meetings.
Internships	Internships may be considered to show high school and college students the potential of careers in transportation construction, specifically for inspection careers. Individuals can be found by attending job and career fairs and providing demonstrations of what inspectors do.
Mentoring	Informal or formal mentoring provides less-experienced inspectors with access to resources and experienced inspectors so that a protégé inspector can gain KSAs from the knowledge and experience of the mentoring inspector.
Inspection career paths	Establishing and sustaining career pathways for construction inspectors can provide opportunities and incentives to entice inspectors to stay at the state DOT for the long term. If career paths already exist, then state DOTs are responsible for ensuring that construction inspectors are aware of these paths and the requirements for promotion and advancement.

Strategies

NEEDS AND RECRUITMENT

- Identify inspection need based on current workforce size and skill sets, as well as the scope and size of forecasted transportation construction work.
- Consider hiring third-party consultant inspection firms to meet the need. State DOTs continue to increase their use of consultants for inspection services.
- Advertise open construction inspection positions and implement recruitment strategies to find quality candidates. To attract good candidates, state DOTs can offer a simple application process, appealing job positions, education support or tuition reimbursement, health benefits, paid time-off, promotion opportunities, retirement benefits, and stable employment. State DOTs also may stress how the position will improve a community or society.
- Evaluate applications for education, experience, and alignment with the skill sets needed to perform construction inspection responsibilities. The state DOT may consider using an education, experience, and certification evaluation process for each construction inspection position candidate.
- Participate in high school and college career fairs and organize hiring and outreach events to raise awareness of the improvements that state DOTs created in the community and society through infrastructure development.
- Network and develop partnerships with technical schools, colleges, and universities.

CORE COMPETENCIES AND KSA ASSESSMENT

- Determine roles and responsibilities for all construction inspection positions and align those with core competency KSAs.
- Assess the competencies possessed by every inspector. Academic and technical competencies may be assessed through performance tests and examinations. Personal effectiveness and workplace competencies may be assessed through longitudinal observations of the individual in a working environment.
- Find the skills gap. Once the KSAs that an inspector possesses are known, remaining KSAs represent the skills that an inspector will need to gain. This helps state DOTs determine the training and certification needs for the inspector.

TRAINING

- Develop a training plan that provides information on the source of training, the type of training, and the way in which it will be presented and received. Utilize training programs provided by state DOTs and third-party organizations.
- Create a training program for each inspector with the help of the inspector's supervisor, based on the position level, experience, and proficiency in inspection competencies. An individual training plan developed with a supervisor promotes a specific progression of desired and required training. Training tied to career paths clearly shows inspectors how they will advance in their careers at the transportation agency.
- Promote career development through coursework and other opportunities that allow inspectors to gain KSAs and progress toward higher level positions.
- Update training programs to align with evolving responsibilities of construction inspectors. State DOTs may need to review training materials regularly and update them as needed, based on the inspector's needs and their current and upcoming workload.
- Ensure that trainers are appropriately prepared and sufficiently skilled to provide training. Provide appropriate training to the trainers when needed (i.e., train-the-trainer courses).

CERTIFICATION AND QUALIFICATION

- Select certification programs most suitable for a state DOT's construction inspection operations.
- Develop similar inspection and testing standards among state DOTs, which helps third-party consultants obtain certifications to work in multiple states. As the use of consultants increases, state DOTs may wish to consider streamlining the certification process to make it more efficient for its consultant partners and to allow for more flexibility in using and sharing consultant inspectors.
- Consider accepting certifications issued by neighboring state DOTs. To offset inspection staff shortages, reciprocity allows inspectors to cross state lines to perform inspections for more than one state DOT. State DOTs may wish to consider sharing inspectors across their districts or regions within a state.
- Consider conducting annual audits of the inspector's KSAs, implementing short or abbreviated courses and recertification exams, and requiring recertification at larger intervals, such as three to five years (or more than five years for well-experienced inspectors).



NAVIGATING FEDERAL FUNDING UNCERTAINTY

Martin Falbisoner, Wikimedia, CC BY-SA 3.0 DEED

BENJAMIN PEREZ AND SIMON MOSBAH

Perez is a vice president and director of national policy, and Mosbah is a senior vice president and managing director of economics, finance, and grants at WSP in New York City.

Night falls over the U.S. Capitol in Washington, DC. Federal funding decisions are made here and reverberate between the U.S. Department of Transportation and state departments of transportation as federal funds follow a complicated process to make their way to state coffers.

While Congress was focused on crafting the Bipartisan Infrastructure Law in August 2021, FHWA held a briefing for state departments of transportation (DOTs), laying out contingency plans for an impending Highway Trust Fund cash flow shortfall. A funding shortfall would seem anomalous on the cusp of the passage of a transportation act providing historic levels of new funding. However, the Highway Trust Fund had been running a continuous cash flow deficit since 2008 and only remained solvent thanks to \$140 billion in transfers from the General Fund and other one-time funding sources.

In the summer of 2021, this situation was further exacerbated by unusual receipt and outlay patterns during the height of the COVID-19 pandemic. According to FHWA, if no additional funding was provided by Congress, the Highway Trust Fund was expected to

run out of cash in early November 2021. Therefore, FHWA announced it would implement cash management procedures that would slow disbursements to states approximately one month before the cash balance in the Highway Trust Fund was projected to fall below \$1 billion. The combination of pending legislation and a potential slowdown in federal payments created a wave of increased uncertainty for state DOTs. This is just one example of the instability surface transportation agencies face with respect to federal funding.

This article, which stems from the research conducted for *NCHRP Research Report 1004: Federal Funding Uncertainty in State, Local, and Regional Departments of Transportation: Impacts, Responses, and Adaptations*, discusses the context and types of federal funding uncertainty, the impacts of uncertainty on surface transportation agencies, the strategies agencies develop to mitigate these effects, and the general outcomes on

surface transportation investment in the United States (1).

Putting Uncertainty into Context

Historically, federal funding for transportation in the United States has been provided through multiyear authorization acts providing predictable levels of funding to state DOTs and local transportation agencies, including metropolitan planning organizations and transit agencies. This funding was underwritten by revenues from the federal motor fuel tax that flowed into the Highway Trust Fund. Predictable funding levels allowed transportation agencies to devise long-term capital investment plans, forecast future asset conditions, set realistic performance targets, and deliver on their commitments to communities and partner agencies.

Since the 1990s, this traditional funding model has evolved in response to the following two trends:

1. A broader array of expenditures became eligible for federal transportation funding.
2. The federal motor fuel tax—which has been 18.4 cents per gallon of gasoline and 24.4 cents per gallon of diesel fuel since 1993—was eroded by inflation, as well as by increased vehicular fuel efficiency.

Similarly, as the construction of the Interstate highway system neared completion, policy makers no longer maintained a clear consensus on the nation’s transportation investment priorities. This resulted in increasingly longer gaps between the expiration of one transportation authorization act and the passage of its successor. As shown in Figure 1, between the passage of the Intermodal Surface Transportation Efficiency Act of 1991 and the Fixing America’s Surface Transportation Act in 2015, six years and four months elapsed—more than 25 percent of the time—without an active authorization act in place. During these

gaps, states received funding for a few months at a time through continuing orders and faced uncertain future federal funding levels.

When the end of a five-year authorization cycle approaches, several questions arise for state DOTs and local transportation agencies:

- How long will it be until the next authorization act is in place?
- What level of funding will that authorization act provide?
- What new policy directives and requirements will be included in the legislation?
- Will Congress identify adequate nontransportation-related funding to fill the widening deficit in the Highway Trust Fund?
- What is the long-term impact of inflation on the purchasing power of federal motor fuel tax revenues?

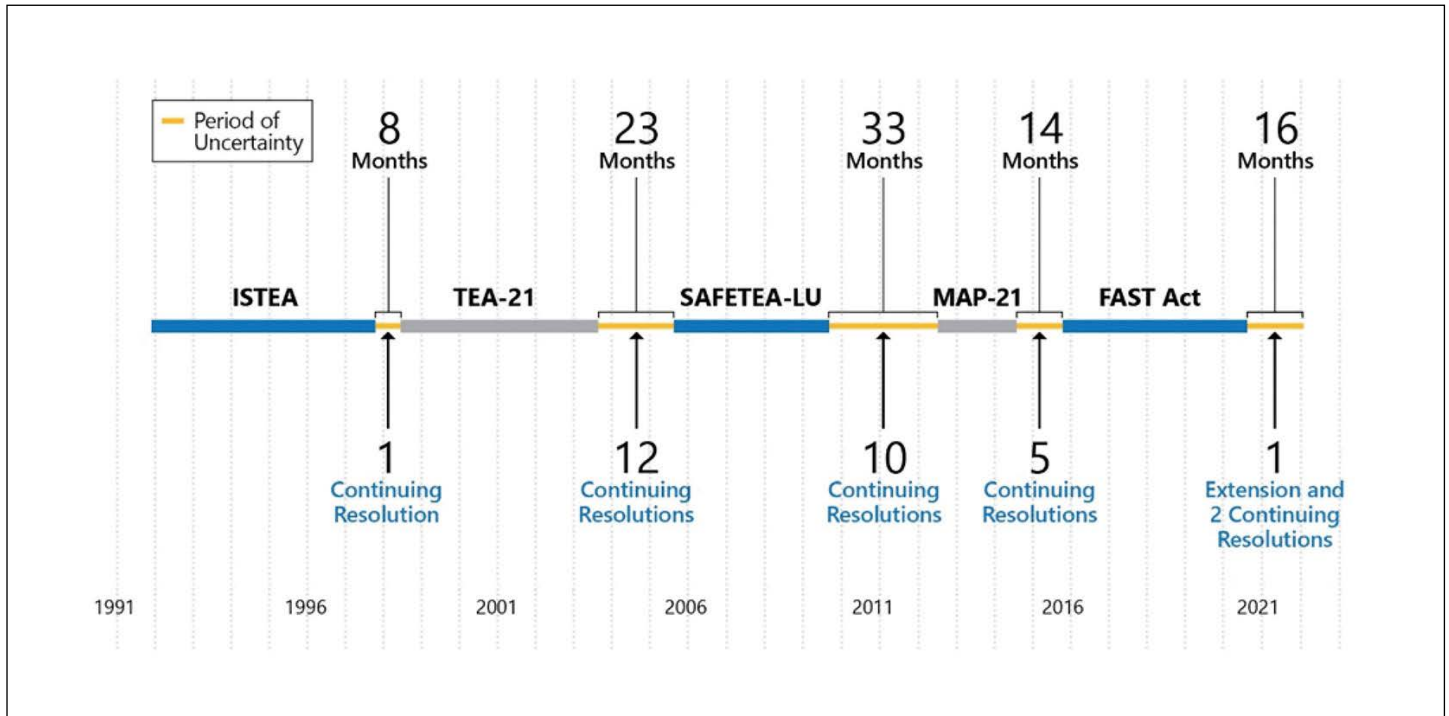


FIGURE 1 Gaps between federal transportation authorization cycles. The FAST Act was extended for one year. (ISTEA = Intermodal Surface Transportation Efficiency Act; TEA-21 = Transportation Equity Act for the 21st Century; SAFETEA-LU = Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users; MAP-21 = Moving Ahead for Progress in the 21st Century; FAST = Fixing America’s Surface Transportation.)

Uncertainty: Timing and Amount

State DOTs tend to respond to the uncertainty posed by pending reauthorization by delaying investments in new projects until another act is in place and funding levels and policy directives are clear. They also respond by making the potentially risky assumption that funding levels will remain steady. Two aspects of federal funding uncertainty that emerge are the timing—which may be within a single fiscal year and occasionally over a longer period for large projects with multiyear funding needs—and the amount across three time horizons that include changes within a fiscal year, in later fiscal years, and in the long-term outlook (Figure 2).

APPROPRIATION UNCERTAINTY

Transportation agencies face ample uncertainties in the near term. Although annual federal funding authorizations are established when an authorization act is signed into law, appropriations are almost always slightly lower. Additionally, while transportation agencies are eligible to receive that funding at the beginning of

the federal fiscal year on October 1, they must first wait for Congress to appropriate the new funding before they have access to it. During the past 20 years, transportation agencies have waited anywhere from one-and-a-half to seven months to access their federal funding.

REIMBURSEMENT UNCERTAINTY

Once federal funding is appropriated, transportation agencies only receive reimbursement from FHWA or FTA after submitting documentation showing they have made qualified disbursements meeting the requirements of each agency’s formula funding programs. Federal reimbursements are deposited anywhere from one to three or more months after submittal, which requires transportation agencies to pay their contractors with other available funding or cash reserves. This poses cash flow challenges.

AUGUST REDISTRIBUTION PROCESS

As the end of the fiscal year nears, FHWA identifies all remaining unobligated funds by program and then initiates the August redistribution—a competitive process through which states identify projects

aligning with available funding categories that can be advanced before the end of the fiscal year. The intent of the August redistribution is to divide additional obligation authority equitably between the states. However, it is a competitive process resulting in winners and losers. Some states receive slightly more than their authorized funding level for the year, while others receive lower levels.

COMPETITIVE GRANT UNCERTAINTY

In addition to appropriated funding, the U.S. Department of Transportation (U.S. DOT) also offers a growing portfolio of competitive grant programs to encourage states and regions to pursue projects that align with a wide range of federal priorities. States must submit applications to qualify to receive grant funding, and they must also commit to providing local matching funds should they receive the grants. Demand for most federal grant programs is high, so applying for a grant does not guarantee an award.

STIMULUS UNCERTAINTY

Federal stimulus funding passed by Congress to counter economic slowdowns

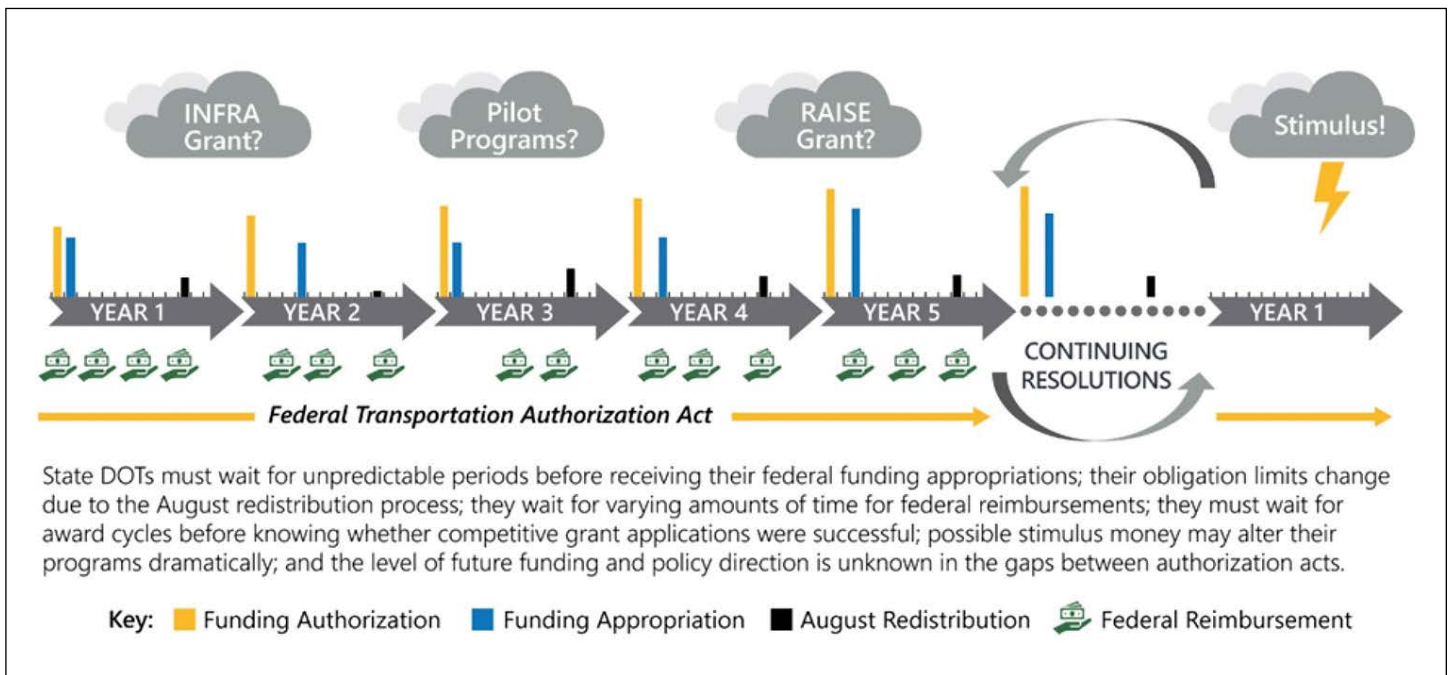


FIGURE 2 Elements of federal transportation funding uncertainty. (INFRA = Infrastructure for Rebuilding America, RAISE = Rebuilding American Infrastructure with Sustainability and Equity.)

also introduces new uncertainties for transportation agencies. Such funding often comes with requirements that can force transportation agencies to pivot from advancing projects in their programs to implementing shovel-ready improvements.

REQUIREMENTS UNCERTAINTY

The potential for changes in federal requirements with constant and limited transportation funding is an additional source of uncertainty. Such changes may arise at any time because of a new authorization or appropriations act; executive order; or regulation or guidance from U.S. DOT, its modal administrations, or other federal agencies with a role in transportation projects. The types of projects eligible for federal funding can change, as can requirements for measuring performance, ensuring safety, or reporting. These changes can force transportation agencies to adjust their own programs and processes.

The Effects of Uncertainty

Federal funding uncertainty affects the work of transportation agencies in four key functional areas: project programming, project development and delivery, financial management, and system operations (Figure 3).

Timing uncertainty primarily impacts financial management activities. Because federal funding often becomes available within a fiscal year in unpredictable intervals, financial management strategies are required to cover cash flow needs, allow agencies to pay their bills on time, and initiate projects according to established schedules. Any disruption in these activities can have a ripple effect through the private construction industry because of its reliance on timely payments to employees and subcontractors and because shifts in demand for construction can lead to layoffs or labor shortages.

Funding amount uncertainty primarily affects project programming, as well as project development and delivery. This type of uncertainty relates to changes in the amount of expected funding as follows:

- **Within a fiscal year**—Federal funding is not ordinarily reduced within a fiscal year. Once appropriations acts are passed, they are rarely cut (although a legislated rescission planned for the end of Fixing America’s Surface Transportation Act would have led to a cut in fiscal year 2020 had it not been canceled). Typically, changes in federal funding

within a fiscal year are increases due to the August redistribution or competitive grant awards. The burden, in this case, falls primarily on the project development and delivery team to obligate the new funds quickly.

- **Within the term of the capital program**—Capital projects are typically programmed four years out (the federal short-term planning horizon), although some agencies prepare plans of longer duration. If funding does not materialize at expected levels over the course of those programs, the project programming team must adjust the programs accordingly.
- **Over the long term**—Uncertainty about the future of the federal transportation program over the long term has had little practical impact on the agencies studied. Most transportation agencies simply assume that federal funding will continue at or near current levels. However, one agency reported that it has, on occasion, developed a flat-funded and a reduced statewide transportation improvement program corresponding to the drastic cut in federal funding

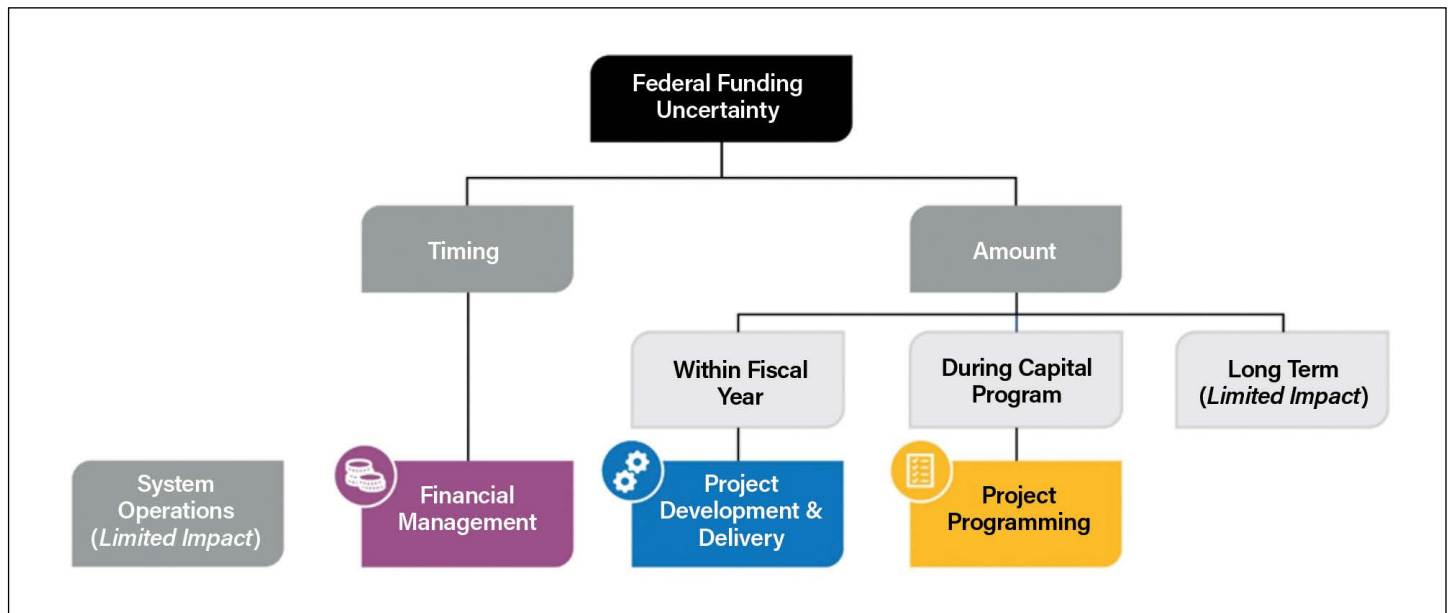


FIGURE 3 Primary functional areas impacted by federal funding uncertainty.

that would be required if additional revenues were not redirected to the Highway Trust Fund.

Federal funding uncertainty does not directly affect system operations because most operational activities are supported by nonfederal funding. The main exceptions are highway safety improvements and intelligent transportation systems, which are supported by federal funding. Federal highway safety funding has been relatively stable in recent years, and state DOTs can transfer funding to support intelligent transportation systems needs if they are a priority.

Mitigation Strategies

The strategies used by transportation agencies to mitigate the risk of federal funding uncertainty can be grouped by functional area (Figure 4). Revenue generation is included because it is an important mitigation strategy, although transportation agencies are typically not the lead actors.

PROJECT PROGRAMMING

Conservative federal funding projections assume a continuation of current levels of federal funding or a modest inflation adjustment in the future. This common approach allows agencies to program projects with a reasonable expectation that federal funding will be sufficient to cover the costs of programmed projects. Planning or programming additional projects beyond those that are expected to be funded within a particular year enables agencies to advance projects quickly if additional federal funding becomes available.

Prioritizing preservation focuses on existing assets—particularly those subject to federal asset management standards—rather than undertaking projects to expand capacity. By allocating currently available federal funding toward preservation, agencies have been able to meet federal performance requirements even with limited or uncertain federal funding.

Project deferrals or schedule adjustments allow agencies to respond flexibly to funding delays or to changes in the total amount of funding they receive. If funding is not available at the time or in the amounts expected, projects can

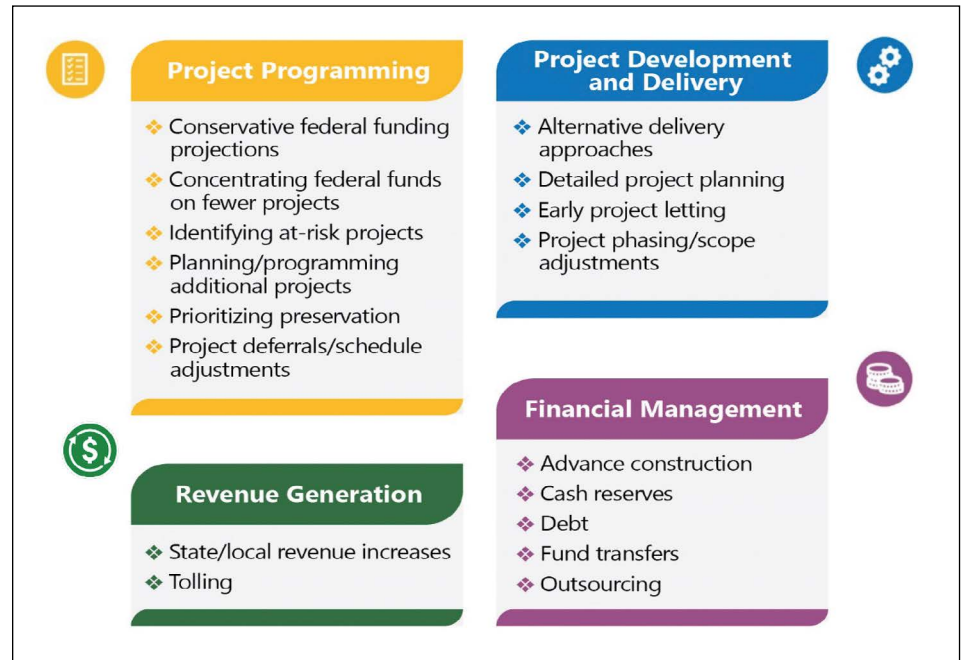


FIGURE 4 Mitigation strategies by functional area.

be slowed, pushed out to later years, or deferred indefinitely.

PROJECT DEVELOPMENT AND DELIVERY

Detailed project planning refers to the development of specific information on project costs and implementation time frames early in project development. Having a clear understanding of project schedules and costs enables programming staff to adjust project phasing if federal funding does not arrive in expected amounts or at expected times.

Project phasing or scope adjustments involve dividing large projects into smaller segments or reducing the scope of projects, which allows agencies to deliver more projects with available funding and reduces the risk of projects being delayed or becoming inactive if future funding does not materialize.

FINANCIAL MANAGEMENT

Advance construction, a practice by which transportation agencies use state or local funding to advance projects for which federal obligation authority has not yet been received, can be reimbursed once federal funding becomes available.

Advance construction is widely used to get projects underway without regard for the timing of federal funding.

Fund transfers encompass practices such as flexing, swapping, and trading. Flexing is a practice by which transportation agencies transfer funds between different federal transportation programs. Swapping funds refers to state agencies allocating state funds to local communities in lieu of passing through federal funds. It may also be possible to trade funds among state DOT districts, regional planning organizations, and local transportation agencies.

REVENUE GENERATION

State or local revenue increases include motor fuel taxes, piloting road usage charges, revenue measures, and other strategies to raise or redirect revenues to transportation. Having additional nonfederal revenues available provides greater flexibility for state and local governments, reduces their reliance on federal funding, and makes it more tenable for them to withstand federal funding delays or shortfalls.

Outcomes Caused by Uncertainty

The strategies used to mitigate federal funding uncertainty by transportation agencies have led to several common outcomes across most, if not all, transportation agencies and the systems they manage. Although there are generally positive and negative outcomes, the effects of funding uncertainty are—for the most part—negative (Figure 5).

With regard to general outcomes on the U.S. surface transportation system, federal funding uncertainty has most often led states to focus increasingly on projects that help meet federal performance standards. This means leaving other priorities unaddressed, such as capacity expansion and preservation of facilities that are not part of the roadway system in the Federal-Aid Highway Program. For agencies' internal functions, the most common outcomes of federal funding uncertainty were a higher workload for staff and increased project costs due to delays and less efficient project scheduling. On the positive side, virtually all agencies have benefited from more detailed planning as pertain to cost and scheduling needs for their projects and programs. Many states have also benefited from raising additional nonfederal revenues for transportation, although this has not occurred uniformly across all states and regions.

The availability of nonfederal transportation revenue, asset condition, and the extent of the state roadway network also have a fundamental influence over the extent to which states and regions are sensitive to federal funding uncertainty (Figure 6). Generally, transportation agencies experience more harmful effects from federal funding uncertainty when they have limited access to nonfederal revenue, poor asset condition, and large state-owned roadway networks. For instance, some transportation agencies have dedicated all of their federal revenues to preservation, only advancing capacity expansion projects through public-private partnerships (see More to Explore.) Similarly, states that own more miles of roadways in the Federal-Aid

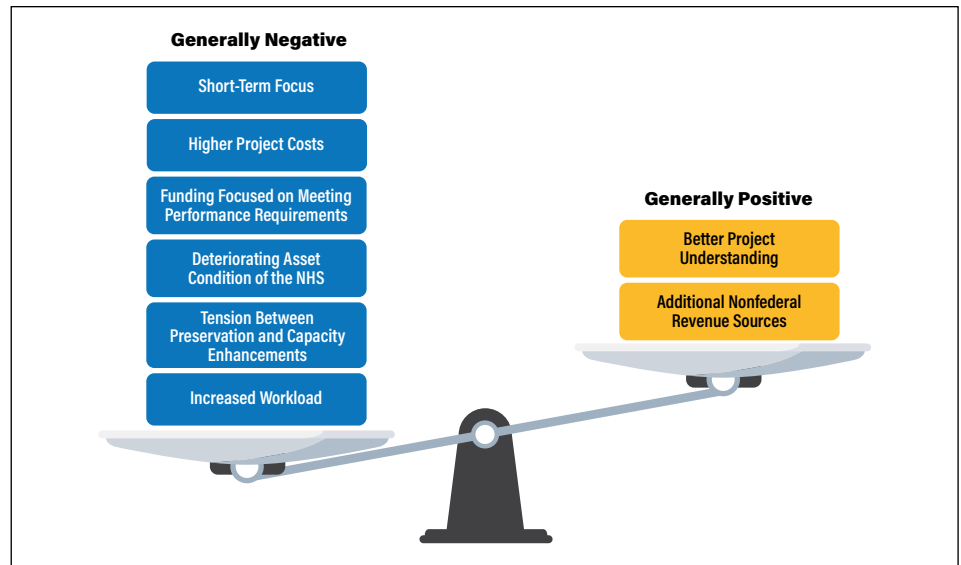


FIGURE 5 Outcomes of federal funding uncertainty. (NHS = National Highway System.)

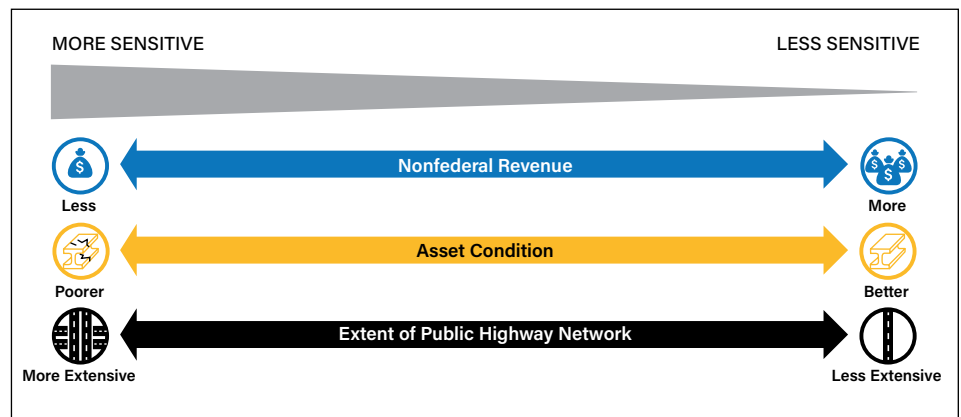


FIGURE 6 Sensitivity to federal transportation funding uncertainty.

Highway Program (i.e., public highway network miles) are more susceptible to federal funding uncertainty.

Learning from Research

The research performed for *NCHRP Research Report 1004* resulted in a set of observations that are intended to aid transportation professionals in navigating the inherent uncertainty of federal funding (see Key Takeaways, Page 24.)

REFERENCE

1. WSP USA, Inc., SK Solutions, and EPB U.S. *NCHRP Research Report 1004: Federal Funding Uncertainty in State, Local, and Regional Departments of Transportation—Impacts, Responses, and Adaptations*. Transportation Research Board, Washington, DC, 2022. <https://doi.org/10.17226/26591>.

More to Explore

Learn more by reading *Public-Private Partnerships: Policy, Practice, and Popularity* by Mohammad S. Khan, which appeared in *TR News 320* (March–April 2019). This article is an insightful examination of many aspects of public-private partnerships, including funding and financing, legal implications, and legislative status in different states. Successful projects and technologies derived from public-private partnerships are also presented. Scroll to Page 30 at <https://onlinepubs.trb.org/onlinepubs/trnews/trnews320.pdf>.

Key Takeaways

1. Federal funding uncertainty has limited impact on long-range planning.

Federal funding uncertainty has not had a major impact on long-range planning because planning teams assume that the status quo will continue and that, despite the declining purchasing power of the federal motor fuel tax, Congress will continue to keep the Highway Trust Fund solvent and provide the same general level of federal transportation funding as it has in the past.

2. A similar toolbox is used around the country.

State DOTs and other transportation agencies are generally using the same project development and delivery, capital programming, and financial management tools to manage the effects of federal transportation funding uncertainties. For instance, all state DOTs included in the research effort reported extensive use of advance construction, conservative federal funding projects, and project phasing and schedule adjustments.

3. Some states are better equipped than others to handle federal funding uncertainty.

The extent to which states are sensitive to federal transportation funding uncertainty depends on the availability of nonfederal transportation funding sources and the condition of their transportation assets. Generally, transportation agencies experience more deleterious effects from federal transportation uncertainty when they have limited access to nonfederal revenue or poor asset conditions.

4. Federal funding uncertainty has a mixed array of outcomes.

Federal transportation funding uncertainty has led to a mixture of generally positive and negative outcomes. For example, one positive outcome is that many states and local regions put new revenue sources in place, increasing overall funding levels for transportation needs. But uncertainty also introduces the potential for higher costs from delays and piecemeal implementation. Workloads for transportation agencies also have increased because of the need to respond to the ebb and flow of federal funding availability.

5. Rigorous federal performance requirements have reshaped transportation investment and led to important dichotomies.

Some states and regions are only able to meet federal performance requirements by cutting or eliminating spending on capacity enhancements, a dynamic that may exacerbate underlying congestion conditions. National transportation policy focuses maintenance on the National Highway System, introducing the risk that other assets may not be maintained to the same standards.

6. Federal funding uncertainty complicates the challenges facing transportation agencies.

Regardless of the conditions on the ground, federal funding uncertainty adds a layer of complication to the many other challenges they must address, such as climate change, disaster response, and the evolution of technology.

7. Managing federal funding uncertainty requires constant attention and adjustment.

State and local governments are adept at managing short-term uncertainty in the timing and amount of federal transportation funding. However, doing so requires regular attention and ongoing adjustment as states continue to fund their programs and pay their bills while receiving sporadically timed reimbursements from U.S. DOT.

8. Outcomes of funding uncertainty are mixed for end users.

Users of the transportation system may benefit from improved roadway and bridge conditions on Interstates and the National Highway System due to federal asset condition standards that lead states to focus funding on maintaining those assets. However, those users also may experience congestion and delay related to forgone investments in capacity enhancements or deteriorating conditions on secondary roads that cause delay, diversions, and possible safety concerns.

9. Federal policy directives can skew state programs.

In addition to federal transportation funding, there is uncertainty over what policy directives will be attached to the use of federal funds in future transportation authorization acts and how they will affect the ability of state DOTs and other transportation agencies to address their own needs. Some state DOTs believe that current asset management requirements and the inability to transfer monies among certain funding categories limit their ability to prioritize needs and make data-driven decisions across the entire roadway system.

10. Increased competition for transportation funding creates winners and losers.

Federal transportation funding uncertainty heightens competition for federal funds made available through competitive grant programs and the August redistribution. These dynamics create winners and losers, with certain states receiving proportionally more or less federal transportation funding than others.

Kimberly Kenville has always forged her own path. As an undergraduate noise abatement intern at Minneapolis–St. Paul International Airport in Minnesota, Kenville recalls being excited by “the hustle and bustle—and knowing that no two days are the same.” After earning a bachelor of business administration degree in airport administration from the University of North Dakota at Grand Forks, she worked in airport operations in Detroit, Michigan, and Milwaukee, Wisconsin. When she returned to her hometown of Grand Forks, similar jobs were scarce. Kenville entered the master of business administration in management program at her alma mater to pursue her interests in the unmapped terrain between business administration and aviation. After completing her master’s degree, she was asked to join the aviation department as a new faculty member. “The department chair took a chance on me in 1999,” she acknowledges, noting that she was only the second woman to be hired by the department.

As an assistant professor, Kenville taught introductory air transportation and two upper-level airport management and operations courses while serving as a faculty adviser, gaining university leadership experience and joining professional industry groups such as the American Association of Airport Executives. Although eager to find a mentor to guide her along this new university career path, “I never really found one like me,” she recalls. “I was not a hard scientist, yet I was interested in making my industry the best it could be.” In 2005, Kenville completed her doctorate in organization and management with an emphasis in leadership from Capella University in Minneapolis. She was promoted to associate professor with tenure in 2006, became a thesis committee member in the department’s graduate program, and served as an independent study adviser.



“ACRP is real-world, operational research used by airports in real time.”

At the same time, TRB’s Airport Cooperative Research Program (ACRP) was just getting started. Kenville suggested a research idea that was not accepted, but with guidance from ACRP staff and her experience on a project panel, she learned how to thrive in the research arena. “ACRP opened the door for me to become a successful researcher for the airport industry,” she notes. “This allowed me to gain tenure, achieve a promotion, and, in 2008, to open my own consulting business.” Involvement at the TRB Annual Meeting and as an active volunteer led to six ACRP reports, seven ACRP syntheses, and additional project panels on issues such as transitioning to lead-free aviation gasoline, airside snow removal, and backcountry airstrip preservation. “Funded research opportunities were scarce,” she points out, “but allowed me to investigate the world of research.” Kenville joined the Standing Committee on Aviation Administration and Policy and then the

Standing Committee on Aviation System Planning. “ACRP is real-world, operational research used by airports in real time,” she stresses.

In 2011, Kenville accepted an appointment by the governor of North Dakota to become a member of the state’s Aeronautics Commission, for which she later served as vice chair and chair. In the same year, she accepted a special appointment by the University of North Dakota aviation department to assist in working with the Grand Forks Regional Airport on flight operations issues. Shortly thereafter, she was promoted to professor, became director of the aviation graduate program, and, in the following year, was appointed co-director for the university’s aerospace sciences PhD program. In 2019, Kenville was appointed to the ACRP Oversight Committee by the secretary of the U.S. Department of Transportation. Today, she is the committee’s vice chair.

Looking back on her career, Kenville is grateful that ACRP and TRB were so instrumental in her growth as a researcher. “I hope that I have served them well,” she adds, “because—through ACRP and TRB—I finally found the mentors I sought early in my career.”

Kenville encourages women aspiring to make a difference “to jump in with both feet, treasure who you meet, ask questions, speak up, and have a strong support system in place to help you make decisions.” She ensures that her students know, “I engage in real-time with research and meet with airport executives to bring that information and those connections back to the classroom.” Of equal importance, she explains, “is for my children to know that I work hard to provide a high standard of living for them, and if you really love what you do, it does not feel like work.” The career path Kenville carved out was paved with the advice of industry professionals, friends, and family members, including her father. “He always reminds me—*If it is to be, it is up to me.*”

INFLUENCER



Rachel James

A policy research analyst at FHWA's Office of Transportation Policy Studies in Washington, DC, Rachel James is a member of the Standing Committee on Traffic Flow Theory and Characteristics and the Standing Committee on Traffic Simulation.

How did you become involved with TRB?

In 2013, I was fortunate to have professors who connected me to the TRB community as an undergraduate research assistant. The TRB Annual Meeting continues to be one of my favorite weeks of the year because of the opportunity to learn about cutting-edge research and network with transportation professionals from around the world.

Why did you become interested in volunteering on the Standing Committee on Traffic Flow Theory and Characteristics and the Standing Committee on Traffic Simulation?

Early in my career, I learned about the impact of TRB standing committees. That motivated me to get involved with the Traffic Flow Theory and Characteristics and Traffic Simulation committees. On both, my primary roles are to support two-way communication between the committees and relevant FHWA research programs and to help with paper review.

What led you to plan the equity track of the TRB 2023 Innovations in Travel Analysis and Planning (ITAP) Conference?

This was an excellent opportunity to engage with the planning and policy committees that I hadn't been as active with. ITAP combined two conferences into one event, actively trying to bridge the gap between modeling researchers and practitioners. My primary responsibility was using the submitted abstracts to plan the equity track. It was rewarding to see how well attended and impactful the conference was.

What advice would you offer to others who may hesitate to take on a similar committee role?

Don't hesitate! Take a seat at the table! At first, I was intimidated; it was surreal the first several times I met individuals whose prior research had formed the foundation of my thesis and dissertation research. But all the committees I've worked on have been extremely inviting to younger members. It is an opportunity to work alongside the best, brightest, and most passionate in the transportation community. You will get out so much more than you put into your role.

The views and opinions provided herein are my own and do not necessarily represent the views of FHWA or the U.S. Department of Transportation (U.S. DOT). The contents do not necessarily reflect the official policy of U.S. DOT.

Transportation Influencer highlights the journey of young professionals active in TRB. Have someone to nominate? Send an e-mail to TRNews@nas.edu.

MEMBERS ON THE MOVE

Jill Hough retired from the Upper Great Plains Transportation Institute at North Dakota State University in Fargo, where she was program director for the Small Urban and Rural Center on Mobility. She chairs TRB's Standing Committee on Rural, Intercity Bus, and Specialized Transportation.

Sadaf Khosravifar, a former senior project manager and engineering technical lead at IMS Infrastructure Management Services, has joined TRB as a Cooperative Research Programs senior program officer.

Beverly Kuhn retired from Texas A&M University's Texas Transportation Institute in College Station, where she was a research fellow and head of the System Reliability Division of the Transportation Operations Group. Previously, she chaired TRB's Standing Committee on Freeway Operations.

Bastian Schroeder, Chair of TRB's Standing Committee on Highway Capacity and Quality of Service and former national director of research at Kittelson & Associates, became the company's chief information and technology officer in January 2024.

Tim Sexton, Chair of TRB's Transportation Sustainability Section and member of the Transportation Sustainability and Resilience Group, has accepted the position of public works director for Minneapolis, Minnesota.

John Siekmeier, a research engineer at the Minnesota Department of Transportation, retired. He is a past chair of the TRB Standing Committee on Mechanics and Drainage of Saturated and Unsaturated Geomaterials.

Diversity Blue Ribbon Awardees Reveal Successful Methods



The Technical Activities Council (TAC) sponsors the Blue Ribbon Awards to recognize exemplary best practices for committee activities and associated volunteer efforts. The diversity award category recognizes committees that have made noteworthy efforts to increase the diversity of committee membership and friends, especially from groups that are historically underrepresented in transportation research and practice. At the 2024 TRB Annual Meeting, TAC presented this award to the following standing committees:

- Design and Rehabilitation of Asphalt Pavements,
- Highway Traffic Monitoring, and
- Freight Transportation Planning and Logistics.

Strategic Outreach and Recruiting

The Standing Committee on Design and Rehabilitation of Asphalt Pavements actively recruited from and expanded its young members subcommittee to encompass more Pavements Section committees. They also recruited from professional groups that embody underrepresented groups, TRB participants in areas of the world underrepresented in TRB activities (e.g., Costa Rica, Mexico, and Thailand), and Washington, DC–area agencies (for members who may be more likely to attend in-person meetings). Committee members conducting outreach encouraged those on their friends list to attend two yearly meetings so they could be considered as potential future members.

Now, women make up 33 percent of the committee (up from 24 percent in 2016 and 27 percent in 2020), 33 percent identify as an underrepresented racial or ethnic minority in TRB (up from 24 percent in 2016 and 29 percent in 2020), and international and young member slots are filled. Says Committee Chair Leslie Myers, “the starting point was to recruit a diverse



Risdon Photography

Design and Rehabilitation of Asphalt Pavements Committee Chair Leslie Myers (left) accepts the Diversity Blue Ribbon Award from TAC Chair Avery Grimes.

composition of members by broadly defining diversity.” Although she feels the committee made progress, the goal is to expand further by “selecting new female members from the waiting list and reaching out to invite at least one member from an underrepresented international demographic.” This committee also aims to better engage members who are unable to travel to the Annual Meeting.

Incentivizing Participation

For the past six years, the Standing Committee on Highway Traffic Monitoring leadership team focused on enhancing membership diversity and inclusivity. Committee leaders engaged and supported more young members, ensured that committee friends were well informed of committee activities beyond the Annual Meeting, and conferred an annual award for best paper by a young professional.

These efforts increased the number of young professionals and individuals from historically underrepresented groups on the leadership team and among members and friends. Geographically, the committee’s membership roster spans the world and showcases diversity across organization types and sectors. Committee leadership hopes its activity-based approach and achievements will be an example for other TRB committees.

“The Blue Ribbon Award reaffirms our dedication to creating an inclusive space within the transportation community where diverse perspectives thrive,” noted Committee Chair Ioannis Tsapakis. “A more diverse and vibrant community not only enriches our field but also ensures a robust and sustainable future for transportation.”

Addressing Imbalance

Although the Standing Committee on Freight Transportation Planning and Logistics was comprised of 53 percent minority members and 42 percent female members in 2020, committee leaders realized that this diversity was not spread across racial or ethnic groups and that committee member composition did not represent the diversity of their friends list. To address this imbalance, leaders appointed a committee rotation coordinator who recruited individuals from underrepresented groups via a mobile-friendly survey that garnered 90 expressions of interest for 11 committee slots. Committee members now better reflect the diversity of the committee’s friends list and represent a broader array of professional backgrounds.

The committee also launched engagement initiatives such as publishing committee newsletters that spotlight the accomplishments of members and friends and hosting Freight Hour, a bimonthly virtual meeting for exchanging ideas. Committee leaders noted the importance of reevaluating committee membership to reflect the diversity of the friends list. “Winning the Blue Ribbon Award for Diversity highlights our commitment to inclusivity,” remarked Committee Chair Sushant Sharma. He stressed that this strategic diversity empowers the committee to tackle critical freight issues with greater insight and innovation, and “it enhances our ability to make meaningful contributions to the field and TRB.”

NCHRP RESEARCH REPORT 1072

A Post-Pandemic Path to a Flexible Work Future

ANN M. HARTELL

The author is a former TRB senior program officer at the National Academies of Sciences, Engineering, and Medicine in Washington, DC.

As the COVID-19 pandemic gripped the nation, measures to slow the spread of the virus dramatically changed day-to-day workplace operations at state departments of transportation (DOTs). Quarantine orders and requirements for physical distancing necessitated shifts in business processes, including modifications of telework policies so that more employees could work remotely and enable those who already had telework agreements to expand their remote schedules. This helped maintain business continuity through the pandemic. Although some pandemic-related practices and policies have been rolled back, the increased use of flexible work arrangements (FWAs) is widely recognized as a permanent feature of the future of work. FWAs allow employees to work all or part of the workweek remotely from alternative locations (e.g., home office, co-working space, or satellite office), on an alternative schedule, or both.

NCHRP [National Cooperative Highway Research Program] Research Report 1072: *Telecommuting, Remote Work, and Hybrid Schedules: Managing the Shift to a Flexible Work Future* describes recent state DOT experiences with FWAs. Key findings include a gradual shift from highly centralized decisions about FWAs toward greater manager discretion in approving FWAs for the people they supervise. While this can help ensure that decisions about FWAs are made by someone with extensive and direct experience with an individual employee, it also can lead to



Courtesy of Oregon DOT

Abandoned figurines line computer monitors and cubicle walls in an Oregon Department of Transportation office during the COVID-19 quarantine. Telework and other flexible arrangements are here to stay, but organizations need new ways to manage and measure the productivity of remote employees.

inconsistent and inequitable implementation of FWAs across an agency.

Another important issue that the pandemic experience brought to light is employee productivity. For many state DOT positions, it is challenging to measure employee productivity, and managers have relied on using in-person presence to verify whether employees are working. FWAs require new management skills, new ways of building and supporting teams, and new ways to measure productivity.

The research points to a number of strategies for developing a robust agency-level policy on FWAs. It also highlights a range of FWAs—not just telework—that can support recruitment and retention efforts while noting the particular challenges associated with each type of FWA. In addition, the report provides a checklist to help leadership

assess overall organizational readiness to implement expanded FWA policies and programs. To support implementation of the research, the report is accompanied by two spreadsheet-based resources that provide practice-ready tools for managers and employees to use in assessing individuals' suitability for telework and to track FWAs across an agency. The report and accompanying resources will be of interest to those in human resources and leadership positions at state DOTs who are responsible for designing and implementing FWA policies and programs.

Read NCHRP Research Report 1072: *Telecommuting, Remote Work, and Hybrid Schedules: Managing the Shift to a Flexible Work Future* at <https://doi.org/10.17226/27167>.

Pollinator Habitat Conservation Along Roadways

TREY JOSEPH WADSWORTH

The author is a TRB senior program officer at the National Academies of Sciences, Engineering, and Medicine in Washington, DC.

Pollinating insect populations, which play a critical role in agricultural production and human well-being, are declining. As a result, there is increased interest in protecting bumblebees and other native pollinators along roadways. State departments of transportation (DOTs) and other transportation agencies own linear rights-of-way (ROWs). As owners, they can establish or conserve pollinator habitat through changes in ROW management, such as updating practices for planning, designing, constructing, and



Jennifer Hopwood, Xerces Society for Invertebrate Conservation

An American bumblebee hovers over blossoms of rattlesnake master. Planting or conserving such pollinator-friendly patches along roadways can help shore up declining insect populations that enable food crops to flourish.

maintaining habitat, as well as enhancing staff training. To explore this topic and develop resources for state DOTs and other ROW owners and operators, the National Cooperative Highway Research Program (NCHRP) established a project panel under NCHRP Project 25-59 and published the 16-volume *NCHRP Web-Only Document 362: Pollinator Habitat Conservation Along Roadways*.

The panel—chaired by Christopher Smith, wildlife ecologist at the Minnesota DOT—selected consulting firm ICF and the Xerces Society for Invertebrate Conservation to conduct the project. The researchers documented successful practices and lessons learned from states where pollinator species are listed under the Endangered Species Act. The result is 16 regional guides that span the 50 states, with associated tools to share this knowledge and show how to implement integrated pollinator habitat programs.

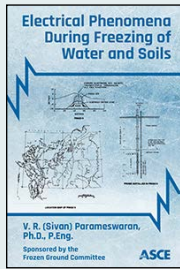
NCHRP Web-Only Document 362 also includes regional accessory materials and a communications toolbox to help inform state DOT staff and leadership, as well as the general public, about pollinators. Each guide provides state DOTs with information on their region's specific imperiled pollinator species and their habitats to promote management of existing roadside vegetation and design new revegetation plantings with habitat needs in mind.

Explore *NCHRP Web-Only Document 362*, the guides, and accessory materials at <https://www.trb.org/NCHRP/NCHRPWOD362.aspx>.



Risdon Photography

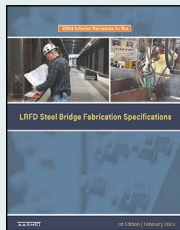
FACE TO FACE—TRB Technical Activities Division Deputy Director for Program Content Stephen Maher (*second from left*) and Technical Activities Council members (*left to right*) Tara Cavalline, Robert Hazlett, and William Eisele pose for a photo at TRB's 2024 Annual Meeting. Cavalline quipped to Maher, "I hope this photo somehow makes its way into *TR News*." Hazlett agreed. "We clean up pretty good! I echo Tara's thoughts about it appearing in *TR News*!" Eisele followed with "I love this!" The magazine's team felt the same and was glad to make it happen!



Electrical Phenomena During Freezing of Water and Soils

V. R. (Sivan) Parameswaran, ASCE, ISBN 978-0-7844-8448-7, <https://ascelibrary.org/doi/book/10.1061/9780784484487>.

This e-book examines the early observations of the generation of charges and electrical potentials developed during the freezing of water, dilute aqueous solutions, and moist soils. From a description of observations of natural phenomena, such as lightning and thunderstorms and their effects on aircraft flying through thunderclouds, the author describes the historic laboratory measurements carried out to understand the physical processes behind charge separation and generation of high voltages at the freezing interface, provides examples of field studies, and notes the need for continued study.



2024 Interim Revisions to the LRFD Steel Bridge Fabrication Specifications, 1st Edition

AASHTO, ISBN 978-1-56051-827-3, <https://store.transportation.org/Item/CollectionDetail?ID=257>.

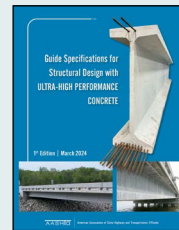
These specifications govern the fabrication of vehicular steel bridges, including the furnishing and fabrication of steel structures and the structural steel portions of other structures. Their objective is to achieve quality and value from a common specification that standardizes vehicular steel bridge fabrication in the United States.



Uniform Audit and Accounting Guide for Audits of Architectural and Engineering (A/E) Consulting Firms, 2024 Edition

AASHTO, ISBN 978-1-56051-823-5, <https://store.transportation.org/Item/PublicationDetail?ID=5225>.

This guide is designed as a tool for state department of transportation auditors, architectural/engineering (A/E) firms, and public accounting firms that perform audits and attestations of A/E firms. The techniques presented focus on auditing and reporting procedures to be applied to costs that are incurred by A/E firms for engineering and design-related services performed on federal, state, and local transportation projects. This resource provides general guidance only and is not meant to supersede generally accepted government auditing standards, the Federal Acquisition Regulation, or any related laws or regulations. This edition replaces the 2016 edition.



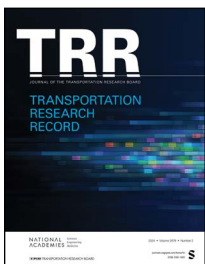
Guide Specifications for Structural Design with Ultra-High Performance Concrete, 1st Edition

AASHTO, ISBN 978-1-56051-829-7, <https://store.transportation.org/Item/CollectionDetail?ID=259>.

These guide specifications are intended for the structural design of bridge and ancillary structures utilizing ultra-high performance concrete. This class of concrete has emerged as a compelling material for use in the design, construction, and preservation of structures. It is a versatile material that can be used in primary structural components, field-cast connections between prefabricated components, and repair applications.

The titles in this section are not TRB publications. To order, contact the publisher listed.

TRB PUBLICATIONS



Transportation Research Record 2678, Issue 3

This issue examines driver dilemma at high-speed unsignalized intersections, bicyclist and motorist behavior at bike

boxes, pedestrians' road crossing behavior, and other topics.

Transportation Research Record 2678, Issue 4

Topics include travel time prediction utilizing hybrid deep-learning models; flight time and flight traffic before, during, and after the height of the pandemic; risk assessment of hazardous materials transportation for small and tribal communities; electric vehicle adoption behavior; and inspection of bridge infrastructure using uncrewed aerial vehicles.

SAGE is the publisher of the *Transportation Research Record: Journal of the Transportation Research Board* (TRR) series. To search for TRR articles, visit <http://journals.sagepub.com/home/trr>. To subscribe to the TRR, visit <https://us.sagepub.com/en-us/nam/transportation-research-record/journal203503#subscribe>.



Application of Big Data Approaches for Traffic Incident Management

NCHRP Research Report 1071

This report applies the guidelines presented in NCHRP Research Report 904:

Leveraging Big Data to Improve Traffic Incident Management to validate the feasibility and value of the big data approach for traffic incident management among transportation and other responder agencies.

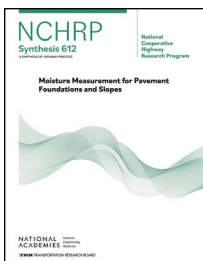
2023; 106 pp.; TRB affiliates, \$62.25; TRB nonaffiliates, \$83. Subscriber categories: *Data and Information Technology* • *Operations and Traffic Management* • *Safety and Human Factors*.

Incorporating Nondestructive Testing in Quality Assurance of Highway Pavement Construction

NCHRP Research Report 1082

This report provides a manual designed to assist state departments of transportation in selecting and incorporating applicable nondestructive testing methods into their quality assurance programs for highway pavement construction, both concrete and asphalt.

2023; 74 pp.; TRB affiliates: \$54; TRB nonaffiliates: \$72. Subscriber categories: *Construction* • *Materials* • *Pavements*.



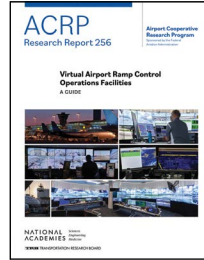
Moisture Measurement for Pavement Foundations and Slopes

NCHRP Synthesis 612

This synthesis documents state department of transportation practices for field and laboratory moisture measurement for pavement foundations and slopes, both concrete and asphalt.

2023; 90 pp.; TRB affiliates, \$59.25; TRB nonaffiliates, \$79. Subscriber categories: *Highways* • *Hydraulics and Hydrology* • *Pavements*.

2023; 90 pp.; TRB affiliates, \$59.25; TRB nonaffiliates, \$79. Subscriber categories: *Highways* • *Hydraulics and Hydrology* • *Pavements*.



Virtual Airport Ramp Control Operations Facilities: A Guide

ACRP Research Report 256

This guide provides U.S. airport operators and their partner agencies with a roadmap and key information for implementing virtual ramp control systems at airports of all sizes.

2023; 102 pp.; TRB affiliates, \$59.25; TRB nonaffiliates, \$79. Subscriber category: *Aviation*.

2023; 102 pp.; TRB affiliates, \$59.25; TRB nonaffiliates, \$79. Subscriber category: *Aviation*.

Guide for Treatment of Airport Stormwater Containing Deicers: Update

ACRP Research Report 257

This report provides a comprehensive guide for selecting appropriate technologies to treat stormwater containing deicers at airports. The report will be of particular interest to industry practitioners who are considering the development, expansion, or enhancement of their treatment facilities.

2023; 94 pp.; TRB affiliates: \$59.25; TRB nonaffiliates: \$79. Subscriber categories: *Aviation* • *Environment*.

Evolution of Knowledge Management at Airports

ACRP Research Report 258

This report is a resource that airports can use to help mitigate the loss of institutional knowledge when employees change jobs or retire.

2023; 92 pp.; TRB affiliates: \$59.25; TRB nonaffiliates: \$79. Subscriber categories: *Aviation* • *Administration and Management*.



Landscape of the FBO Industry in 2022

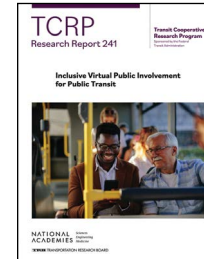
ACRP Synthesis 129

This synthesis report investigates how general aviation fared during the height of the COVID-19 pandemic and how fixed-base

COVID-19 pandemic and how fixed-base

operators (FBOs)—as the principal service agents for the industry—met pandemic challenges and addressed changes that predated COVID-19.

2023; 82 pp.; TRB affiliates, \$56.25; TRB nonaffiliates, \$75. Subscriber category: *Aviation*.



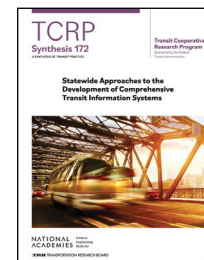
Inclusive Virtual Public Involvement for Public Transit

TCRP Research Report 241

This report is designed to assist public transit agencies in enhancing public engagement by effectively using virtual tools and strategies.

2023; 112 pp.; TRB affiliates, \$66; TRB nonaffiliates, \$88. Subscriber category: *Public Transportation*.

2023; 112 pp.; TRB affiliates, \$66; TRB nonaffiliates, \$88. Subscriber category: *Public Transportation*.



Statewide Approaches to the Development of Comprehensive Transit Information Systems

TCRP Synthesis 172

This synthesis report documents the state department of transportation and metropolitan planning organization practices of integrating information from different agencies into a single network or resource.

2023; 60 pp.; TRB affiliates: \$51; TRB nonaffiliates: \$68. Subscriber categories: *Administration and Management* • *Data and Information Technology* • *Public Transportation*.

2023; 60 pp.; TRB affiliates: \$51; TRB nonaffiliates: \$68. Subscriber categories: *Administration and Management* • *Data and Information Technology* • *Public Transportation*.

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MEETINGS, WEBINARS, AND WORKSHOPS

August

- 12–14 **Symposium on Managed Lanes**
Irvine, California
*For more information, contact
Cynthia Jones, TRB, 202-334-2675,
CLJones@nas.edu.*
- 25–28 **Transportation Symposium
on Environment, Energy, and
Livable Economies**
Denver, Colorado
*For more information, contact
Christine Gerencher, TRB,
202-334-2970, CGerencher@nas.edu.*

September

- 9–11 **International Conference
on Women and Gender in
Transportation**
Irvine, California
*For more information, contact Bill
Anderson, TRB, 202-334-2514,
WBAnderson@nas.edu.*

November

- 7–8 **Conference on Advancing
Additive Manufacturing and
Construction in Transportation**
Irvine, California
*For more information, contact
Nancy Whiting, TRB, 202-334-2956,
NWhiting@nas.edu.*

January 2025

- 5–9 **TRB 104th Annual Meeting**
Washington, DC
*For more information, contact
TRBmeetings@nas.edu.*

Please contact TRB for up-to-date information on meeting cancellations or postponements. For TRB, as well as Technical Activities Division events, visit www.nationalacademies.org/trb/events. For information on all other events or deadlines, inquire with the listed contact.

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Be part of the TRB Annual Meeting
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INFORMATION FOR CONTRIBUTORS TO TR NEWS

TR News welcomes the submission of articles for possible publication in the categories listed below. All articles submitted are subject to review by the Editorial Board and other reviewers to determine suitability for *TR News*; authors will be advised of acceptance of articles with or without revision. All articles accepted for publication are subject to editing for conciseness and appropriate language and style. Authors review and approve the edited version of the article before publication. All authors are asked to review our policy to prevent discrimination, harassment, and bullying behavior, available at <https://www.nationalacademies.org/about/institutional-policies-and-procedures/policy-of-harrasment>.

ARTICLES

FEATURES are timely articles of interest to transportation professionals, including administrators, planners, researchers, and practitioners in government, academia, and industry. Articles are encouraged on innovations and state-of-the-art practices pertaining to transportation research and development in all modes (highways and bridges, public transit, aviation, rail, marine, and others, such as pipelines, bicycles, pedestrians, etc.) and in all subject areas (planning and administration, design, materials and construction, facility maintenance, traffic control, safety, security, logistics, geology, law, environmental concerns, energy, technology, etc.). Manuscripts should be no longer than 3,000 words. Authors also should provide tables and graphics with corresponding captions (see Submission Requirements). Prospective authors are encouraged to submit a summary or outline of a proposed article for preliminary review.

MINIFEATURES are concise feature articles, typically 1,500 words in length. These can accompany feature articles as a supporting or related topic or can address a standalone topic.

SIDEBARS generally are embedded in a feature or minifeature article, going into additional detail on a topic addressed in the main article or highlighting important additional information related to that article. Sidebars are usually up to 750 words in length.

POINT OF VIEW is an occasional series of authored opinions on current transportation issues. Articles (1,000 to 2,000 words) may be submitted with appropriate, high-quality graphics, and are subject to review and editing.

RESEARCH PAYS OFF highlights research projects, studies, demonstrations, and improved methods or processes that provide innovative, cost-effective solutions to important transportation-related problems in all modes. Research Pays Off articles should describe cases in which the application of project findings has resulted in benefits to transportation agencies or to the public, or in which substantial benefits are expected. Articles (approximately 750 to 1,000 words) should delineate the problem, research, and benefits, and be accompanied by the logo of the agency or organization submitting the article, as well as one or two photos or graphics. Research Pays Off topics must be approved by the RPO Task Force; to submit a topic for consideration, contact Nancy Whiting at 202-334-2956 or nwhiting@nas.edu.

OTHER CONTENT

TRB HIGHLIGHTS are short (500- to 750-word) articles about TRB-specific news, initiatives, deliverables, or projects. Cooperative Research Programs project announcements and write-ups are welcomed, as are news from other divisions of the National Academies of Sciences, Engineering, and Medicine.

BOOKSHELF announces publications in the transportation field. Abstracts (100 to 200 words) should include title, author, publisher, address at which publication may be obtained, number of pages, price, Web link, and DOI or ISBN. Publishers are invited to submit copies of new publications for announcement (see contact information below).

SUBMISSION REQUIREMENTS:

- › **Articles** submitted for possible publication in *TR News* and any correspondence on editorial matters should be sent to the *TR News* Senior Editor, Cassandra Franklin-Barbajosa, cfranklin-barbajosa@nas.edu, 202-334-2278.
- › Submit **graphic** elements—photos, illustrations, tables, and figures—to complement the text. Photos must be submitted as JPEG or TIFF files and must be at least 3 in. by 5 in. and 2 megabytes with a resolution of 300 dpi. Large photos (8 in. by 11 in. with a minimum of 4 megabytes at 300 dpi)

are welcome for possible use as magazine cover images. A detailed caption must be supplied for each graphic element.

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