

TR NEWS

May–June 2023

NUMBER 345

Journeying Through Public Lands

Why Transportation Planning Is Essential

PLUS

A Trail for Everyone

**Forecasting Recreational
Travel Demand**

RESEARCH PAYS OFF
**Indirect Tension
Asphalt Cracking Test**

**NATIONAL
ACADEMIES** *Sciences
Engineering
Medicine*

TRB TRANSPORTATION RESEARCH BOARD

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

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

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

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

Learn more about the National Academies of Sciences, Engineering, and Medicine at www.nationalacademies.org.

The **Transportation Research Board** is one of seven major programs of the National Academies of Sciences, Engineering, and Medicine. The mission of the Transportation Research Board is to provide leadership in transportation improvements and innovation through trusted, timely, impartial, and evidence-based information exchange, research, and advice regarding all modes of transportation. The Board's varied activities annually engage about 8,000 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest. The program is supported by state departments of transportation, federal agencies including the component administrations of the U.S. Department of Transportation, and other organizations and individuals interested in the development of transportation.

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



TRANSPORTATION RESEARCH BOARD 2023 EXECUTIVE COMMITTEE*

OFFICERS

Chair: *Diane Gutierrez-Scaccetti, Commissioner, New Jersey Department of Transportation, Trenton*
Vice Chair: *Carol A. Lewis, Professor, Transportation Studies, Texas Southern University, Houston*
Executive Director: *Victoria Sheehan, Transportation Research Board, Washington, DC*

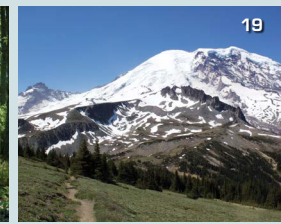
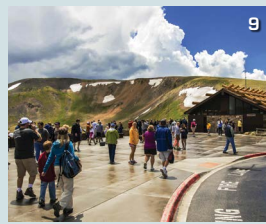
MEMBERS

Michael F. Ableson, CEO, Arrival Automotive–North America, Detroit, MI
James F. Albaugh, President and Chief Executive Officer, The Boeing Company (retired), Scottsdale, AZ
Carlos M. Bracer, Executive Director, Utah Department of Transportation, Salt Lake City
Douglas C. Ceva, Vice President, Customer Lead Solutions, Prologis, Inc., Jupiter, FL
Nancy Daubenberger, Commissioner of Transportation, Minnesota Department of Transportation, St. Paul
Marie Therese Dominguez, Commissioner, New York State Department of Transportation, Albany
Ginger Evans, President, Tower Consulting, LLC, Arlington, VA
Nathaniel P. Ford, Sr., Chief Executive Officer, Jacksonville Transportation Authority, Jacksonville, FL
Stephen W. Hargarten, Professor, Emergency Medicine, Senior Injury and Policy Advisor, Comprehensive Injury Center; Founding Dean, Office of Global Health, Medical College of Wisconsin, Milwaukee
Chris T. Hendrickson, Hamerschlag University Professor of Engineering Emeritus, Carnegie Mellon University, Pittsburgh, PA
Randell Iwasaki, President and CEO, Iwasaki Consulting Services, Walnut Creek, CA
Ashby Johnson, Executive Director, Capital Area Metropolitan Planning Organization (CAMPO), Austin, TX
Joel M. Jundt, Secretary of Transportation, South Dakota Department of Transportation, Pierre
Drew Kodjak, Executive Director, International Council on Clean Transportation, Washington, DC
Hani S. Mahmassani, W.A. Patterson Distinguished Chair in Transportation; Director, Transportation Center, Northwestern University, Evanston, IL
Michael R. McClellan, Vice President, Strategic Planning, Norfolk Southern Corporation, Norfolk, VA
Russell McMurtry, Commissioner, Georgia Department of Transportation, Atlanta
Craig E. Philip, Research Professor and Director, VECTOR, Department of Civil and Environmental Engineering, Vanderbilt University, Nashville, TN
Steward T.A. Pickett, Distinguished Senior Scientist, Cary Institute of Ecosystem Studies, Millbrook, NY
Leslie S. Richards, General Manager, Southeastern Pennsylvania Transportation Authority (SEPTA), Philadelphia
Susan A. Shaheen, Professor and Co-Director, Transportation Sustainability Research Center, University of California, Berkeley

EX OFFICIO MEMBERS

Michael R. Berube, Deputy Assistant Secretary for Sustainable Transportation, U.S. Department of Energy, Washington, DC
Shailen Bhatt, Administrator, Federal Highway Administration, U.S. Department of Transportation, Washington, DC
Amit Bose, Administrator, Federal Railroad Administration, Washington, DC
Tristan Brown, Deputy Administrator, Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, Washington, DC
Ann Carlson, Acting Administrator, National Highway Traffic Safety Administration, Washington, DC
Steven Cliff, Executive Officer, California Air Resources Board, Sacramento, CA
Nuria I. Fernandez, Administrator, Federal Transit Administration, Washington, DC
LeRoy Gishi, Chief, Division of Transportation, Bureau of Indian Affairs, U.S. Department of the Interior, Germantown, MD
William H. Graham, Jr. (Major General, U.S. Army), Deputy Commanding General for Civil and Emergency Operations, U.S. Army Corps of Engineers, Washington, DC
John T. Gray II, Senior Vice President, Policy and Economics, Association of American Railroads, Washington, DC
Robert C. Hampshire, Deputy Assistant Secretary for Research and Technology, U.S. Department of Transportation, Washington, DC
Robin Hutcheson, Administrator, Federal Motor Carrier Safety Administration, Washington, DC
Eletheria Kontou, Assistant Professor, University of Illinois, Urbana-Champaign, Urbana, and Chair, TRB Young Members Coordinating Council
Billy Nolen, Acting Administrator, Federal Aviation Administration, U.S. Department of Transportation, Washington, DC
Stephanie Pollack, Acting Administrator, Federal Highway Administration, U.S. Department of Transportation, Washington, DC
Karl Simon, Director, Transportation and Climate Division, U.S. Environmental Protection Agency, Washington, DC
Paul P. Skoutelas, President and CEO, American Public Transportation Association, Washington, DC
Polly Trottenberg, Deputy Secretary of Transportation, U.S. Department of Transportation, Washington, DC
Jim Tymon, Executive Director, American Association of State Highway and Transportation Officials, Washington, DC

* Membership as of February 2023.



3 Journeying Through Public Lands: Why Transportation Planning Is Essential

Natalie Villwock-Witte

National parks and public lands are places of the people, and how we get to them and navigate around them takes special transportation planning. The author introduces the articles in this theme issue by highlighting the efforts that maintain such locales and keep them accessible to all of us.

5 Federal Lands Transportation Planning 101

Benjamin Rasmussen and Nicholas Grisham

Federal lands make up 25 percent of the United States and require complex interactions among public, private, and nonprofit organizations to guide transportation planning. The authors provide a primer on how to navigate this process, who does what, and other essential tips for planning practitioners.

9 Enhancing the Visitor Experience: The National Park Service’s Data Collection Innovations

Erica Cole and Rachel Collins

The National Park Service is integrating emerging technologies—including mobile device data analysis—to better understand key transportation and visitor travel patterns, congestion, and other transportation analytics. The authors explain how data show the way visitors reach and move through parks and determine what travel information guests need and when, thereby better connecting them to their outdoor destinations.

13 Integrated Planning: Closing the Tribal Engagement Gap

Elijah Henley

Planning transportation projects on tribal lands can be fraught with challenges, not the least of which is finding effective ways to bring tribal representatives to the table. The author makes the case for integrated planning, in which multiple jurisdictions, funding sources, parties, and purposes merge for the good of all.

16 A Trail for Everyone: Active Transport in State Parks

Katherine Pritchett, Linda Lanterman, David Kelly, and Shea Lewis

Kansas, Arkansas, and Missouri state parks are dedicated to active transportation and are partnering with neighboring communities to plan trail linkages. Their goal is that one day everyone might reside within 15 minutes of a trail.

19 Wild Open Spaces: Cultivating the Next Generation of Public Lands Stewards

Jaime Sullivan, Pat McMahon, Charlie Gould, Tommy Eglund, Ella Weber, and Taylor Long

The Public Lands Transportation Fellows Program provides recent college graduates with hands-on professional development, opportunities to explore America’s natural splendors, and a route to federal service. In return, national parks and wildlife refuges get help developing and implementing cost-effective transportation innovations. Five current fellows share their experiences.

23 Transportation Connections 2040: Preserving Transportation Within America’s Great Outdoors

Reuben Vidaurrazaga, Rosemarie Spano, David Jeppesen, and Katie Lamoureux

The Bureau of Land Management conserves and maintains public lands for activities as varied as wilderness camping and solar-energy generation. Its first transportation planning tool and performance framework aims to support collaboration with partners and ensure future access to America’s great outdoors for generations to come.



Ken Lund, Flickr, CC BY-SA 2.0

COVER Soaring sandstone walls line a stretch of Utah SR-279 near Moab, a breathtaking route for explorers in search of Native American petroglyphs, dinosaur tracks, and rock climbing. The road gives way to jeep trails winding toward nearby Canyonlands National Park. Whether for major state roads or a smaller network of trails, all transportation elements and infrastructure through these special places must be planned with safety, innovation, and preservation in mind.

Coming Next Issue

The July–August 2023 issue of *TR News* explores the theme of transportation-related advancements in accessibility and mobility. From individuals with disabilities that affect the senses and physical movement to the concerns of older adults and those with invisible disabilities that present cognitive issues, the authors look at innovations and their applications in myriad settings that make transportation for this population easier or, at times, possible for everyday living.

A warm, sunny day beckons a man to the paths in New York City's Central Park. As the 843-acre greenspace undergoes restoration, accessibility is at the forefront of plans when installing such features as sloped pathways, restrooms, and adaptive swings on playgrounds. Such efforts empower people with disabilities as they navigate their larger environment.



Ed Yourdon, Flickr, CC BY-NC-SA 2.0

27 NCHRP PROJECT 08-132

Peaks and Valleys: Forecasting Recreational Travel Demand

Mark Bradley, Greg Spitz, Aaron Lee, Ben Swanson, and Theodore Mansfield

National and state parks welcome millions of visitors annually, but seasonal surges can jam roads and overcrowd facilities. A National Highway Cooperative Research Program project is harnessing smartphone data to develop recreational travel-demand models aimed at helping public lands transportation planners better forecast and manage congestion.

RESEARCH PAYS OFF

32 Indirect Tension Asphalt Cracking Test: Ensuring Asphalt Mix Designs for Durable Pavements

Fujie Zhou and Kelly West

Road repairs can be costly, particularly when pavement breaks up before anticipated. Researchers at Texas A&M Transportation Institute have developed a cracking test that will help state departments of transportation gauge asphalt resiliency, saving time—and money.

ALSO IN THIS ISSUE

35 Transportation Influencer

Arif Sadri, The University of Oklahoma

36 Profiles

Roxanne Bash, FHWA, and Robert L. Bertini, Oregon State University

38 Diversity, Equity, and Inclusion

39 TRB Highlights

41 Members on the Move

42 Bookshelf

44 Calendar

44 In Memoriam

TRB COVID-19 Resources

Agencies and organizations can use TRB publications and online resources for useful and timely information to help address issues related to the COVID-19 pandemic. To read about TRB's current research and activities, and for a list of relevant publications, visit www.nationalacademies.org/trb/blog/transportation-in-the-face-of-communicable-disease.

The *TR News* Editorial Board thanks Christine Gerencher, TRB, for her work assembling and developing this issue.

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.

TR News is produced by the Transportation Research Board

Publications Staff

Natalie Barnes, Director of Publications
Heather DiAngelis, Associate Director of Publications
Cassandra Franklin-Barbajosa, Senior Editor
Erin Patricia Doherty, Editor
Jennifer G. Corroero, Assistant Editor

TR News Editorial Board

Christine L. Gerencher, Chair
Brittany Bishop
Karen S. Febey
Ann M. Hartell
Micah Himmel
Katherine Kortum
Joseph D. Navarrete

Transportation Research Board

Victoria Sheehan, Executive Director
Russell W. Houston, Associate Executive Director
Ann M. Brach, Director, Technical Activities
Patrice Davenport, Director, Strategic Program Development
Christopher J. Hedges, Director, Cooperative Research Programs
Paul Mackie, Director of Communications
Thomas R. Menzies, Jr., Director, Consensus and Advisory Studies
Gary J. Walker, Director, Finance and Business Operations

TR News (ISSN 0738-6826) is issued bimonthly by the Transportation Research Board, 500 Fifth Street, NW, Washington, DC 20001. Internet address: www.TRB.org.

Editorial Correspondence: By mail to the Publications Office, Transportation Research Board, 500 Fifth Street, NW, Washington, DC 20001, by telephone 202-334-2278, by fax 202-334-3495, or by e-mail cfranklin-barbajosa@nas.edu.

Subscriptions: North America: 1 year \$75; single issue \$19. Overseas: 1 year \$100; single issue \$19 plus shipping. Inquiries or communications

concerning new subscriptions, subscription problems, or single-copy sales should be addressed to the Business Office at the following address, or by phone 202-334-3216, fax 202-334-2519. Periodicals postage paid at Washington, D.C.

Postmaster: Send changes of address to *TR News*, Transportation Research Board, 500 Fifth Street, NW, Washington, DC 20001.

Notice: The opinions expressed in articles appearing in *TR News* are those of the authors and do not necessarily reflect the views of the Transportation Research Board. The Transportation Research Board and *TR News* do not endorse products or manufacturers. Trade and manufacturers' names appear in an article only because they are considered essential.

Printed in the United States of America.

Copyright © 2023 by the National Academy of Sciences. National Academies of Sciences, Engineering, and Medicine and the graphical logo are trademarks of the National Academy of Sciences. All rights reserved.



Journeying Through Public Lands

Why Transportation Planning Is Essential

NATALIE VILLWOCK-WITTE

The author is an associate research professor and research engineer at the Western Transportation Institute at Montana State University in Bozeman.

National parks and other public lands are treasured by Americans and international visitors alike. Planning for transportation to and within these public lands is distinct from planning at the local, state, and federal levels. In this theme issue are articles highlighting the unique considerations associated with transportation planning on public lands.

Federal Lands Transportation Planning 101 describes the challenges specific to federal lands, including coordination, deferred maintenance, electrification, resiliency, and equitable access, as well as determining which entities may constitute a federal land management agency. This article provides a roadmap of the scope, structure, and direction for those new to federal lands planning.

Enhancing the Visitor Experience: The National Park Service's Data Collection Innovations details the challenges of applying mobile device data for small zone sizes and short time segments and

explains how mobile device data can augment—but not replace—traffic counts. Ultimately, the National Park Service expects that this data can provide better information about how visitors travel to and through parks and whether entering and exiting from the same entrance or pass-through drives are more common. The authors also highlight how rapid changes to technology may have affected a previously promising technology (e.g., Wi-Fi-based data), as well as the limitations of technologies in rural areas due to limited data and concerns about data reliability.

Integrated Planning: Closing the Tribal Engagement Gap explores ways to bridge the divide between federal and tribal planning programs that are exacerbated by how funds are allocated (i.e., where the federal and tribal land concentration is the greatest, the federal aid allocation is the smallest). The authors explain collaborative long-range transportation plans and why development of these plans was discontinued. The article also describes a

new piloted approach and the challenges uncovered as a result of that effort. This article features the need to engage tribes one on one, emphasizing the value of personal connections.

A Trail for Everyone: Active Transport in State Parks showcases several state parks dedicated to active transportation, such as biking and hiking. It looks at how federal funding programs, such as the Transportation Alternatives Program and Recreational Trails Program, proved vital to the successful implementation of these and other trails. The trails have improved the economic well-being of nearby communities with—for example, new restaurants and convenience shops—as well as the health of community members with such benefits as reduced health care costs because of a more active population. The article touches on the need to ensure access for all, regardless of socioeconomic status; the benefits that trails provide by reducing greenhouse gas emissions; and the role that state parks may play in improving Americans' mental health.

Wild Open Spaces: Cultivating the Next Generation of Public Lands Stewards describes the roles that transportation fellows fill in national parks and wildlife refuges, such as helping to improve the visitor experience, community outreach, and coalition building, as well as facilitating partnerships, developing new programs, and piloting next-generation technologies. The fellowship program can serve as a pipeline to federal service through providing federal noncompetitive eligibility upon completion. The article details the experiences of current fellows, highlighting their varied and often unexpected backgrounds (e.g., a history major) and how those skill sets have proven useful for the success of their tasks.

Transportation Connections 2040: Preserving Transportation Within America's Great Outdoors is a significant achievement that supports the valuation of the bureau's transportation system as critical to its mission. The authors discuss the



Matt and Cyndi Maxson, Flickr, CC BY-NC-SA 2.0

Thickets of greenery line a stretch of Missouri's Katy Trail State Park, where bicyclists get fresh-air exercise while enjoying the scenery. Running 240 miles along the corridor of the old Missouri-Kansas-Texas Railroad, it is the longest continuous rail trail in the United States and is dedicated exclusively to active transportation.

plan's five goals and how they align with the U.S. Department of Transportation's national goals for the Federal-Aid Highway Program. Within the five goals, a performance-based framework was used to enable implementation and monitoring.

Peaks and Valleys: Forecasting Recreational Travel Demand provides a summary of a National Cooperative Highway Research Program project that builds a series of models and open-source tools to predict recreational travel to America's great outdoors. The demand models and tools highlighted in this article will allow state and regional transportation agencies and public land managers to predict visitor demand and vehicle travel to their recreational sites under a variety of scenarios.

Throughout several of these articles, FHWA's new funding source through the Innovation and Research Council is featured and can be expected to move the needle on research related to

federal lands for years to come. The articles discuss various funding programs, including—but not limited to—the Office of Federal Lands Highway's three capital funding programs: the Federal Land Transportation Program, the Federal Lands Access Program, and the Tribal Transportation Program.

The TRB Standing Committee on Transportation Needs of National Parks and Public Lands contributed to the development of the articles in this TR News issue and welcomes those interested in continuing the discussion on these important topics to participate in future committee activities. For more information on how to get involved, become a Friend of the committee at <https://MyTRB.org>.



U.S. Forest Service, Flickr

Federal Lands Transportation Planning 101

BENJAMIN RASMUSSEN AND NICHOLAS GRISHAM

Rasmussen is public lands team leader at the U.S. Department of Transportation Volpe Center in Cambridge, Massachusetts. Grisham is a senior transportation planner at the FHWA Western Federal Lands Highway Division in Vancouver, Washington.

Precariously perched on a crenellated ridge, a lookout in Montana’s Flathead National Forest allows park personnel to take the measure of their panoramic surroundings. Many agencies work in concert to care for federal lands, majestic and diverse treasures that beckon visitors but require complex planning for new facilities and repairs to existing infrastructure.

Transportation planning for federal lands is a broad and complex practice that draws on partners from a variety of public, private, and nonprofit organizations.

Federal lands planning can be especially difficult to navigate—even for seasoned planning practitioners—because of its complex interagency scope. This article offers a roadmap detailing the scope, structure, and direction of federal lands planning for those new to the field.

Managing Federal Lands

The federal government owns about 28 percent of the total land area of the United States. Although each state contains some federal lands, most of this land is concentrated in western states, as shown in Figure 1 (Page 6). Ninety-six percent of these lands are managed by the following agencies:

- Bureau of Land Management,
- U.S. Forest Service,
- U.S. Fish and Wildlife Service,

- National Park Service, and
- Bureau of Reclamation.

All of these agencies are part of the U.S. Department of the Interior—except for the U.S. Forest Service, which is part of the U.S. Department of Agriculture. The remaining 4 percent of federal lands are managed by the U.S. Department of Defense (including the U.S. Army Corps of Engineers), NASA, the U.S. Department of Energy, and a federal agency called the Presidio Trust focused in the San Francisco Bay Area. Collectively, these agencies that administer federal lands are referred to as federal land management agencies.

Federal land management agencies manage about 60 percent of the land area in the state of Alaska, 45 percent of the land in the 11 contiguous western states, and about 4 percent of the land in the rest of the states. Throughout the country, most federal land management agencies have regional offices that cover multiple states.

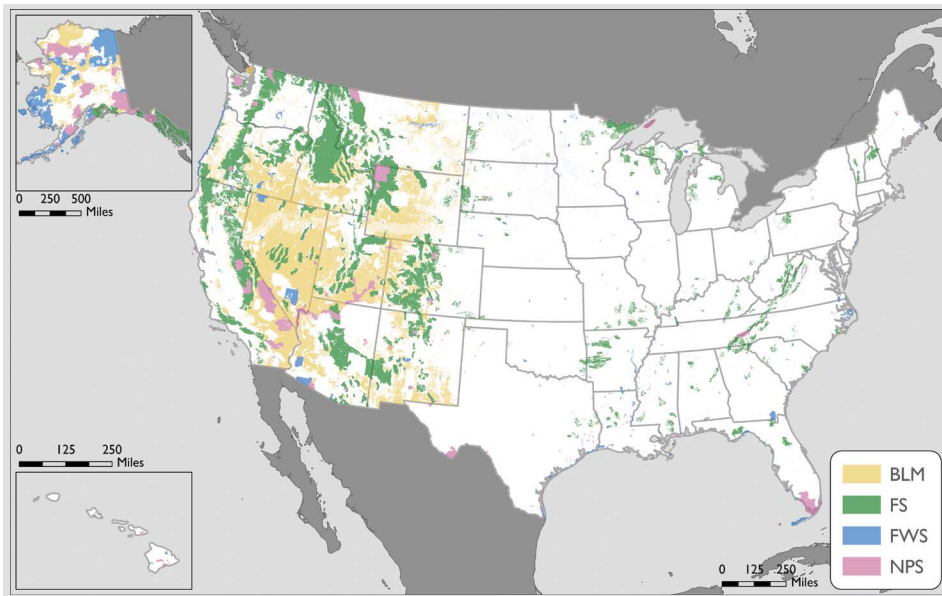


FIGURE 1 Federal lands in the United States. [BLM = Bureau of Land Management, FS = U.S. Forest Service, FWS = U.S. Fish and Wildlife Service, and NPS = National Park Service. (Source: U.S. Geological Survey Protected Area Database, 2017.)]

Each agency is responsible for managing thousands of miles of roads, bridges, and other transportation infrastructure on their land. Often, these federal land management agencies work closely with state departments of transportation (DOTs), metropolitan and regional planning organizations, counties, and municipalities to cooperatively manage transportation infrastructure connecting to and passing through their lands. Indeed, some federal land management agencies and their individual units build, own, and maintain the transportation systems in their lands. Others have state or locally owned roads that go through their lands. Together with their partners, federal land management agencies work to ensure that this vast infrastructure network safely transports visitors—as well as resources, such as timber and minerals—from federal lands to destinations throughout the country and internationally.

Legislative Framework

Federal lands transportation planning responds to interrelated policies and programs that together address different aspects of federal lands transportation. Federal lands planning is governed by 23 United States Code Section 201–204, which outlines the basic parameters of federal lands and tribal transportation. As detailed in Section 201(a), the intent of

these provisions is to “coordinate a uniform policy for all public federal and tribal transportation facilities that shall apply to federal lands transportation facilities, tribal transportation facilities, and federal lands access to transportation facilities.” Also outlined in 23 United States Code Section 201–204 is the following:

- The funding allocation between the FHWA Office of Federal Lands Highway, federal land management agencies, and federally recognized tribes;
- The structure of federal land funding programs;
- Federal lands planning processes that should be consistent with states and metropolitan planning organizations; and
- The development of a federal lands Transportation Improvement Program.¹

The major programs of federal lands transportation include the Federal Lands Access Program, Federal Lands Transportation Program, Tribal Transportation Program, and a separate authorization called the Great American Outdoors Act.

¹ For more information, see the Office of Federal Lands Highway Planning webpage at <https://highways.dot.gov/federal-lands/programs-planning>.

The Federal Lands Access Program is a discretionary grant program open to federal land management agencies and other transportation agencies to improve access to federal lands with the intent of improving transportation facilities that provide access to, are adjacent to, or are located within federal lands. Transportation planning, design, and construction funding from the Federal Lands Access Program is open to state, local, and tribal agencies in cooperation with federal land management agencies. However, the key requirement is that the nonfederal agency must have title to or maintenance responsibility for the transportation facility that the funds would support (1).

The Federal Lands Transportation Program is similar but intended for transportation facilities on federal lands that are owned and maintained by federal land management agencies (2).

The Federal Lands Planning Program is a subset of the Federal Lands Transportation Program that allows for the planning for federal lands and tribal transportation facilities. This planning must be consistent with statewide and metropolitan transportation planning processes (3).

A relatively new program was created by the Great American Outdoors Act and is managed by the U.S. Department of the Interior to address deferred maintenance on federal lands. The Great American Outdoors Act is not exclusive to transportation facilities. It provides continued funding for federal land management agencies to repair transportation, recreation, housing, and school assets managed by component agencies (4).

The Tribal Transportation Program is a formula and grant program jointly managed by FHWA and the Bureau of Indian Affairs. It provides funding and oversight to federally recognized tribes in planning, design, and construction of tribal transportation facilities.

The Office of Federal Lands Highway, a unit within FHWA, provides stewardship and oversight of federal lands transportation planning activities and delivers many of the plans and projects that these programs produce.

Federal Lands Transportation Planning Components

LONG- AND SHORT-RANGE PLANNING

Like statewide and metropolitan transportation planning, Federal Lands Highway requests that federal land management agencies develop national long-range transportation plans, as well as five-year Transportation Improvement Programs. Initially, Federal Lands Highway requested that long-range transportation plans be developed at a regional level.² At the time of this writing, the National Park Service and the Fish and Wildlife Service are updating their national long-range transportation plans. The Bureau of Land Management and the Bureau of Reclamation completed their plans within the past two years; the Forest Service and Army Corps of Engineers are working toward completing their first national long-range transportation plans by the end of 2024.

CHALLENGES

Although this is not an exhaustive list, the primary challenges faced by federal land management agencies during transportation planning can be described as involving coordination, deferred maintenance, electrification, resilience, and equitable access as follows:

- Since local agencies, metropolitan planning organizations, state DOTs, tribes, and federal land management agencies all operate at different geographic scales and often with different stakeholders, one common challenge has been how to coordinate planning efforts between one another.
- Federal land management agencies face a considerable backlog of deferred maintenance costs, which the new Great American Outdoors Act is intended to address.

- Recent federal and state electric vehicle initiatives focus on major urban areas and high-capacity transportation corridors (5). Federal land management agencies and tribes, however, are often located outside of urban areas and away from major corridors where these investments have been prioritized. This presents a disadvantage to federal lands, which do not receive electric vehicle investments and can discourage access by those with electric vehicles.
- Flooding, wildfire, and other climate challenges in the United States disproportionately affect rural areas where federal land management agencies and tribes typically are located. In the western United States, for example, wildfires have ravaged forest and grasslands on Forest Service and Bureau of Land Management lands, along with the local and state lands that provide access to federal land (6).
- Federal lands are unique environments, often at a large geographic scale and sometimes at a significant distance from population centers. This makes equitable access to federal lands a major challenge for those who either cannot drive or have mobility issues.

RESEARCH

TRB's Standing Committee on Transportation Needs of National Parks and Public Lands actively identifies, supports, and discusses the need for transportation research to aid federal lands management agencies. Created as a task force in 1998 and transitioned to a standing committee in 2007, the committee is composed of individuals working in federal, state and local governments, nonprofits, academia, and the private sector (7). With more than two dozen research needs statements in various levels of development, the committee meets monthly to coordinate its activities and research efforts. In August 2022, the committee co-sponsored the TRB National Tools of the Trade Conference in Boise, Idaho, which included more than 200 attendees.

Several of the committee's research needs statements were recently submitted

for consideration and selected for funding by the National Cooperative Highway Research Program (NCHRP) and the FHWA Federal Lands Highway's Innovation and Research Council. NCHRP Project 08-132, "Accessing America's Great Outdoors: Forecasting Recreational Travel Demand," which will conclude in 2023, stemmed from a research needs statement developed by the committee. Over the course of its first few rounds of funding, the Innovation and Research Council funded several committee-supported research needs statements. Submissions to the Innovation and Research Council must be made by a federal land management agency. The next application period for this program will likely be in early 2024.

NCHRP Research Report 988: Rural Transportation Issues—Research Roadmap outlines 26 new research needs across 15 themes, as shown in Figure 2 (8). This

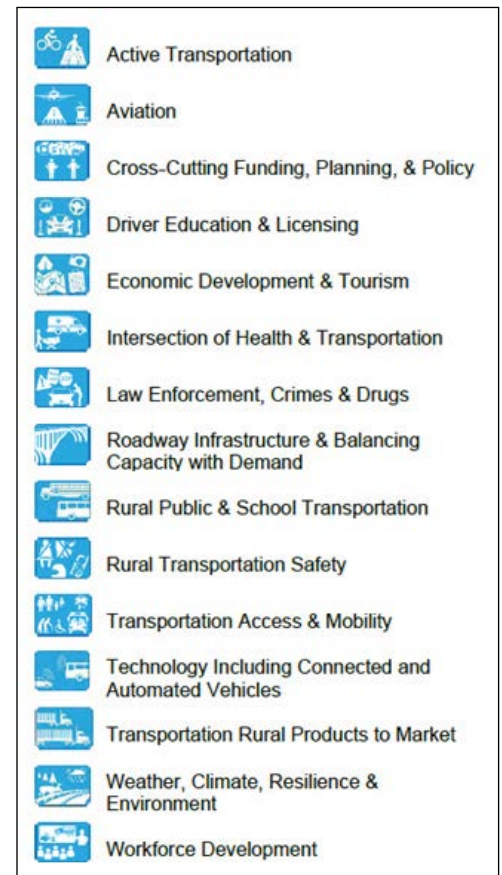


FIGURE 2 Research themes identified by NCHRP Research Report 988.

² For a list of all publicly available long-range transportation plans, see <https://highways.dot.gov/federal-lands/programs-planning/lrtps>.

work consolidates many of the transportation challenges and opportunities facing rural communities into a framework upon which researchers and practitioners can act.

Looking Ahead

Despite their challenges, federal land management agencies face several opportunities. During the next 10 years, federal land management agencies will likely face increasing visitation and congestion, wildfire and flooding response and recovery, as well as shifting habitats and biomes. At the same time, public and private actors have piloted new innovations on federal lands; these include automated vehicles, electric vehicles and charging infrastructure, clean energy, micromobility (especially e-bikes), and new ways to use technology to collect and analyze transportation data, inform the public of current conditions, enforce protected or restricted areas, and collect fees. To continue to address these challenges and maximize the benefits of these emerging innovations, federal land management agencies must work closely with their partners, including state DOTs, counties, and gateway communities, as well as with each other and other federal agencies.

Federal Land Management Agencies

U.S. Department of the Interior
National Park Service
U.S. Fish and Wildlife Service
Bureau of Reclamation
Bureau of Land Management

U.S. Department of Agriculture
U.S. Forest Service

Presidio Trust

U.S. Department of Defense
U.S. Army Corps of Engineers



Michael Quinn, National Parks Service, Flickr, CC BY 2.0

Ready to get the next vehicle on the road, charging stations at Grand Canyon National Park in Arizona were part of a National Park Foundation, National Park Service, and U.S. Department of Energy partnership with BMW of North America.

Federal lands transportation planning is very broad but also complex. Planning practitioners should balance the focus on their own area of expertise with an understanding of the broader field. This includes considering the needs of the partners with whom they work, the way similar federal lands challenges and opportunities manifest across other contexts, and how their personal and organizational roles influence the wider federal planning network. By doing so, practitioners will gain depth of understanding and experience in their own aspects of federal planning and be better equipped to serve their partner agencies and the public.

REFERENCES

1. Federal Lands Access Program (FLAP). FHWA, Washington, DC. <https://highways.dot.gov/federal-lands/programs-access>. Accessed Nov. 2022.
2. Federal Lands Transportation Program (FLTP). FHWA, Washington, DC. <https://highways.dot.gov/federal-lands/programs/transportation>. Accessed Nov. 2022.
3. Federal Lands Planning Program (FLPP). FHWA, Washington, DC. <https://highways.dot.gov/federal-lands/programs-planning>. Accessed Nov. 2022.
4. Great American Outdoors Act. U.S. Department of the Interior, Washington, DC. <https://www.doi.gov/gaoa>. Accessed Nov. 2022.
5. National Electric Vehicle Infrastructure Formula Program. FHWA, Washington, DC. https://www.fhwa.dot.gov/bipartisan-infrastructure-law/nevi_formula_program.cfm. Accessed Nov. 2022.
6. Price, Z., and H. Rein. Oregon Wildfires: 20 of the State's Biggest Since 2002. *Salem Statesman Journal*. July 20, 2021. <https://www.statesmanjournal.com/story/news/2021/07/20/oregon-wildfires-20-biggest-since-2002/7985470002/>. Accessed Nov. 2022.
7. Transportation Research Board. Centennial Paper: Transportation Needs of National Parks and Public Lands. <https://onlinepubs.trb.org/onlinepubs/centennial/papers/ADA40-Final.pdf>. Accessed Dec. 2022.
8. Sullivan, J., K. Clouser, and J. Shaw. *NCHRP Research Report 988: Rural Transportation Issues—Research Roadmap*. Transportation Research Board, Washington, DC, 2022. <http://doi.org/10.17226/26343>.

Enhancing the Visitor Experience

The National Park Service's Data Collection Innovations



Peter Biddle, National Park Service

ERICA COLE AND RACHEL COLLINS

Cole is a transportation planner and Collins is a visitor use project manager at the National Park Service in Denver, Colorado.

Sightseers amble along a damp walkway outside Rocky Mountain National Park's Alpine Visitor Center in Colorado. Many may have used the National Park Service's latest—and innovative—weather data to plan their trip and dodge the raindrops.

The National Park Service is the agency within the U.S. Department of the Interior that manages all national parks; most national monuments; and other natural, historical, and recreational sites of national significance. To better understand key transportation and visitor use questions related to visitor travel patterns, congestion, and other transportation data, the agency is integrating emerging technologies in transportation analytics into park unit-level planning. The resulting information is meant to inform National Park Service decision making and regional partnership opportunities. The studies discussed in this article exemplify the best available technologies used to make data-informed decisions that improve visitor experiences and park operations.

Mobile device data are increasingly being used for planning in the public and private sectors. Now that these devices are more common and offer more

accurate data than before, they are better able to provide data about travel patterns at various scales (i.e., statewide, regional, and park-unit level), locations, and time resolutions (i.e., daily, weekly, and so forth). Previously, this type of detailed data could only be estimated using more expensive and time-consuming methods. These mobile device data sources are samples and considered measures of relative use. They are not a complete replacement for traffic counts that provide absolute measures of vehicle volume.

The National Park Service's Transportation Planning Program is taking a phased approach to exploring applications of mobile device data technology. Research and development initiatives have increased the agency's learning, and its planning processes are incorporating these data sources into strategy development. This article outlines the preliminary research phases and associated insights. What follow are sections, each with a question, an answer, and an associated study.

Research Phase 1 (2016–ongoing)

HOW ARE VISITORS MOVING THROUGH PARKS?

By understanding how visitors move through parks, the National Park Service can better identify what messages and strategies are needed in which locations, based on visitors' travel patterns.

ASSOCIATED STUDY

The Yellowstone National Park Transportation and Vehicle Mobility Study (1) was conducted in Phase 1. Yellowstone is a large landscape with an extensive roadway system that encompasses portions of three states: Idaho, Montana, and Wyoming. During this study, Yellowstone received more than 4.1 million visitors per year, and visitation continues to grow.

To better understand travel patterns through the park, the study included the collection of several types of data to quantify baseline trends. These data allowed the park to analyze fundamental transportation problems in detail. Data sources included traditional and modern vehicle counters, Wi-Fi readers, video cameras, and manual staff counts. Combined with existing data sources already maintained by the National Park Service, the snapshot data collected in the study allowed the park to identify how visitors move throughout the park, what their dominant travel patterns are, and where the park should allocate resources to best manage visitor demand. After a serious flooding event in June 2022 damaged or destroyed major roadway segments, these data and models helped the National Park Service evaluate different reopening scenarios to ensure that park access could be maintained and resources protected with only three entrances open.

Research Phase 2 (2018–ongoing)

HOW DO VISITORS GET TO PARKS?

By better understanding transportation patterns—en route to parks and through gateway communities—the National Park



U.S. National Park Service

The white ribbon of Trail Ridge Road winds through Rocky Mountain National Park between Grand Lake and the community of Estes Park. The National Park Service uses mobile device data to understand baseline traffic conditions and develop strategies to improve the transportation-related visitor experience.

Service can answer critical questions about where visitors are coming from and what the timing and distribution of recreational use looks like on regional travel routes. This also included recreational travel patterns, identifying peak periods of use (i.e., time of day and day of week), and vehicle movement patterns.

ASSOCIATED STUDY

The Regional Transportation System Usage Analysis for National Parks in Colorado (2) study was one of the Phase 2 studies. This study was executed in conjunction with the National Park Service Intermountain Region's Long Range Transportation Plan update. It provided the agency with the opportunity to understand details around mobile device data collection and evaluation plans, data vendor selection, and data availability at a diverse set of parks. The final report includes a two-page profile spread for 11 of the 13 national parks in Colorado that summarizes the following 2018 and 2019 data:

- When visitors are coming (by season and by weekday versus weekend visitation),

- Whether visitors are residents or nonresidents of Colorado,
- Travel speeds of vehicles within or around the park,
- Dwell times (the duration of visits in specific locations),
- Top five gateways (most visited communities that visitors travel through before accessing the park), and
- Top five internal destinations (most visited sites within the park).

For the two parks without a profile spread, there were not enough observed trips within the park boundaries to provide summary data.

KEY INSIGHTS

- **Mobile Device Data Limitations:** The mobile device data were delivered to the National Park Service in several data files, with trip records for zones of various sizes that were broken down into different seasons, days of the week, times of day, and either resident or nonresident of the state in which the park was located. Review of the data

files aided the agency in understanding data densities for a range of parks from urban to rural locations. When developing the data collection plan in future studies, the agency now understands mobile device data limitations when analyzing small zone sizes and short time segments.

- **Mobile Device Data Uses in National Park Service and Other Public Lands Settings:** The final chapter of the study explores potential future applications of mobile device data: visitor use and travel patterns; traffic assessment and monitoring; parking analysis; regional transportation planning; and community connections, economic development, and tourism.

ASSOCIATED STUDY

Another Phase 2 study is the Mount Rainier National Park Regional Travel Analysis. To better understand transportation patterns en route to parks and through gateway communities, there was a need to gain a greater understanding of the current transportation system uses within the Mount Rainier National Park travel region. This study helped identify and describe the travel patterns and relative volumes within and between the National Park Service and U.S. Forest Service units, as well as other key tourism destinations. The recreational travel pattern analysis included identifying peak periods of use (i.e., time of day and day of week) and vehicle movement patterns. This study also advanced the larger research agenda by leveraging lessons learned from the *Regional Transportation System Usage Analysis for National Parks in Colorado* and testing some of those study assumptions in a new setting.

Results of this study directly inform the ongoing Mount Rainier National Park Nisqually to Paradise Corridor Planning effort by providing the planning team with valuable information about the travel routes and home locations of visitors arriving to the park and their routes as they move through the park. This information helps the National Park Service craft management strategies that reflect

the needs of park operations and existing facilities, as well as current visitor use patterns in the park.

KEY INSIGHTS

- **Travel Patterns:** The highest volume entrance for the park is the Nisqually Entrance on the west side. The mobile device data aligned with the traffic counters in this finding. Besides learning that the Nisqually Entrance is the highest volume entrance, the National Park Service was also able to learn that most travelers exit the park via the same entrance (meaning that pass-through drivers account for only a small portion of all visitors). This study also showed that—while the dominant entrance for all travelers is on the west side—travelers with a trip origin in the Seattle–Tacoma metro area are more likely to arrive and depart using the northeast entrance to the park. From this insight, the planning team gained a more refined picture of the profile of travelers (e.g., travel distance, home location, and trip origin) who were using this travel corridor. This allowed the National Park Service to better assess suitability of various access and visitor transportation services for those travelers.
- **Insufficient Data from Bluetooth/Wi-Fi Readers:** The project team concluded that Wi-Fi–based data collection is no longer a reliable method for estimating visitor use patterns. Device identification randomization has not historically been an issue in understanding visitor use patterns. However, in recent years, device identification randomization has increased substantially. The biggest takeaway is that each MAC IP address does not necessarily correspond to one device, as a single device may generate thousands of different MAC addresses during its time in the park. While this specific study was not able to use the data from these readers to answer additional questions about travel patterns within the park, this finding is an important lesson for federal land

management agencies; that is, data collection technologies are changing quickly. Thus, practitioners cannot assume that technologies that work in urban settings have large enough sample sizes and reliable enough data for use in all recreational travel settings.

Research Phase 3 (2021–ongoing)

WHAT INFORMATION DO VISITORS NEED—AND WHEN—TO INFORM THEIR TRAVEL PLANS?

Providing accurate and reliable information to visitors about travel conditions when they are making their travel decisions may help them make informed choices about how and when they travel to National Park Service units.

ASSOCIATED STUDY

Recreation Travel Forecasting for Visitors Research Study

This year, the National Park Service—in collaboration with the FHWA Federal Lands Highway's Innovation and Research Council—will develop methods for acquiring, transforming, and communicating travel forecast and roadway status information to visitors. The *Recreation Travel Forecasting for Visitors Research Study* will research and summarize travel demand communication tools (travel forecasting); analyze data sources to use, develop, and apply to a travel forecasting tool (Figure 1, Page 12) in a software package that can be used by National Park Service field staff; and develop a communications strategy to share the tool. This project is expected to have enough preliminary results to start pilot testing in late 2023.

Conclusion

These data sources give the National Park Service a more holistic understanding of visitor travel patterns to inform planning and multimodal investments. Analysis at this level helps the agency and its partners capitalize on integrated planning opportunities to increase access to parks and better connect parks to communities in ways that promote regional recreational opportunities and benefit

tourism economies. The National Park Service is committed to continuing to evaluate and implement the best available transportation analysis technologies, including mobile device data analysis, to identify locations to work collaboratively and leverage resources and funding opportunities.

REFERENCES

1. National Park Service. *The Yellowstone National Park Transportation and Vehicle Mobility Study: Data Collection and Analysis*. June 2017. https://www.nps.gov/yell/getinvolved/upload/Yellowstone-Transportation-Mobility-Study_lo-res.pdf.
2. National Park Service. *The Regional Transportation System Usage Analysis for National Parks in Colorado*. December 2020. <https://parkplanning.nps.gov/document.cfm?parkID=73&projectID=84156&documentID=108288>.



FIGURE 1 National Park Service usage analysis data. (Source: National Park Service.)

V O L U N T E E R V O I C E S

“ Since my first TRB Annual Meeting in January 1979, I've seen that TRB has delivered extraordinary, value-adding ideas. Interdisciplinary, cooperative research projects are critical to workforce development. This is specifically true for undergraduate and graduate students who are new to TRB, so they can start their professional careers by networking with international peers. Likewise, the exhibitions—with the latest products commercially available, including product types such as pavement evaluation and management, commercial and autonomous vehicles, and traffic forecasting—show TRB's immense added value to our industry.

—**BENJAMIN COLUCCI-RÍOS**

Director, Puerto Rico Transportation Technology Transfer Center
University of Puerto Rico at Mayagüez



Integrated Planning



Closing the Tribal Engagement Gap

U.S. Department of Agriculture

ELIJAH HENLEY

The author is a transportation planning team lead at FHWA, Central Federal Lands Highway Division, in Lakewood, Colorado.

Hills and plains of dry grass surround a highway that leads trucks out of the Northern Cheyenne Indian Reservation in Southeast Montana. Construction of such roads can benefit from integrated planning, in which all invested parties—particularly tribal representatives—make their voices heard.

Integrated transportation planning involves projects that are cross-jurisdictional with multiple funding sources and that are intended to meet various needs. However, for such planning to be effective, a great deal of coordination and an effort to bring all concerned parties to the table are required. A thoughtful approach is particularly important when considering projects on tribal land and engaging tribal leadership. But, before delving into the details of integrated planning and opportunities to improve the incorporation of federal land management agencies and tribal project needs into the state and local transportation planning process (as required under the Federal-Aid Highway Program), some overarching challenges related to tribal engagement need to be overcome. These challenges have prevented FHWA Office of Federal Lands Highway from integrating more effectively across its three capital programs, including the Federal Lands Transportation Program, the Federal Lands Access

Program, and the Tribal Transportation Program. They include the following:

- Each federal land management agency and tribe has separate long-range transportation plans and transportation improvement programs that outline and implement projects by separate jurisdiction.
- State departments of transportation (DOTs) and local planning agencies have formal tribal consultation processes, but there is no comparable coordination process in place for federal land management agencies.
- Integrated planning is intended to close both of these gaps, but how federal land management agencies engage concurrently with tribes is a process gap that remains to be filled.

As the origins of integrated planning are considered, it is important to understand transportation planning in the federal lands and tribal context and the persistent challenges that make incorporation of

their needs into the state and local planning process difficult. First and foremost, Federal-Aid Highway Program planning is focused on the National Highway System, other state highways, and major urban arterials. By contrast, the routes that provide primary access to federal and tribal land tend to be on the local road system and outside the boundaries of metropolitan planning organizations, the principal local partner in the federal transportation planning process.

The other challenge is that Federal-Aid Highway Program planning is almost exclusively focused on nondiscretionary travel—work, school, and freight trips—while federal lands transportation planning is predominately focused on discretionary travel that occurs after work and on weekends and holidays. Tribal transportation planning is a combination of both that doesn't fit exactly in either the Federal-Aid Highway Program or the Federal Lands Transportation Program planning processes.

Finally, tribal transportation planning and the Federal Lands Transportation Program have a much greater emphasis on transportation's effects on the visitor experience and natural and cultural resources, whereas Federal-Aid Highway Program planning focuses predominately on asset condition, safety, and efficient throughput.

Additionally, the divide between the various planning programs is further exacerbated by how funds are allocated. The approximately \$1 billion per year in funding for the Federal Lands Transportation Program, the Federal Lands Access Program, and the Tribal Transportation Program is divided into hundreds of small suballocations by state, federal land management agency, such agency's region, and tribe. On the Federal Lands Transportation Program side, the approximately \$50 billion allocated each year is similarly divided by state, and then suballocated to urbanized areas, leaving limited funds to cover the rural parts of each state. This way of allocating funds often creates a compounding challenge: Where the concentration of federal and tribal lands is often highest, the



Bob Wick, Bureau of Land Management

A painted horizon captures the quiet contemplation of visitors at Bears Ears National Monument in Southeastern Utah. One of the United States' most culturally rich landscapes, its ancient cliff dwellings, rock art, and ceremonial kivas contribute to its spiritual significance to many Native American tribes.

Federal-Aid Highway Program allocation is the lowest.

Integrated planning is intended to bridge the gap between all these differences. It seeks to unify transportation needs and priorities across jurisdictions and funding programs to maximize the benefit of each program (i.e., federal, tribal, state, and local). While federal planning regulations require state DOTs, metropolitan planning organizations, other local planning agencies, federal land management agencies, and tribes to have a consistent planning process, programs have become so siloed that the projects for tribes and federal land management agencies are planned and programmed in isolation from each other and from the rest of the Federal-Aid Highway Program. One of the main reasons for this isolated process is a lack of planning capacity, both in terms of specialized expertise and staffing resources among many of the federal land management agencies and tribes across the country.

To better meet a growing backlog of need, it is critical that some of the current separation between the Federal-Aid Highway Program, Federal Lands Transportation Program, and tribes is

alleviated by developing new partnering strategies and data analytics designed to better align priorities and program eligibility, based on network ownership and identifying the connectivity gaps that exist in each state.

The goal of integrated planning is to identify projects of mutual interest that have overlapping funds eligibility and ensure that all those needs are incorporated into state, regional, and local plans. This starts by expanding the Federal-Aid Highway Program inventory of transportation facilities to include those owned by federal land management agencies, counties, cities, and tribes: the portions of the local road system that are eligible for the Federal Lands Transportation Program, Federal Lands Access Program, and Tribal Transportation Program. By incorporating the portions of the local road system that provide primary access to federal and tribal lands, state and local transportation plans will provide a more complete picture of network connectivity that better supports all trip purposes.

Integrated planning builds upon lessons from the collaborative long-range transportation plans that were intended to develop consolidated federal plans for each state. However, the approach was

too costly and reductant in relation to the Federal-Aid Highway Program. Such collaborative plans were discontinued in 2017, as FHWA sought more effective ways to coordinate needs and priorities across the Federal Lands Transportation Program and the Federal-Aid Highway Program. In 2018, FHWA's Office of Federal Lands Highway partnered with the Colorado DOT, the National Park Service, and other federal land management agencies to pilot a more integrated approach to transportation planning.

Instead of developing a separate, consolidated federal land management agency long-range transportation plan for the state (which had been the collaborative long-range transportation plan model), the Colorado Federal Lands Planning Pilot (CO Pilot) sought to eliminate the need for a separate plan by incorporating all primary access routes to federal lands directly into Colorado DOT's regional transportation plans. In addition to including the routes, a comprehensive inventory of multimodal project needs throughout the state was developed and incorporated into the regional transportation plans. While federal land management agency routes and needs were incorporated, the CO Pilot did not fully incorporate tribal routes and project needs.

As to the tribal engagement gap challenge, several factors with regard to CO Pilot may have led to tribes not engaging in the process. Tribes were invited to participate concurrent with invitations going out to federal land management agencies and local planning agencies. However, the project team did not reach out one-on-one to each tribe. Because there wasn't a preexisting relationship between the lead agency—Office of Federal Lands Highway—and the tribes, trust was never established. A compound problem was the lack of access to the tribes' long-range transportation plans, other planning documents, or any other



Bureau of Land Management

With backgrounds ranging from conservation to developed recreation to paleontology, members of the Bears Ears National Monument Advisory Committee gather with purpose. Also including tribal representatives, state government officials, and the general public, they meet to determine how, for example, rock climbing and rock art, backpacking and livestock grazing, and sightseeing and traditional Native American ceremonies can coexist—while preserving the monument's majesty.

data on the condition of their transportation system. Without any point of reference, attempts to engage were not successful.

FHWA endeavors to expand integrated planning in other states—including Nevada, Oregon, and Pennsylvania—with a greater emphasis on a link between planning and programming by developing federal land management agency coordination frameworks. Such frameworks better align with the tribal consultation processes that are in place in each state. The following lessons are being applied to close the tribal engagement gap:

- Try to make a personal connection with tribal leaders before invitations to participate in a meeting or workshop go out;
- Meet in person, if possible, and send correspondence in duplicate (i.e., electronic and postal mail);

- Coordinate through federal tribal liaisons, in addition to state DOT and local planning agency liaisons; and
- Work with the Bureau of Indian Affairs and FHWA's Office of Tribal Transportation to improve data availability for tribal transportation systems.

As coordination between federal land management agencies, state DOTs, metropolitan planning organizations, and local planning agencies improves, it is important that tribal engagement is done in a manner that builds trust before initiating a study or plan update. Working with the Office of Tribal Transportation, the Bureau of Indian Affairs, state DOT tribal liaisons, and other tribal advocacy groups, the Office of Federal Lands Highway would like to increase awareness of the benefits of integrated planning and increase the level of tribal participation in the process.



Kansas Tourism

A Trail for Everyone

Active Transport in State Parks

**KATHERINE PRITCHETT,
LINDA LANTERMAN,
DAVID KELLY, AND
SHEA LEWIS**

Pritchett is a retired trails coordinator for the Kansas Department of Wildlife and Parks in Topeka, and Lanterman is a state parks director for the Kansas Department of Wildlife and Parks in Pratt; Lewis is a director at Arkansas State Parks in Little Rock; and Kelly is a director at Missouri State Parks in Jefferson City.

Maintaining a steady pace, cyclists on Kansas' Flint Hills Trail can potentially get an intense workout—the trail extends 118 uninterrupted miles. Kansas is one of several states committed to linking with other state parks to build a network of trails—all to promote outdoor activity.

State parks, by their very nature, encourage active transportation. Patrons stay active by walking on the beach and strolling among the campsites. Trail networks at state parks provide patrons with opportunities for hiking, biking, paddling, and horseback riding. Some state parks—including those in Kansas, Arkansas, and Missouri—are solely dedicated to active transportation. Several communities along these park trails are planning for and developing their own trail linkages to accommodate their active transportation needs. A goal for some trail advocates is for every citizen to live within 15 minutes of a state park trail, which can become a reality through partnerships with state parks (1).

Kansas State Park System

In Kansas, many such partnerships have already been established. Volunteers and donors in Iola and neighboring Humboldt

united to complete an additional 6.5 miles of the Southwind Trail at the former terminus of the Prairie Spirit Trail State Park. Trail advocates in Junction City are working on a linkage to the Flint Hills Trail State Park. The Landon Trail, which begins in the state capital of Topeka, is getting closer to linking to the Flint Hills Trail and has already connected to the trails in Clinton State Park. Volunteers in Marysville have linked the Blue River Rail Trail with Nebraska's Homestead Trail. They are also working to connect the Blue River Trail to the downtown Marysville trail system. As these linkages are completed, more than 200 miles of interconnected trails that offer hiking, biking, and—in some places—equestrian use will be available to citizens of the region. Many of these linkages, as well as initial construction phases of the Flint Hills Trail and Prairie Spirit Trail state parks, found crucial financial assistance through FHWA's Transportation Alternatives Program or the Recreational Trails Program, both of which provide

cost-share grants through the Surface Transportation Block Grant Program (2).

As trail networks have grown, communities in Kansas have learned that trails are economic drivers that contribute to business development, reduced health care costs, and better community health outcomes. For example, the city of Ottawa—located at the intersection of the Flint Hills Trail and Prairie Spirit Trail state parks—has added a bicycle shop that operates a travel service, a bowling alley, and numerous restaurants. Smaller communities along the Prairie Spirit Trail have opened restaurants, bed and breakfasts, bicycle repair shops, and convenience stores that provide services and amenities to trail users, as well as residents.

Communities adjacent to trails also benefit from construction project jobs and the use of restaurants and hotels. Once a trail is complete, existing businesses along its route are often revitalized and new businesses created. Homes within a quarter mile of a local or regional trail also see an increase in value (3). According to a Rails-to-Trails Conservancy study, crime along well-used trails is virtually nonexistent (4).

Since completion of Prairie Spirit Trail and development of the Flint Hills Trail, Ottawa has continued to see growth in tourism spending and new businesses. In all, 15 new short-term home rental properties have opened, as well as 10 new downtown businesses (J. Coen, personal communication, December 2022). Because of interest in the trails, city officials attracted a donor who invested in a grant match for a new \$1 million gathering place for farmers' markets and open-air entertainment adjacent to the trails.

Arkansas State Park System

Nearby in Northwest Arkansas, recreational and competitive bicycling along the network of trails provides an estimated \$137 million in annual benefits to the regional economy, according to three studies sponsored by the Walton Family Foundation (5). Such activities, as well as running races, contribute to a healthier lifestyle and reduce health care costs in the short and long term. A study by BBC



Arkansas State Parks

Maneuvering around bike-high boulders, a family takes on Monument Trails in Arkansas' Mount Nebo State Park. The multiuse trails are seamlessly woven into the landscape and include world-class mountain biking destinations for all skill levels.

Research and Consulting about bicycling in this area indicates that it generates \$85 million annually in health-related benefits. In addition, results from the study showed that investment in soft-surface mountain bike trails is a key driver of tourism. For instance, at least 55 percent of mountain bikers travel to the area from outside the region, contributing greatly to local economies.

Arkansas state parks also offer approximately 300 miles of hiking trails. Currently under development, Delta Heritage Trail State Park provides visitors with 40 miles of hiking and cycling opportunities on a former rail line. When complete, the trail will stretch more than 80 miles, with camping, bicycle rentals, and other outdoor day-use facilities located along its path.

Monument Trails are a separate collection of world-class shared-use trails, a joint project of Arkansas State Parks and the Arkansas Parks and Recreation Foundation at Hobbs State Park—Conservation Area, Mount Nebo State Park, Pinnacle Mountain State Park, and Devil's Den State Park. "The Monument Trails are designed with an entire family in mind . . . to provide an unforgettable experience along the trail that will inspire you to seek, find, and discover

our state and build a sense of pride and appreciation," says Suzanne Grobmyer, chief of staff for the Arkansas Department of Parks, Heritage, and Tourism. "The Monument Trails are going to change the dynamic for communities across the state by improving quality of life and creating new economic activity" (6).

Missouri State Park System

With a long history of advocating active transportation options, Missouri State Parks supports the benefits that come with establishing an alternative transportation infrastructure. Several of those benefits mirror the goals of its state park system, which include improving the health and well-being of visitors, achieving a cleaner environment, protecting natural resources, and providing equitable access to all citizens regardless of socioeconomic status. The recent increase in state park visitation in Missouri and across the country underscores the need to implement alternative transportation corridors that link more communities to state parks. Such efforts will minimize damage to the natural resources, such as air pollution from high traffic volumes and overcrowding in parking areas. Visitors will thereby enjoy an enhanced



Missouri State Parks, Flickr

Autumn leaves crunch underfoot as hikers turn out to dedicate the 1000th Mile Trail in Missouri's Harry S. Truman State Park.

experience with improved air quality and less noise.

Missouri's most visible alternative transportation corridor is Katy Trail State Park, a 240-mile rails-to-trails conversion built on the former Missouri–Kansas–Texas rail line. The trail nearly bisects the state, running between the communities of St. Charles (just north of St. Louis) and Clinton (approximately 60 miles southeast of Kansas City). The recent addition of the Rock Island Railroad corridor to the state park system provides an opportunity for Missouri to develop a truly cross-state alternative transportation corridor that would connect St. Louis to Kansas City via a connection to the Katy Trail at Windsor, Missouri, with the potential to extend into Illinois in the east and to Kansas, Nebraska, and Iowa in the west and north as part of a future Quad-State Trail system.

Missouri State Parks is actively engaged in developing other alternative transportation corridors that link communities to its state parks, such as a four-mile trail connecting Thousand



Missouri State Parks, Flickr

Pop-up tents and foldout chairs form a campsite community in Missouri's Katy Trail State Park, one of several locations along the park's 240 miles.

Hills State Park to the nearby community of Kirksville in North Missouri and the Johnson County Spirit Trail that, when completed, will connect the community of Warrensburg to Knob Noster State Park and to Whiteman Air Force Base. Missouri State Parks will continue to play an integral role in the expansion of the state's alternative transportation system as it explores additional opportunities to provide community connections.

Concluding Thoughts

During the COVID-19 shutdowns, people in record numbers visited state parks, where they used campsites and trails to socially distance and nature-bathe to deal with the stress of isolation. As the world opens up in the wake of the pandemic, people still seek opportunities to increase their activity and improve their mental and physical health. Active transportation trails are a vital part of this movement. As experiences in Kansas, Arkansas, and Missouri show, trails that connect communities and their public lands play an integral role in active transportation.

REFERENCES

1. Alexander, L. T. *The Effect of Greenways on Property Values and Public Safety: A Joint Study by the Conservation Fund and Colorado State Parks, State Trails Program*. March 1995. <https://babel.hathitrust.org/cgi/pt?id=umn.31951d013088292&view=1up&seq=7>.
2. FHWA. Federal-Aid Programs and Special Funding: Surface Transportation Block Grant Program (STBG). <https://www.fhwa.dot.gov/specialfunding/stp/>.
3. Webel, S. Trail Effects on Neighborhoods: Home Value, Safety, Quality of Life. *American Trails*. September 2000. <https://www.americantrails.org/resources/trail-effects-on-neighborhoods-home-value-safety-quality-of-life>.
4. Tracy, T., and H. Morris. *Rail Trails and Safe Communities: The Experience on 372 Trails*. January 1998. https://safety.fhwa.dot.gov/ped_bike/docs/rt_safecomm.pdf.
5. Walton Family Foundation. Bicycling Provides \$137 Million in Economic Benefits to Northwest Arkansas. March 2018. <https://www.waltonfamilyfoundation.org/about-us/newsroom/bicycling-provides-137-million-in-economic-benefits-to-northwest-arkansas>.
6. Grobmyer, S. Monument Trails Bring World-Class Mountain Biking to State Parks Across Arkansas. <https://www.arkansasstateparks.com/news/monument-trails-bring-world-class-mountain-biking-state-parks-across-arkansas>.



Wild Open Spaces

Cultivating the Next Generation of Public Lands Stewards

Natalie Villwock-Witte and Kevin Witte

**JAIME SULLIVAN,
PAT MCMAHON, CHARLIE GOULD,
TOMMY EGLAND, ELLA WEBER,
AND TAYLOR LONG**

Sullivan is an engineer and manager of the Public Lands Transportation Fellows program at the Western Transportation Institute in Bozeman, Montana; McMahon and Gould are advanced transportation fellows at the National Park Service in Washington, DC; Egland is a transportation analyst at the U.S. Fish and Wildlife Service in Savannah, Georgia; Weber is the visitor services manager and a park ranger at Parker River National Wildlife Refuge Complex in Newburyport, Massachusetts; and Long is a community planner at the U.S. Department of Transportation's Volpe Center in Philadelphia, Pennsylvania.

A footworn path leads to the snowcapped peaks of Mount Rainier, symbol of the national park that bears its name near Seattle, Washington. Such pristine vistas don't endure by accident. Since 2012, university graduates focused on transportation innovations have served to improve access to public lands throughout the United States.

Imagine getting dropped into the wilderness at the start of your career with minimal resources and a monumental assignment: Devise ways to maintain or improve aging roads and infrastructure, expand visitor access and safety, and protect fragile habitats—all on a shoestring budget. Such immersive, hands-on training is a hallmark of the Public Lands Transportation Fellows initiative.

Established in 2012 and funded by the federal land management agencies (FLMAs), the mutually beneficial program attracts and cultivates the next generation of public lands professionals by providing university graduates with paid fellowships to plan and implement transportation solutions that preserve valuable resources and enhance the visitor experience in national parks, wildlife refuges, and other federal preserves.

Fellows work directly with the FLMAs, including the U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, and U.S. Forest

Service. Along with mentoring, they receive career development opportunities in the federal government and—as an incentive to transition to federal service after their fellowships—qualify for the Public Land Corps noncompetitive hiring status. This special hiring authority enables fellows to compete for merit positions as if they already are federal employees, while the FLMAs gain additional staff to raise awareness of transportation challenges and opportunities within public lands; solve specific transportation issues; develop, document, and implement priority transportation projects; and research innovative transportation solutions.

The selection process is extensive. Applicants to the program, which is managed by the Western Transportation Institute at Montana State University through a cooperative agreement, list their top choices among open positions by preferred location or project. They also submit a resume; recommendation letter; writing or graphics sample (some

provide both); and a statement describing their interest in the program and in contributing to federal lands, plus relevant experience. Hiring committees review application materials, rank candidates against the position descriptions, conduct interviews and background checks, and check references. Once selected, fellows serve 18- to 24-month terms, with some offered extended time to continue their work. Fellows who show extraordinary performance are promoted to Advanced Fellows to serve a second term with additional responsibilities, such as working at a regional or headquarters office.

Since the program's inception, 23 fellows with backgrounds as varied as planning, engineering, history, and environmental science have served in 21 FLMA units or complexes, three regional offices, and at agency headquarters. Their projects are similarly diverse, encompassing, for example, culvert construction and self-driving shuttle buses. As one class of fellows wraps up or is extended, a new group arrives to continue the transformative tradition. Here's how the experience affected the careers of the following 2020 cohort fellows, in their words.

Pat McMahon

NATIONAL PARK SERVICE CLIMATE CHANGE ADAPTATION AND ASSET MANAGEMENT FELLOW

I worked on climate change–related challenges in the Pacific Northwest, specifically studying the impacts of climate change at Olympic, North Cascades, and Mount Rainier national parks. Currently, I am working with the U.S. Department of Transportation's Volpe Center to pilot a long-term access and resilience strategy at North Cascades National Park to produce a replicable climate-adaptation methodology that can be applied to federal lands across the country.

With the Alternative Transportation Program in the National Park Service's Washington DC Area Support Office, I secured funding from FHWA's Innovation and Research Council to develop the Trailblazer Research Project, which used e-bikes equipped with cameras and sensors to efficiently collect high-quality



Charlie Gould

High above the Yellowstone River, National Park Service Advanced Fellows Charlie Gould (left) and Pat McMahon snap a selfie near a visitor to Yellowstone National Park's Grand Canyon. The two introduced other sustainable ways for sightseers to experience nature, including self-driving electric shuttle buses.

data on the condition of multiuse trails in the Washington, DC, area. The photographic, annotative, and roughness data were compiled in a geodatabase to inform maintenance and management decisions by National Park Service staff. This innovative trail-condition assessment methodology may be applied more broadly across the agency's trail network after the research phase is complete.

My time as a fellow has given me incredible professional experience and development opportunities. For example, leading the Trailblazer initiative through concept development, funding acquisition, and execution has provided invaluable project management training, as well as my first supervisory experience: managing an intern. The Public Lands Transportation Fellows Program has allowed me to build an extensive professional network and created opportunities to explore some of the nation's most iconic landscapes. I am thrilled to continue as an Advanced Fellow.

Charlie Gould

NATIONAL PARK SERVICE EMERGING MOBILITY FELLOW

I assisted the National Park Service with innovation and emerging mobility

by introducing automated vehicles at Yellowstone National Park in Wyoming and Wright Brothers National Memorial in North Carolina. As a history major, I knew little about this topic, but the writing, research, and cartography skills I had honed during college were useful to the team as we prepared for deployment.

I found myself between the contrasting worlds of national parks and automated transportation, often acting as the intermediary between public and private sectors, wilderness and connectedness, and tradition and innovation. I learned to build trust between parties; recognize vital information in a haystack of competing needs; and communicate clearly, even when the outcomes were negative.

In January 2022 at the TRB Annual Meeting, I was honored to address a crowded room as a panelist on rural automation, sharing details of the automated vehicle shuttle bus pilots. The Public Lands Transportation Fellows Program has given me the skills and confidence over the past two years to face new challenges and grow my resume. I look forward to continuing to support the National Park Service as an Advanced Fellow.

Tommy Egland

U.S. FISH AND WILDLIFE SERVICE FELLOW

As a fellow, I've gained valuable experience and tangibly improved access to wildlife refuges across the Southeast United States. I split my time between the Savannah Coastal Refuges Complex in Hardeeville, South Carolina, and the Fish and Wildlife Service's Southeast regional office in Savannah, Georgia. This has given me insight on what is needed to succeed at the station level while supporting refuges through the transportation program at a regional level.

At the Savannah complex, my work focused on improving the refuges' transportation infrastructure. I served as field inspector for the rehabilitation and construction of a bulkhead and two shoreline wingwalls protecting the boat dock from erosion at Wassaw National Wildlife Refuge. They had been heavily damaged by Hurricanes Matthew and Irma. As a result of the repair, the overall structure is expected to remain functional for at least another 10 years, preventing repairs that could have exceeded \$2 million if left untouched. Instead, that money can now be put toward deferred maintenance or proactive projects.

I temporarily served as one of eight regional transportation coordinators across the country. As the Southeast coordinator, I was responsible for the stewardship of several federal funding programs that require intergovernmental coordination between FHWA and refuge staff. While I gained a ton of experience, my biggest takeaway is the importance of customer service. More than anything, the regional transportation coordinator position provides support with specific knowledge on a relatively obscure funding area. It is important for a coordinator to clearly and succinctly share information that advances the Fish and Wildlife Service's mission while improving conditions of public access to more than 130 refuges across the Southeast. My coordinator work led to a permanent job as a transportation analyst at the Southeast regional headquarters.



Russ Webb, Savannah National Wildlife Refuge

Cabbage palms frame the Savannah Coastal Refuges Complex headquarters in Hardeeville, South Carolina, where U.S. Fish and Wildlife Service fellow Tommy Egland contributed to a variety of projects for the complex's seven refuges.

Ella Weber

U.S. FISH AND WILDLIFE SERVICE FELLOW

As a fellow with Parker River National Wildlife Refuge and the Northeast regional office in Massachusetts, I led projects related to transportation and community connections. This included evaluating and implementing visitor access programs and coordinating the implementation of novel transportation interventions. During my tenure, I increased visitor access and accessibility through improved bike, paddling, pedestrian, wheelchair, shuttle, and riverboat programming and infrastructure. I engaged community groups, local businesses, and municipal officials to enhance connectivity to urban communities and developed new partnerships and programs, including the completion of a 230-mile trail terminus with the Appalachian Mountain Club. To promote active outdoor recreation and connect with families, I implemented two Open Streets car-free events.

Working as a fellow provided experience well beyond conventional transportation planning. This included developing public programs; collaborating with refuge biology, maintenance,

and management teams; conducting community outreach; gaining supervisory experience; and partnering with allied organizations for ongoing research, programming, and grant development. I learned that public service requires a positive attitude, enthusiasm, and the ability to remain open to new ideas. I gained the experience and knowledge required to successfully obtain a permanent federal position as a visitor services manager for the Parker River refuge.

Taylor Long

U.S. FISH AND WILDLIFE SERVICE FELLOW

I worked with three national wildlife refuges in the greater Philadelphia area to support refuge access. Since I was primarily based at refuges that are urban in character, my work focused on collaborating with local agencies on alternative transportation projects to improve access to the refuges and identifying opportunities to connect with adjacent parks, public lands, and trail networks. I quickly learned that community outreach and coalition building is a crucial part of moving projects forward and ensuring that they equally benefit all stakeholders. I also provided technical



Ella Weber and Taylor Long

A small pollinator garden in Philadelphia, Pennsylvania, is a colorful—and familiar—backdrop for U.S. Fish and Wildlife Service fellows Ella Weber (*left*) and Taylor Long. Their urban-focused work included partnering with parks departments and local agencies on community outreach events, such as installing just such garden oases.

assistance to refuges across the Fish and Wildlife Service’s Northeast Region and—at a national level—as part of the agency headquarter’s transportation branch. These efforts focused on visitor estimation, implementation of emerging

transportation trends such as rideshare and electric vehicle charging stations, and funding acquisition.

The Public Lands Transportation Fellows Program is a truly unique opportunity for early career planners and

transportation professionals to gain a wide array of experiences. It connected me with leaders in the transportation and public lands management fields and exposed me to a wide range of projects. Fellows receive a unique combination of autonomy and support, which leaves room for exploration and the pursuit of interests while guided by external and internal mentors. By working collaboratively with local agencies and across levels of Fish and Wildlife Service management, I was able to network organically, identify mentors, and access future career opportunities. The exposure to a broad range of experiences and management styles helped me to better understand and articulate what I am looking for from my career as a planning and transportation professional and enabled me to secure a position as a community planner at the U.S. Department of Transportation’s Volpe Center.

To learn more about the program and individual projects, visit <https://westerntransportationinstitute.org/professional-development/public-lands-transportation-fellows/>.

“The Public Lands Transportation Fellows Program has allowed me to build an extensive professional network and created opportunities to explore some of the nation’s most iconic landscapes.”

—Pat McMahon

Transportation Connections 2040

Preserving Transportation Within America's Great Outdoors



Bob Wick, Bureau of Land Management

REUBEN VIDAURRAZAGA,
ROSEMARIE SPANO,
DAVID JEPPESEN, AND
KATIE LAMOUREUX

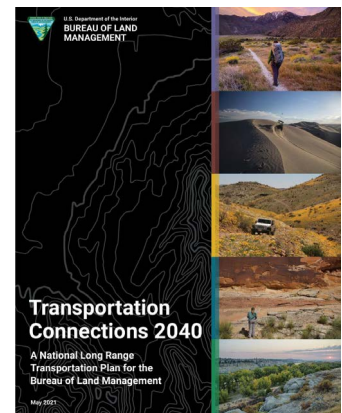
Vidaurrazaga and Spano are Denver, Colorado-based transportation program managers, and Jeppesen is a Salt Lake City, Utah-based accessibility coordinator and travel and transportation management program lead at the Bureau of Land Management in Washington, DC. Lamoureux is a community planner at the U.S. Department of Transportation's Volpe National Transportation Systems Center in Cambridge, Massachusetts.

Storm clouds gather above a rider on the Pony Express National Historic Trail in Wyoming. Mail carriers on horseback once provided the nation's fastest east-west communication system. Today's trail visitors can saddle up or drive, bike, or hike to sites along the storied route that traverses five western states and is among more than 90,000 miles of BLM-managed transportation infrastructure.

Backcountry campers and white-water rafters have something in common with cattle ranchers, gold prospectors, and even history buffs: All pursue these and myriad other activities on the vast tracts of publicly owned wilderness, rangeland, mineral deposits, and forests administered by the U.S. Department of the Interior's Bureau of Land Management (BLM). With more than 90,000 miles of BLM-managed roads, primitive roads, trails, bridges, and culverts stretching from Alaska's North Slope to the Florida Keys, the transportation system is essential to fulfilling BLM's congressionally established, multiple-use mission of sustaining the health, diversity, and productivity of public lands for the use and enjoyment of present and future generations. BLM supports economic generation, livestock grazing, energy development (including renewable energy), timber harvesting, recreation access, conservation, disaster response and evacuation, and tribal and rural community connections. Moreover, BLM is well

connected to the transportation networks of its partners, including facilities owned and maintained by other federal land management agencies, state departments of transportation (DOTs), county and tribal governments, and private landowners.

BLM saw a need to develop a long-term vision for managing its transportation program. *Transportation Connections 2040*,

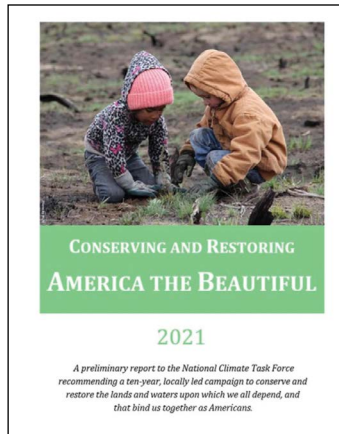


To review *Transportation Connections 2040*, see https://www.blm.gov/sites/default/files/docs/2021-10/IB2021-040_att1.pdf.

BLM's first national long-range transportation plan, was published in 2021. Designed as a practical tool to convey BLM's strategic goals and vision for travel and transportation planning, as well as transportation asset management, the plan is intended to advance the Biden Administration's national conservation and restoration priorities established in the 2021 multiagency report, *Conserving and Restoring America the Beautiful*. It underscores BLM's aim to work in partnership to manage the multimodal transportation system that supports the equitable access, connectivity, and safety needs of multiple users across public lands while protecting natural, cultural, and historic resources.

Collaborative, Interdisciplinary Planning Process

The national long-range transportation plan is the culmination of BLM's three-year effort to create a common vision for managing the agency's transportation network, increase understanding of its transportation program, and support future collaborations. BLM's Division of Business, Engineering, and Evaluations and Division of Recreation and Visitor Services developed the plan, with facilitation and technical support from the U.S. Department of Transportation (U.S. DOT) Volpe National Transportation Systems Center. Between 2018 and 2019, an interdisciplinary team drawn from various program areas and representing BLM headquarters, state, district, and field offices created the plan's content. FHWA's Office of Federal Lands Highway participated in the development and review process. BLM also reached out to transportation officials from Western states and local jurisdictions, including those attending the 2019 Western AASHTO Annual Meeting. These officials—and those overseeing large state, county, municipal, and tribal transportation networks—provide critical connectivity and access for the public to enjoy BLM-managed public lands. Along with establishing vital relationships with stakeholders, BLM's transportation program benefits a wide range of the bureau's initiatives.



Learn more about this multiagency report at <https://www.doi.gov/sites/doi.gov/files/report-conserving-and-restoring-america-the-beautiful-2021.pdf>.

A Wide Audience

BLM developed this plan to benefit multiple and diverse audiences, including BLM staff, BLM and Interior Department leadership, and BLM's partners such as other federal land management agencies, U.S. DOT, state DOTs, counties, tribes, stakeholders, and the traveling public. Staff at BLM headquarters, as well as at state, district, and field office levels, can use this plan to guide their transportation decision making. BLM's partners can identify opportunities to collaborate with them on projects of mutual benefit, while the public can gain a better understanding of BLM's transportation program and how the planning process supports the agency's mission and improves access to BLM-managed public lands and resources.

Performance-Based Planning Framework

Transportation Connections 2040 identifies actions to help BLM reach the following transportation goal areas that the agency developed as part of the planning process:

1. **Access, Connectivity, and Experience:** Manage BLM's transportation system to provide seamless public access to support BLM's multiple-use mission.

2. **Transportation Asset Management:** Strategically invest funding to sustainably maintain BLM transportation assets.
3. **Collaborative Partnerships:** Develop and maintain collaborative partnerships for a transportation system that connects communities to public lands.
4. **Natural, Cultural, and Historical Resources:** Manage BLM's transportation system to protect resources while providing appropriate access.
5. **Safety:** Provide safe and appropriate multimodal transportation access for all users of BLM-managed lands.

A performance-based framework for implementation and monitoring helps ensure accountability and links the long-term plan—which includes objectives, strategies, and performance measures for each goal area—to future investment decisions. For each strategy, the plan identifies the current status—existing, expanded, or new—of activities, responsible BLM division, and time horizon for implementation. The monitoring process identifies existing data sources and the responsible divisions for each performance measure.

Since publishing *Transportation Connections 2040*, BLM has developed a performance management plan that identifies baseline data, trends, and targets for the long-term plan's performance measures and establishes procedures for ongoing monitoring. Tracking performance will help BLM evaluate how well the agency is meeting its transportation goals and pinpoint opportunities to adjust management practices aimed at improving transportation conditions. BLM intends to use the plan's performance-based framework to inform investment decisions during the next two decades and beyond.

The Importance of Partnerships

The plan includes collaborative partnerships as one of its five fundamental



Jesse Pluim, Bureau of Land Management

A four-wheel-drive vehicle crests a rutted sand dune at Samoa Dunes Recreation Area near Eureka, California. The 300-acre park, which attracts surfers, beachcombers, and birdwatchers, is among dozens of rugged Bureau of Land Management sites that welcome all-terrain motorists.

goals. This and associated objectives, strategies, and performance measures are intended to

- Foster a shared understanding of BLM and partner transportation planning and programming processes,
- Build capacity for transportation improvements through leveraging shared resources, and
- Increase connections and the value of BLM-managed lands to communities through better understanding of shared needs.

Congress established BLM's multiple-use mission with a mandate to manage public lands for recreational and commercial uses while ensuring that natural, cultural, and historic resources are conserved for present and future use. That would be impossible without a transportation system that can effectively and sustainably move people and products to and

through BLM-managed lands. Existing routes on these lands are often a complex network of legacy routes that originated for purposes that may differ from those today and require evaluation to determine if they no longer meet the safety, access, or other needs of current users. Many of these routes are owned and maintained by BLM. Others are within the purview of state, municipal, and tribal agencies, or private entities. As such, BLM depends on partnerships to plan and implement transportation improvements and leverage limited available funding.

Transportation Connections 2040 was developed by BLM as a springboard for collaboration among BLM and its partners and established BLM's national transportation goals, objectives, strategies, and performance measures to respond to the agency's challenges, needs, and opportunities. Many of the actions proposed in this plan are mutually beneficial. For

example, each of BLM's five goals are aligned with U.S. DOT's national goals for the Federal-Aid Highway Program. Therefore, many of the BLM plan's strategies are intended to mesh with the same goals that DOTs, metropolitan planning organizations, and others are working to achieve through their own planning efforts.

Additionally, many of the BLM plan's performance measures and strategies help foster progress toward state DOT and metropolitan planning organization targets for federally required performance measures for safety and asset condition. A common theme is the need to increase the quality of data to better understand the safety and condition of the transportation system. Once these data sets are established and refined, BLM will be in an even better position to support state DOTs, metropolitan planning organizations, and other partners in achieving

shared goals for the larger transportation network.

BLM's national long-range transportation plan is about forging connections to BLM-managed public lands for the wide range of travelers who work on, enjoy, or journey through them. The agency's transportation system includes particularly important connectors for many tribal and rural communities throughout the United States. In the BLM Information Bulletin announcing the publication of *Transportation Connections 2040*, Nada Wolff Culver, deputy director for policy and programs, underscored the hope that

transportation planners everywhere will find the information "beneficial to your programs and valuable when advancing stakeholder engagement."¹ Ultimately, this plan aspires to build and strengthen the fundamental internal and external connections on which BLM's transportation program relies—particularly with the many local, state, and national partners that enable the agency to achieve more than it can on its own.

¹ Read Nada Wolff Culver's announcement at <https://www.blm.gov/policy/ib-2021040>.

Looking Forward

Though developed with a planning horizon of 20 years, *Transportation Connections 2040* was designed as a living document. Using the plan's performance management framework, BLM will monitor progress and update transportation management strategies as conditions change. The agency can update the plan or its implementation actions to address future needs, take advantage of new opportunities, and continue to preserve access to America's great outdoors for future generations to enjoy.

Factoid

NATIONAL PARKS

Trail Ridge Road in Rocky Mountain National Park connects Grand Lake and Estes Park. However, its claim to fame is that it is the highest continuously paved road in the United States, offering stunning views along its 48 miles.

—Source: Outdoor Project

Peaks and Valleys

Forecasting Recreational Travel Demand

David Fulmer, Flickr, CC-BY-2.0

**MARK BRADLEY, GREG SPITZ,
AARON LEE, BEN SWANSON,
AND THEODORE MANSFIELD**

Bradley is a principal at RSG, Inc., in Santa Barbara, California. Spitz is a community planner and systems analyst at FTA in Washington, DC. Lee and Swanson are senior consultants at RSG, Inc., in White River Junction, Vermont, and Mansfield is a senior consultant at RSG, Inc., in Washington, DC.

On one last ride for the season after fall's first dusting of snow, motorcyclists rumble through Tuolumne Meadows at California's Yosemite National Park. Closed during the winter, this popular park's peak traffic can cause long lines at entrances and crowded parking lots. Travel-demand forecasting tools seek to alleviate both inconveniences.

At any given time, day-trippers, vacationers, and outdoor adventurers from all over the country head off to enjoy the spacious skies, majestic mountains, and shining seas of America's public lands. Recreational travel is a major and growing activity in the United States, fueling significant economic contributions regionally and nationally. The 2017 National Household Travel Survey indicates that about 7 percent of all trips were for social or recreational purposes such as visits to parks, movies, bars, and museums (1). Recreational trips to parklands—a term used to distinguish destination parks (managed by federal or state agencies) from local parks—tend to have different characteristics than other types of social or recreational trips. They also have different impacts on transportation infrastructure. A surge in visitors, for example, has compelled some popular national parks to institute timed admission or even close their gates early to alleviate traffic, overcrowding of facilities, and damage to vulnerable trailside vegetation.

Despite the significance of recreational travel to parklands and its impact on the transportation system in many regions, regional and statewide models do not explicitly represent the factors that determine demand for such specific types of travel. National Cooperative Highway Research Program (NCHRP) Project 08-132, "Accessing America's Great Outdoors: Forecasting Recreational Travel Demand" is designed to increase understanding of the elements that shape the spatial and temporal characteristics of travel to parkland sites and to apply that understanding in a way that is useful for regional and state planners. As the first national-scale project on this subject, it also provides a foundation for future research efforts.

The NCHRP project panel selected RSG, an organization specializing in travel-demand research and analytics, to conduct research to build a series of models and open-source tools to predict recreational travel to America's great outdoors. The demand models and tools



Mark Bradley

Outcroppings and rugged, snow-swept peaks have made the Alabama Hills National Scenic Area near Lone Pine, California, a popular film location for old Westerns and modern blockbusters. To preserve the fragile high-desert environment, the Bureau of Land Management urges today's explorers to use campgrounds, pack out all trash, and stay on trails so delicate nearby brush remains untrampled.

highlighted in this article will enable state and regional agencies and public land managers to predict visitor demand and vehicle travel to their recreational sites under a variety of scenarios. The models use passively collected big data on mobility from many different location-aware applications on smartphones and other devices in conjunction with data on recreational-site attributes, U.S. Census Bureau data, and data on climate and topography to replicate visitation patterns to various federal and state parklands nationwide. These models will work for major recreational sites located in natural settings across the country that attract significant numbers of local and out-of-town visitors. Local parks in urban areas, where recreational visits already are largely accounted for in regional models, are excluded from this study.

Since the majority of currently collected recreational travel data and modeling efforts are site- and time-specific, it was never intended to be generalized across various locations or used in forecasting future demand. By contrast, the models being developed by NCHRP Project 08-132 will be generalized to cover a much larger scale.

This study proved challenging for several reasons. It is the first attempt at creating predictive models of parkland visits that can be used by state and regional agencies in the United States. Moreover, the modeling uses passive big data as its primary source, supplemented with census data on socioeconomics, land-use data, road and air network data, and climate and topology data that can add explanatory power to the models. Finally, the models must be incorporated into software tools and supporting data inputs that are readily available and usable by a wide variety of agencies—including state departments of transportation, regional metropolitan planning organizations, and parkland management agencies.

Modeling Approach

The theoretical framework is the same one used by most regional and statewide travel-demand forecasting models and draws on econometric discrete-choice and logistic regression models. The overall approach is to model parklands as special generators, which are often used in regional and state model systems to predict demand to major, unique

destinations or attractions such as airports, large shopping malls, or major event venues. Whereas most types of trips are modeled as originating at the home location and then distributed across destinations and times of day and week, special-generator trips flip that orientation: They are generated at the destination and then distributed across home locations, times, and dates of the visits they attract.

The following models are based mainly on data from a passive location-based services database that contains trace data for roughly 10 percent of all trips made in the United States in 2019. That year's data were used to avoid the recreational travel market's volatility that occurred in 2020 and 2021 because of the COVID-19 pandemic. Park boundaries were geocoded for more than 100 preselected park destinations nationwide, including several in Alaska and Hawai'i. The sites comprised 89 national parks, monuments, recreation areas, and other federal sites; 47 California state parks; and 29 Pennsylvania state parks. Parks with major highways running through or adjacent to their boundaries were excluded, since it can be difficult using passive data

to distinguish recreational park visits from traffic bound elsewhere. California and Pennsylvania were selected for state park sites because both states have comprehensive and accessible online databases of park amenities that are largely compatible with those available from the National Park Service.

For a given destination, data records were generated for mobile devices that crossed the corresponding park boundaries. For modeling purposes, a single visit could entail multiple instances of entering and leaving a given park between the time the traveler left and returned home, provided those trips remained within 50 miles of the park boundary. This definition was chosen because many visitors use lodging outside of the park boundaries and enter more than once during their stay. More than three million visits were recorded across the selected destinations and subsequently used in the analysis.

The study follows the model structure shown in Figure 1. The overall structure and various components were based on a comprehensive review of the existing literature and data carried out during the first phase of the project.

Outward Bound

The Visitor Home Location model—the first simulation developed—predicts where U.S.-based visitors come from for a given park destination. While the data are coded to the census tract level, this study aggregated tracts into a system of roughly 4,500 zones representing the intersection of all counties and public use microdata areas in the United States.¹ Factors used to explain where visitors arrive from include the following:

- Distance from the park, as a nonlinear function;
- The distribution of sociodemographic characteristics among residents of each zone along such dimensions as income, age group, household composition, and race or ethnicity;
- Land-use characteristics of the zone, including population density, prevalence of various types of employment, and fraction of the land that is protected open space; and

¹ This is the same zone system used in the FHWA National Long-Distance Passenger model at <https://www.fhwa.dot.gov/policyinformation/analysisframework/02.cfm>.

- Climate and topographical characteristics of the zone, including elevation, average temperature and precipitation by season, and presence of ocean coastline.

Modes of Travel

For any visits that start 100 miles or more from the park, the Access Mode and Airport model predicts whether the traveler flies part way or drives the entire distance between home and destination. The model also predicts which airport is used, providing further clarity in forecasting road trips into the park.

The model uses a nested logit specification, with the feasible set of airports for the destination grouped under the broad air-mode category. Nested logit models treat some choice alternatives as closer substitutes than others. In this example, a traveler is more likely to switch between using different airports than to switch between traveling by air and driving the entire distance. The model's main variables are functions of the distance to travel all the way by road, the distance from each airport to the destination, and the number of passenger trips originating from each airport during 2019 (2). With passive mobility data, it is not possible to distinguish between types of vehicles—private car or truck/recreational vehicle, rental car, motorcycle, tour bus, and so on. The model system also does not attempt to predict which modes people use within the parks, such as car, truck, motorcycle, bicycle, tour bus, shuttle bus, or walking, since that also is not clear from the passive data. Moreover, the available non-auto modes can vary greatly from one parkland destination to the next. Generally, a very high percentage of trips are by private or rental vehicle except in parks such as Zion National Park, Utah, that require the use of a shuttle to reduce traffic and protect the environment.

Although the passive data do not include international travelers, the Access Mode and Airport model can use the travel choices predicted for travelers between Hawai'i and the continental United States as a proxy for the travel choices made by visitors who arrive

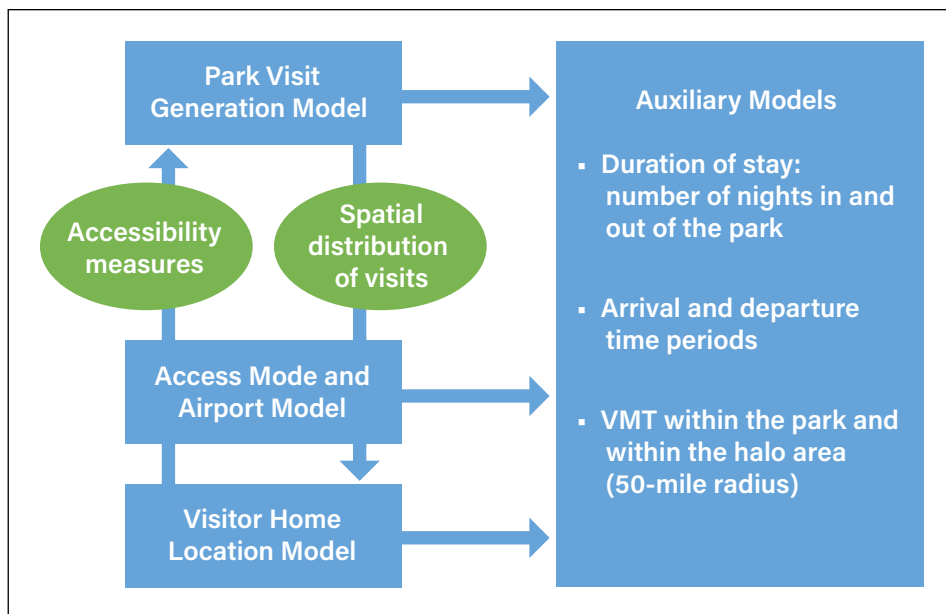


FIGURE 1 Model system structure for a given parkland destination within a specific season of the year. (VMT = vehicle miles traveled.)



Veronica Verdin, National Park Service

Sitting in the shade after a steep hike, visitors to Arches National Park near Moab, Utah, admire the iconic Delicate Arch and snowy La Sal mountains beyond. This popular park welcomes more than 1.5 million people annually and instituted a timed entry system to ease traffic and overcrowding, improve safety, and protect landmarks.

from abroad by air and then drive to the recreation destination. The National Park Service carries out visitor surveys that provide an estimate of the fraction of international visitors to specific parks (3).

As Figure 1 indicates, the Visitor Home Location model and Access Mode and Airport model are used to predict not only the spatial distribution of where visits to a given parkland originate, along with some transfers from nearby airports, but also to calculate accessibility measures for that destination's Park Visit Generation model. The word "accessibility" in travel modeling terms means that the larger the population living in zones that are likely to generate large numbers of visitors to a park, the closer those zones are to the park. Likewise, the more airports that are within reasonable driving

distance of the park, the more recreational visits the park is likely to attract.

The Park Visit Generation model is based on the number of visitors to each parkland destination per quarter during 2019, as reported by the National Park Service (4). It uses accessibility measures derived from the two previously described simulations, both of which show positive effects on visitation.

Other important variables in the Park Visit Generation model account for climate and topographical differences between park and home zones along the following four indices:

- Winter Sport Index: colder average temperatures and elevation;
- Mountain Hiking Index: warmer average temperatures and elevation;

- Coastal Recreation Index: warmer average temperatures and presence of coastline; and
- Too Hot Index: maximum temperatures high enough to discourage visitors during some seasons, such as summer in Death Valley.

Various specifications were tested for these indices and showed significant effects in the expected direction in this and the other models. Potential variables such as the number of camping sites, parking spots, and visitor centers are more likely to correlate with—rather than drive—travel demand. That is, such amenities often are provided to satisfy existing visitors rather than to attract new ones.

The auxiliary models shown in Figure 1 determine additional aspects of demand

that are useful in understanding how parkland visitation affects regional traffic patterns. For example, the number of nights that visitors stay in an area is a function of factors such as the distance traveled from home, the park's size, and the season. The split between nights spent in the park versus outside the park is influenced by the relative availability of lodging within the park's boundaries and a 50-mile radius or halo area. The daily time period (i.e., morning peak, midday, evening peak, and night) and day of the week when visitors arrive and leave also are important for traffic planning and can vary depending on the duration of stay, distance traveled, and season.

Finally, the data include measures of the number of car trips and vehicle miles traveled within the park and surrounding halo area during each visit. These are modeled as a function of the number of nights stayed inside and outside of the park, as well as land use in the halo area, such as employment related to meals and accommodation. This serves as a proxy for the prevalence of nearby tourist facilities. There is a separate set of auxiliary

models for residents of the park's halo area, who—when compared with visitors from farther away—are much more likely to make day trips and come at different times and seasons.

Next Steps

At the time of this writing, the models are in the final stages of implementation and testing. They are being rolled out in Python, a computer language that federal and state agencies can access online, download, and run as a stand-alone tool or in combination with any of the major network-modeling software packages. A forthcoming NCHRP research report and a model users' guidebook will describe the models and how they can be used, along with conclusions about the use of passive big data for modeling travel to parklands. In general, passive mobility data are valuable in providing the origin–destination distributions of trips to parkland destinations—information unavailable from other sources. Passive data also provide insights on the temporal distribution of those trips and the vehicle miles traveled by visitors. For modeling the absolute

number of visitors to each destination, however, National Park Service visitor-use statistics were used instead. These headcounts, tallied by month and type of stay (i.e., day use, tent camping, recreational vehicle camping, indoor lodging, and so on) and published for each park, help refine travel-demand predictions, thereby providing park staff and transportation planners with a surer sense of when to expect a surge in visitors—and how to accommodate them.

REFERENCES

1. FHWA. 2017 National Household Travel Survey Public Use Codebook Version 1.2. Washington, DC. https://nhts.ornl.gov/assets/codebook_v1.2.pdf.
2. Bureau of Transportation Statistics. Airline Origin and Destination Survey (DB1B), DB1B Market Database. U.S. Department of Transportation, Washington, DC, 2019.
3. U.S. National Park Service. Socioeconomic Monitoring Visitor Surveys. Washington, DC, 2022. <https://www.nps.gov/subjects/socialscience/socioeconomic-monitoring-visitor-surveys.htm>.
4. U.S. National Park Service. Visitor Use Statistics Database. Washington, DC, 2019. <https://irma.nps.gov/Stats/>.

Factoid

NATIONAL PARKS

The National Park Service system offers 879 visitor centers and more than 18,000 miles of trails to explore.

—Source: Outdoor Project

INDIRECT TENSION ASPHALT CRACKING TEST

Ensuring Asphalt Mix Designs for Durable Pavements

Washington State DOT

FUJIE ZHOU AND KELLY WEST

Zhou is a senior research engineer and West is senior communications specialist at Texas A&M Transportation Institute in College Station.

Drivers endured a bumpy ride along a stretch of Padden Parkway in Washington State's Clark County, coming up to its 2017 repair. Before then, the asphalt roadway had been prematurely affected by fatigue cracking and rutting. Researchers have now developed an economic and reliable cracking test that helps state departments of transportation determine how well pavement will hold up under the ravages of time—and heavy traffic.

Over the past five years, researchers at the Texas A&M Transportation Institute developed and implemented a simple and practical indirect tension asphalt cracking test (IDEAL-CT) for use during asphalt balanced mix design and quality control/quality assurance (QC/QA) testing. The test was developed for National Cooperative Highway Research Program (NCHRP) Project 20-30/Innovations Deserving Exploratory Analysis (IDEA) 195, "Development of an IDEAL Cracking Test for Asphalt Mix Design, Quality Control and Quality Assurance"¹ and demonstrated to several state departments of transportation (DOTs) through NCHRP Project 20-44(16), "Implementation of the IDEAL Cracking Test for Asphalt Mix

¹ Review the full report at <https://onlinepubs.trb.org/onlinepubs/IDEA/FinalReports/Highway/NCHRP195.pdf>.

Design QC/QA."² The test is now an ASTM standard test method—D8225-19: *Standard Test Method for Determination of Cracking Tolerance Index of Asphalt Mixture Using the Indirect Tensile Cracking Test at Intermediate Temperature*.

Problem

State DOTs have long faced the problem of premature asphalt pavement cracking (Figure 1). The current—and increasing—use of recycled materials and binder modifications can potentially make these asphalt mixes even more susceptible to this type of damage. A number of asphalt cracking tests have been developed over the years, but none offers the desired ease-of-use, reliability, efficiency, repeatability, and cost effectiveness. So, transportation agencies

² See the full report at [https://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-44\(16\)_Final_Report.pdf](https://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-44(16)_Final_Report.pdf).



FIGURE 1 Typical fatigue cracking in asphalt pavement.

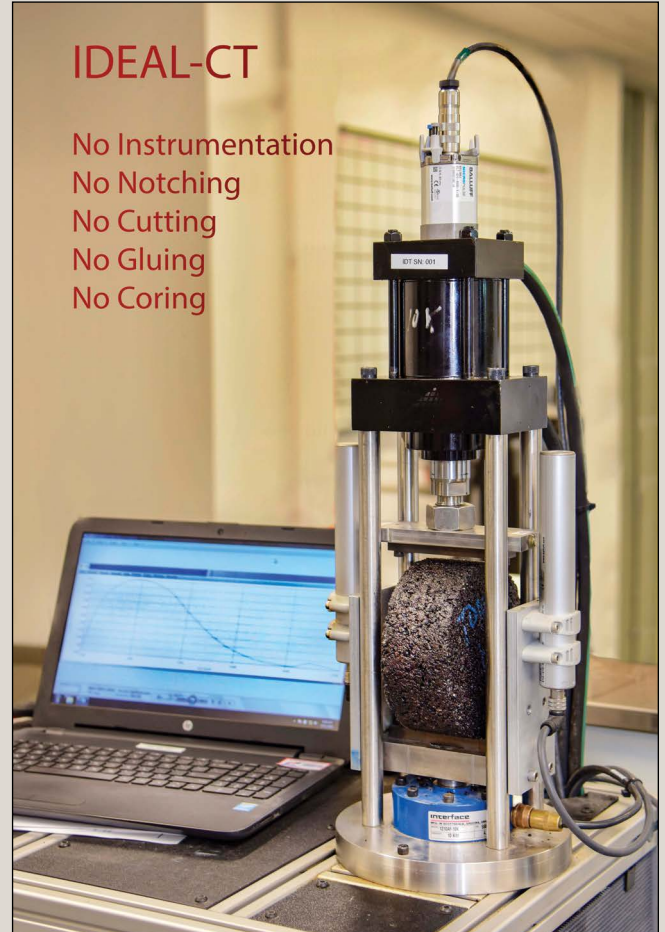


FIGURE 2 IDEAL cracking test.

have long felt a need for an economical, reliable, practical asphalt cracking test that state DOTs could routinely use in their balanced mix design process, as well as during QA testing.

Solution

The IDEAL-CT, shown in Figure 2, fills this need and has proven to be a reliable cracking test for fatigue cracking, top-down cracking, low-temperature cracking, and reflective cracking, which is caused by breaks in underlying layers from movement at the original crack. The test was validated using performance data from FHWA's Accelerated Loading Facility, Long Term Pavement Performance Special Pavement Study 10 (1), the National Center for Asphalt Technology (NCAT) test track, the Minnesota Road Research Facility, and a number of Texas test sections.

Researchers also established cracking criteria for different types of asphalt mixes and worked with several equipment manufacturers to make low-cost, stand-alone IDEAL-CT equipment or test fixtures

to allow the use of existing load frames (such as the Marshall stability load frame).

The IDEAL-CT is, essentially, an indirect tensile strength test and is run at intermediate temperature using cylindrical specimens at 50 millimeters per minute loading rate. The intermediate temperature depends on the asphalt binder used; most state DOTs are currently using 25°C (77°F). Lab-molded cylindrical specimens are tested directly without the need for being instrumented, glued, cut, notched, cored, or using any other preparation. The procedure for sample preparation and testing is detailed in the ASTM Standard Test D8225-19.

The software provided with the IDEAL-CT system continuously records the load and vertical deformation and then automatically calculates the parameter: the cracking tolerance index. The larger the cracking tolerance index value, the better the cracking resistance.

Application

According to an NCAT survey conducted in 2020, at least 14 state DOTs were using the IDEAL-CT as the cracking test in their balanced mix design work to improve mix quality and durability at that time (2). The 14 states noted in the NCAT survey were Alabama, Arizona, Arkansas, Georgia, Idaho, Kentucky, Maryland, Missouri, Oklahoma, Tennessee, Utah, Virginia, West Virginia, and Wisconsin. Researchers worked with the states of Kentucky, Maine, Minnesota, Oklahoma, Texas, and Virginia to implement the IDEAL-CT for balanced mix design and QC/QA testing through NCHRP Project 20-44(16). The implementation activities included a demonstration workshop, webinars, training videos, and flyers for technicians,

engineers, and managers. Texas DOT intends to use the test for ensuring high-quality mix production at asphalt plants. Virginia DOT has been using it for its balanced mix design implementation initiative, with pilot balanced mix design sections placed in Virginia over the past three years.

Benefits

Commonly used traditional asphalt cracking tests in the United States—such as the flexural beam fatigue test, semicircular bend test, and overlay test—require significant specimen preparation before testing, such as cutting, notching, or gluing. The IDEAL-CT offers users the following benefits:

- **Simplicity**—Needs no specimen cutting, gluing, coring, or notching;
- **Practicality**—Requires minimum training for routine operation;
- **Efficiency**—Completed test within one minute;
- **Affordability**—Uses existing or low-cost equipment;

- **Repeatability**—Coefficient of variation less than 20 percent; and
- **Sensitivity**—Sensitive to mix compositions (e.g., recycled materials, aggregates, binder, and aging).

IDEAL-CT requires fewer sample preparation steps, which helps minimize the potential for human error. The test simply requires molding the specimen to a commonly used size disc—with no cutting, notching, or gluing. The specimen is tested in a standard, indirect tensile-strength testing machine, which most contractors and state DOTs already own and know how to use. Even if a new test machine needs to be purchased, the cost is generally less than \$10,000—at least seven times cheaper than the flexural beam fatigue test, making the equipment cost-economical over the long term. For data analyses, the calculation of the cracking tolerance index requires the whole load versus displacement curve, rather than just the maximum load. Those load-displacement curve readings can be recorded manually, or laboratories can

automate them with an accessory for less than \$3,500.

In addition to its simplicity and practicality, the IDEAL-CT is much more efficient and rapid than its predecessors, with a loading rate of 50 millimeters per minute and a testing time of one minute or less, compared with days for the flexural beam fatigue test. The simplicity, practicality, and rapidity of the IDEAL-CT make it highly desirable for cracking testing during asphalt plant mix production to ensure high quality of the produced mix.

REFERENCES

1. FHWA. Specific Pavement Study Experiments. <https://highways.dot.gov/research/ltp/datal-collection/specific-pavement-studies>. Accessed March 27, 2023.
2. West, R. A Roadmap to Implementation of Performance Tests in Asphalt Specifications. Presented at 1st FHWA Technical Feedback Group, 2020.

View a three-minute video about the IDEAL-CT at <https://www.youtube.com/watch?v=6D327J5IXMo>.

Factoid

TRANSPORTATION

Based on data gathered from FHWA and other government agencies, New Hampshire ranks first as having the best roads in the United States, followed by Minnesota and Vermont.

—Source: Consumer Affairs

TRANSPORTATION

INFLUENCER



Arif Sadri

Arif Sadri is an assistant professor in the School of Civil Engineering and Environmental Science at the University of Oklahoma in Norman. He serves as chair of TRB's Committee Communications Coordinators (CCC) Council of the Transportation Sustainability and Resilience Group. He is also the communications coordinator for the Standing Committee on Critical

Transportation Infrastructure Protection and the Standing Committee on Disaster Response, Emergency Evacuations, and Business Continuity.

What is your role as chair of the Committee Communications Coordinators Council for the Transportation Sustainability and Resilience Group?

My role as chair is to provide a platform for appointed communications coordinators to help foster cross-committee communication and collaboration within the group. The group consists of three sections (Transportation and Society, Transportation Systems Resilience, and Transportation and Sustainability) and 18 committees. In my role, I support our group chair, Jane Lin, and TRB Senior Program Officer Christine Gerencher by overcoming emerging challenges to meet communication needs at the group level. I also try to create a synergy between our group-level communication activities and those of the main TRB CCC Council.

What is helping you to be successful in this role?

It is always the team effort that I enjoy the most. I find it highly satisfying when I see myself being part of a team where all the members play complementary roles. Our

group consists of like-minded volunteers with a strong track record of leadership excellence, within and outside of TRB. I am deeply inspired by their dedication, time, and efforts in making TRB a great professional community, which I believe makes me accountable to reflect on my responsibilities as a TRB volunteer in a timely manner.

How has TRB influenced your career?

This past January, I attended my 12th consecutive TRB Annual Meeting—all in person except for the one held virtually because of the pandemic. However, the 2023 meeting was my last as a young professional. Over the years, TRB has allowed me to closely observe the dedicated leadership roles and success stories of several transportation researchers and practitioners. TRB also has provided a valuable platform to share my research with a broader audience in a meaningful way. While annual meetings are great for making new connections and nurturing existing ones, I have found TRB to be a year-round resource for conducting community-engaged research. Altogether, I sincerely believe that TRB has helped a lot in shaping my career trajectories.

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

My advice to next-generation transportation professionals would be to take on leadership roles that are aligned with their long-term career goals while serving a professional community for the greater good. If we enjoy what we do, we can get the most out of the work.

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

Roxanne Bash

Transportation Planning Team Lead, FHWA, Vancouver, Washington

PROFILES

Roxanne Bash encourages her younger colleagues—as they support the federal land management agencies—to ask themselves from a land manager’s perspective, “What do I need to know to make the best decision—with the limited resources available—to keep people coming to these amazing public spaces without doing harm to the places we all love?”

Next, she advises that they let that thought process guide the content of strategic plans. Bash, who earned an MBA with an emphasis in public administration and planning from the University of Alaska Southeast—Juneau, has applied her education, as well as her 20-plus years of experience as the FHWA Western Federal Lands Highway Division’s planning team lead, to successfully create the following plans:

- Long-Range Transportation Plan for the U.S. Fish and Wildlife Service in the Pacific Northwest Region, the first collaborative regional federal land management agency long-range transportation plan;
- Alaska Collaborative Regional Federal Land Management Agency Long-Range Transportation Plan, the first collaborative long-range transportation plan in partnership with the National Park Service, Bureau of Land Management, U.S. Fish and Wildlife Service, and the U.S. Forest Service in the Alaska region and with the support of the Alaska Department of Transportation and Public Facilities;
- Pacific Northwest Collaborative Long-Range Transportation Plan, a collaborative federal land management agency long-range transportation plan between Oregon and Washington State departments of transportation (DOTs) and with the support of both departments;
- The Collaborative Visitor Transportation Survey instrument that brought all federal land management agencies together to create a compendium of known



“No matter what agency we are from—whether a federal land management agency or federal, state, or local government—we are truly all in this together.”

survey questions and justifications to streamline the Office of Management and Budget survey approval process for the agencies; and

- The National Park Service’s Denali National Park and Preserve Long-Range Transportation Plan, which was the first such document, included a risk assessment that helped identify the need for—and prepare for the current major closure of—the 90-mile historic road that provides access through the park.

Applicable research that informs strategic plans is important to any planning process. The Western Federal Lands Highway Division’s supporting research has helped answer questions for federal land management agencies, as well as for tribes. “My team is currently researching effective management of growing trends,” Bash states, “such as making transportation planning applicable in tribal communities, the future of e-bikes on public lands,

planning and data-sharing partnerships between governments and public land management agencies, and best practices in rural virtual public involvement.”

For nearly a decade, from 2013 to 2022, Bash was a member of the Standing Committee on Transportation Needs of National Parks and Public Lands and is currently a friend of several Transportation Research Board standing committees, including Women and Gender in Transportation, Low-Volume Roads, Transportation Needs of National Parks, and Public Lands.

Building relationships with like-minded professionals—whether through committee participation or networking at meetings—is key to planners’ ability to keep their spirits up in the face of roadblocks while keeping the research effective and applicable to the end user. One way to accomplish this goal is to regularly attend TRB’s Annual Meeting, as Bash has done between 2014 and 2021. She suggests that her younger colleagues follow suit to build strong relationships and trust with those they support and those in their field. “This involves seeking out passionate people in the agencies they support,” she advises, “that is, the people who see the possibilities and are willing to put in the extra work to make them happen, even if they are not in the perfect position to get it done. Seek out the doers or those who know how to get the planning and research on the books and able to be performed.

“Those relationships will feed your soul when you are most frustrated with bureaucracy and renew your spirit for finding the most good you can do for the traveling public,” Bash continues. “No matter what agency we are from—whether a federal land management agency or federal, state, or local government—we are truly all in this together. Our systems are tied together. We all need to go to the grocery store, get to school or work, and escape to those beautiful places in nature. Enjoy the people you are working with and the spectacular places your work takes you.”

Robert L. Bertini

Professor and Head of the School of Civil and Construction Engineering, Oregon State University in Corvallis

Robert Bertini has always been fascinated by how things work and interested in making them work better. Experiencing multimodal travel for the first time in Europe as a teenager, he wondered how transportation modes work together. This set him on a career path where he continues to be “excited about research that cuts across modes and is collaborative and coordinated with stakeholders on the ground.”

After earning a bachelor of science cum laude in civil engineering from California Polytechnic State University in San Luis Obispo, Bertini came to believe that “improving transportation is the ultimate people-serving profession.” As a transportation engineer, he worked on roads, bridges, storm drainage, and retaining walls in the San Francisco Bay Area. He spent evenings at San Jose State University studying civil engineering with a transportation and construction emphasis, gained a master’s degree, and became a licensed professional engineer.

Inspired by engineering professionals and teachers alike, Bertini began teaching engineering economics, transportation planning, and public transportation on a part-time basis. “It was so exciting to explain a concept and see the light bulb go on in a student’s mind,” he notes. His love of educating is palpable, and he is quick to quote one of his students, reminding everyone that “we are all mentors.” Like a train switching tracks, his fascination with how things work merged with how students learn, and he found the spot in transportation engineering where he would thrive. On track to pursue a research path via academia, he received his PhD in transportation engineering from the University of California at Berkeley in 1999.

Learning from industry legends, Bertini notes, gave him “the opportunity to pursue a career as a transportation faculty member for the past 22 years.” He taught at Portland State University in Oregon from 2000 to 2014 and was founding director of the Portland State



“I tell students to step up and volunteer for *something* because you never know where it might lead.”

University Intelligent Transportation Systems Laboratory and the Oregon Transportation Research and Education Consortium. Subsequently, he taught at California Polytechnic, and then joined the University of South Florida in Tampa as professor of civil and environmental engineering, executive director of the Florida Center for Urban Transportation Research, and director of the National Institute for Congestion Reduction and the National Center for Transit Research. Since 2020, Bertini has been a professor and head of the School at Oregon State University in Corvallis. He oversees the School of Civil and Construction Engineering’s 50 faculty members, 12 staff, and more than 1,100 students studying within six undergraduate and graduate programs in civil, architectural, and construction engineering.

Along the way, President Barack Obama appointed him to the U.S.

Department of Transportation (U.S. DOT) as deputy administrator for Research and Innovative Technology Administration. In this role, he also led the Intelligent Transportation Systems Joint Program Office and chaired the U.S. DOT Innovation Council. Bertini is quick to point out that his U.S. DOT role included special responsibility for civil rights within the agency, a task he took head-on to “help strengthen the diversity, collaborative spirit, trust, and employee satisfaction of the organization.”

Perhaps some of Bertini’s success as a life-long educator is tied to his ability to remember his own days as a student, such as when he presented two papers to TRB and first attended the TRB Annual Meeting in 1993. In later years, he would bring students to the TRB Annual Meeting and watch their reactions. “The experience is always transformative,” he notes. “For first-time attendees, seeing and talking with transportation leaders in person—yes, they are real people—meeting other students, and putting our work in perspective are all things unique to the TRB experience.” On the practical side, Bertini also would warn them to bring coats and waterproof shoes to withstand January’s famously fickle weather in Washington, DC.

Near the end of the 1990s, Bertini increased his own TRB involvement by volunteering to improve the website for the Committee on Traffic Flow Theory and Characteristics. He later served as a member, committee secretary, and chair for two terms: from 2009 to 2015. “I still host the website almost 25 years later!” he laughs. “Now I tell students to step up and volunteer for *something* because you never know where it might lead.” As the current chair of the Safety and Operations Group, as well as a member of the Technical Activities Council, Bertini characterizes TRB as “a special launch pad for so many friendships, collaborations, and inspiring interactions.”



The Blue Ribbon Award for Diversity

Two Committees Win Equal Honors

At the 2023 TRB Annual Meeting, the Technical Activities Council (TAC) awarded two committees with the Blue Ribbon Award for Diversity: the Standing Committee on Freeway Operations and the Standing Committee on Rail Transit Infrastructure Design and Maintenance. This article highlights the efforts of the Rail Transit Infrastructure Design and Maintenance Committee. The Freeway Operations Committee was recognized in the March–April 2023 issue of *TR News*.

Standing Committee on Rail Transit Infrastructure Design and Maintenance

The Blue Ribbon Award for Diversity acknowledged the Rail Transit Infrastructure Design and Maintenance Committee’s successful efforts to increase the committee’s gender diversity. Historically, the Rail Group’s eight committees have struggled to attract female members, particularly on those committees that deal with railroad infrastructure. In May 2021, all 12 members of the Standing Committee on Rail Transit Infrastructure Design and Maintenance were male. Recognizing that there is “an embarrassing lack of gender diversity in the railway industry,” committee Chair Hugh Fuller led an effort to recruit women to join them. One year later, there were 16 members—nine women, six men, and one member who did not provide gender information. “Diversity doesn’t seem to happen as quickly as it should,” Fuller noted, adding that this observation reminded him of an aphorism he heard years ago while working for a Class I railroad: “It isn’t going to happen unless you make it happen.”



Risdon Photography

Committee Chair Hugh Fuller (*left*) accepts the Blue Ribbon Award for Diversity on behalf of the Standing Committee on Rail Transit Infrastructure Design and Maintenance—presented by TAC member Michael Griffith—at the 2023 TRB Annual Meeting in Washington, DC.

Fostering Gender Balance

Fuller identified women with relevant experience and a history of committee involvement by reviewing the roster of committee friends. He then contacted these women to discuss their areas of expertise and potential committee

involvement before inviting them to join. The influx of women members with diverse experience and backgrounds enabled the committee to promote several women to leadership roles, where they are excelling. Of those invited, several took on committee roles, including committee research coordinator and committee communications coordinator.

According to Fuller, “the committee should reflect the communities it serves to best advance their needs.” He further noted that a lack of diversity hampers the committee’s ability to accomplish its work and limits the flow of new ideas. Conversely, he observed, “increased diversity enhances productivity and widens perspectives.”

Increasing the diversity of the committee’s members and friends has been Fuller’s highest priority. “When I was appointed chair, I knew exactly what I wanted to do as my first goal: Improve gender balance. In hindsight, with the incredible pool of young engineers available and interested in joining us, it was very easy to accomplish.”

About the Award Program

The goal of the TAC Blue Ribbon Committees Program is to recognize exemplary best practice committee activities and the associated volunteer efforts. The Blue Ribbon Committees can serve as role models, with chairs and members sharing their experiences with others. The five Blue Ribbon Award categories are as follows:

- Research,
- Renewal,
- Implementation,
- Leadership, and
- Diversity.

The Diversity Award recognizes committees that have taken significant and noteworthy efforts to increase the diversity of committee membership and friends, especially from groups that are historically underrepresented in transportation research and practice.

Rail Transportation

Preserving the Past, Shaping the Future

SCOTT BABCOCK

The author is a senior program officer with the Transportation Research Board of the National Academies of Science, Engineering, and Medicine in Washington, DC.

The legacy of a small coal- and stone-hauling railroad is being preserved in south-central Pennsylvania, while at a nearby track, a possible sustainable solution to the high cost of establishing rail transit service is being tested.

In 1872, the East Broad Top Railroad began construction in Mount Union, Pennsylvania, as a narrow-gauge route. Gauge is the distance between the rails, and the railroad was built to a gauge of 36 inches compared with 56.5 inches—the standard gauge in the United States. Although this approach saved money on construction costs, it also precluded interchange of equipment with standard-gauge railroads and would limit East Broad Top's future growth. The railroad eventually failed and was sold in 1956 to an iron and steel salvage company. Such a sale normally results in the track and associated equipment being dismantled and sold for scrap. However, the Kovalchick family, who owned the salvage company, recognized the railroad's historical significance and left it intact.

Historic steam train rides and tours along the tracks were made available to the public from the early 1960s until 2011, when stricter safety regulation of steam tourist locomotives and deterioration of the physical plant resulted in the closure of the tourist operation. A nonprofit preservation association was formed, and with the support and assistance of some of the foremost proponents of rail preservation in the industry, the railroad has slowly but steadily been revived. Today, the association is in the process of rehabilitating the track and equipment and provides a



James St. John, Flickr, CC BY 2.0

One of the last steam locomotives of any class to be retired, No. 1670—a coal-burning steam engine built in 1916—is on display at the Railroad Museum of Pennsylvania in Strasburg. The train led a working career of little excitement. Assigned to the Baltimore, Maryland, area in the 1930s, it toiled in the railyards until October 15, 1957.

user experience that takes visitors back in time to an earlier industrial era. Unlike many tourist railroads that simply offer train rides on vintage equipment, the East Broad Top provides a return to the past that includes tours of vintage—and largely untouched—machine shops, a preserved roundhouse used for servicing and storing engines, an archive, and freight facilities at its home in Rockhill, Pennsylvania.

The train excursions are still the main draw, however. A narrow-gauge steam locomotive, which, at first glance, appears to be a small replica of its standard-gauge, larger brothers, is still a formidable machine. East Broad Top's recently restored steam locomotive was built by Baldwin Locomotive Works in Philadelphia in 1916. Riders on the leisurely nine-mile, one-hour trip can choose to ride in an enclosed coach, an open-air car, or a caboose. The sound of a steam engine whistle—combined with the smell of coal smoke and the fascinating workings of a vintage steam locomotive—offers a memorable experience.

In addition to providing a trip back in time, this small town in Pennsylvania is also home to a test bed for a new concept in passenger rail service: the Pop-Up Metro, adjacent to the East Broad Top tracks on the Rockhill Trolley Museum standard-gauge tracks.

Introduced by Rail Development Corporation of Pittsburgh, Pennsylvania, the Pop-Up Metro is a low-cost, turnkey system to jumpstart passenger rail service to municipalities, railroads, or private entities while avoiding expensive and lengthy feasibility studies, the purchase of new equipment, and new construction.

The heart of the system is the rolling stock, which consists of remanufactured cars formerly used in the London Underground. Similar equipment has found niches on secondary lines in the United Kingdom, ranging from the Isle of Wight to branch lines in Wales. These cars have been retrofitted with battery propulsion that can provide a top speed of 60 miles per hour and a range of 50 to 60 miles per charge. Fast-charging equipment can recharge the batteries in as little

as 10 minutes. Because these cars have no stairs, modular high-level platforms that are compliant with Americans with Disabilities Act requirements are provided with the system and can be installed at a fraction of the cost of new passenger rail construction. Other services might include training for operators and maintenance workers, an operating plan, assistance in obtaining public financing, and ongoing technical support.

Rail Development Corporation envisions that this concept could provide extensions to existing service, offer a low-cost opportunity to test consumer demand, or introduce new service in traditionally underserved areas. Introducing new transit service in the United States requires an expense that most communities cannot afford. However, demonstrations of potential



Pop-Up Metro

new concepts, such as Pop-Up Metro on the preserved historic steam tourist line in south-central Pennsylvania, might provide low-cost alternatives that could shape the future of rail transit service.

Sunny and sleek, the Pop-Up Metro demonstration train in Orbisonia, Pennsylvania, stands ready to show visitors—including government officials, railroad authorities, and potential public sponsors—the possibilities for using light-density freight lines in their own communities.

CRP CONTRACT AWARDS

PRACTICES FOR STATEWIDE AND MPO COORDINATION

University of South Florida received a \$55,000, 18-month contract [National Cooperative Highway Research Program (NCHRP) Synthesis Project 05/Topic 54-05] to create a synthesis report that documents current state department of transportation (DOT) practice related to coordinating planning and programming requirements with metropolitan planning organizations (MPOs) and common challenges with fulfilling regulatory requirements. Information will be gathered through literature review, a survey of state DOTs, and follow-up interviews with select agencies to develop case examples. Information gaps and suggestions for research to address those gaps will be identified.

For further information, contact *Trey Wadsworth, TRB, at 202-334-2307 or TWadsworth@nas.edu.*

TRANSIT AGENCY GOALS AND NONTRADITIONAL PERFORMANCE INDICATORS FOCUSED ON EQUITY

Texas A&M Transportation Institute

received a \$55,000, 18-month contract [Transit Cooperative Research Program (TCRP) Synthesis Project J-07/Topic SB-37] to develop a report describing the current practice of transit systems in relation to service-planning equity. This report will focus on understanding how transit

agencies set goals, targets they set, and key performance indicators used to measure the success or failures of these goals.

For further information, contact *Mariela Garcia-Colberg, TRB, at 202-334-2361 or MGarciaColberg@nas.edu.*



pi. 141592 6535, Wikimedia, CC BY-SA 3.0

A Silver Line bus glides up to passengers at the Melnea Cass Boulevard stop in Boston, Massachusetts. Research enables transit agencies like Massachusetts Bay Transit Authority to design clean, well-lit bus stops across diverse neighborhoods.

HYDRAULIC AND HYDROLOGIC ENGINEERING CONSIDERATIONS AND PRACTICES

Ohio University received a \$55,000, 18-month contract award (NCHRP Synthesis Project 20-05/Topic 54-09) to document state DOT hydraulic engineering practices for construction and temporary facilities in streams and rivers. Information will be gathered through a literature review, a survey of state DOTs, and follow-up interviews with selected agencies for the development of case examples. Information gaps and suggestions for research to address those gaps will be identified.

For further information, contact Edward Harrigan, TRB, at 540-454-2149 or EHarrigan@nas.edu.

ASSESSING THE EQUITY AND WORKFORCE MOBILITY IMPLICATIONS

Canete Medina Consulting Group received a \$249,995, 22-month contract [NCHRP Project 23-13(06)] to develop for state DOTs and their regional and local partners an objective understanding of (a) the full spectrum of e-commerce and direct-to-consumer deliveries with definitions, frameworks, and a taxonomy; and (b) an understanding of how and to what extent the rise of direct-to-consumer delivery services has created opportunities and challenges for workers and consumers. The other goal is the development of a toolkit with approaches and case studies that demonstrate how to proactively address the challenges and opportunities.

For further information, contact Trey Wadsworth TRB, at 202-334-2307 or TWadsworth@nas.edu.



Chiara Coetzee, Flickr, CC0 1.0

Refueling operations—such as performed on a Hawaiian Airlines aircraft—require airline and airport workers to be vigilant to ensure that environmental and safety regulations are followed.

TRANSIT AGENCY COORDINATION WITH ELECTRIC UTILITIES

APTA received a \$55,000, 19-month contract (TCRP Synthesis Project J-07/Topic SA-60) to document transit agencies' current practices of coordinating or partnering with electric utilities to negotiate rate structure and increase energy loads related to transit fleet electrification and other zero-emissions fleet transitions. Specifically, the synthesis report will focus on bus fleet electrification, whether for specific bus routes or the larger transit network.

For further information, contact Mariela Garcia-Colberg, TRB, at 202-334-2361 or MGarciaColberg@nas.edu.

ENVIRONMENTAL STEWARDSHIP AND COMPLIANCE TRAINING FOR AIRPORT EMPLOYEES

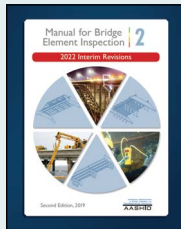
Aviation Planning Group received a \$399,265, 18-month contract [Airport Cooperative Research Program (ACRP) Project 02-101] to develop training materials, tools, guidelines, and other resources to inform airport employees about environmental laws, regulations, and sustainability programs and promote a culture of sustainability and compliance among airport staff.

For further information, contact Joseph D. Navarrete, TRB, at 202-334-1649 or JNavarrete@nas.edu.

MEMBERS ON THE MOVE

Eric Lind, former manager of research and analytics at Metro Transit in Minneapolis–Saint Paul, Minnesota, has accepted the position of director of the Accessibility Observatory at the University of Minnesota.

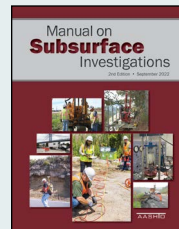
Christopher Lundgreen, chair of TRB's Committee on Stabilization of Geomaterials and Recycled Materials, has left the U.S. Forest Service to accept a position as a pavement research engineer with the Washington State Department of Transportation.



Manual for Bridge Element Inspection, 2nd Edition

AASHTO, ISBN 978-1-56051-723-8, <https://store.transportation.org/Item/CollectionDetail?ID=236>

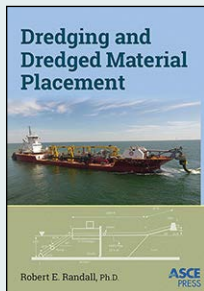
Designed for use by state departments of transportation and other agencies that perform element-level bridge inspections, this reference provides standardized element definitions, condition state definitions, element quantity calculations, element feasible actions, and inspection conventions. These 2022 interim revisions include adding visual guides, improving the accuracy of defect descriptions, and adding a new element for prestressed concrete slabs.



Manual on Subsurface Investigations, 2nd Edition

AASHTO, ISBN 978-1-56051-790-0, <https://store.transportation.org/Item/CollectionDetail?ID=235>

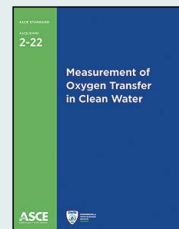
This publication describes the elements, considerations, investigation tools and techniques, and reporting requirements for geotechnical subsurface investigations for transportation facilities. This edition is updated to address advancements in geophysical, in situ, and laboratory testing; reliability-based design as codified by the AASHTO *LRFD Bridge Design Specifications, 9th Edition*; and project delivery methods.



Dredging and Dredged Material Placement

ASCE, ISBN 978-0-7844-1607-5, <https://sp360.asce.org/PersonifyEbusiness/Merchandise/Product-Details/productid/282208393>

Using descriptions, examples, definitions, and problems, author Robert E. Randall provides a comprehensive overview of the current state of dredging and dredged material placement. This thorough summary is relevant to interested students, practicing engineers, consultants, and scientists.



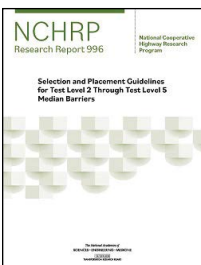
Measurement of Oxygen Transfer in Clean Water

ASCE, ISBN 978-0-7844-1564-1, <https://sp360.asce.org/PersonifyEbusiness/Merchandise/Product-Details/productid/282767165>

Providing the latest methods for measuring the rate of oxygen transfer from diffused gas and mechanical oxygenation devices to water, this standard aims to be general enough to be applied to all clean water unsteady-state tests and specific enough to incorporate all essential procedures. Revisions to the 2006 version include the use of nonlinear least squares estimates for parameter fitting and acceptance of a nitrogen gas method for deoxygenation.

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

TRB PUBLICATIONS



Selection and Placement Guidelines for Test Level 2 Through Test Level 5 Median Barriers
NCHRP Research Report 996

This report develops—in a format suitable for consideration and possible adoption by AASHTO—proposed guidelines for the

selection and placement of *Manual for Assessing Safety Hardware* Test Level 2 through Test Level 5 median barriers. 2022; 178 pp.; TRB affiliates, \$73.50; TRB nonaffiliates, \$98. Subscriber categories: highways, design, safety and human factors.

Planning Freight-Efficient Land Uses: Methodology, Strategies, and Tools
NCHRP Research Report 998

This report provides practitioners with the tools to analyze the freight efficiency

of current and future land uses, identify and select land-use and transportation initiatives, and make land-use decisions that minimize costs associated with production, transportation, and consumption of goods.

2022; 324 pp.; TRB affiliates, \$84; TRB nonaffiliates, \$112. Subscriber categories: planning and forecasting.

Design and Construction of Deck Bulb Tee Girder Bridges with UHPC Connections

NCHRP Research Report 999

An evaluation of prestressed concrete deck bulb tee girder bridges with ultrahigh-performance concrete (UHPC) connections is presented in this report. Deck bulb tee girders can span greater distances than other superstructure systems that allow for accelerated bridge construction. This gives bridge owners the ability to minimize disruption to environmentally sensitive terrains.

2022; 128 pp.; TRB affiliates, \$64.50; TRB nonaffiliates, \$86. Subscriber categories: bridges and other structures, construction, design.

Evaluation of Bonded Concrete Overlays on Asphalt Pavements
NCHRP Research Report 1007

This report describes a literature review and agency survey; documents performance through site investigations that assessed in-service design, construction, performance, preservation, and rehabilitation; and compares the results of current design methods with the actual performance of thin bonded concrete overlays on asphalt.

2022; 146 pp.; TRB affiliates, \$68.25; TRB nonaffiliates, \$91. Subscriber categories: design, materials, pavements.



Quality Control Plans for Administering Quality Assurance Specifications
NCHRP Synthesis 590

This synthesis identifies quality

control requirements used by state DOTs to meet quality assurance specifications promoted by FHWA. State DOTs can use well-developed and proactive quality control plans to reduce process variability, prevent rework, and aid in delivering projects on schedule and within budget.

2022; 164 pp.; TRB affiliates, \$68.25; TRB nonaffiliates, \$91. Subscriber categories: administration and management, construction.

Use of Safety Management Systems in Managing Highway Maintenance Worker Safety

NCHRP Synthesis 591

This synthesis documents the state of the practice of safety management systems, including system capabilities and related policies and procedures.

2022; 238 pp.; TRB affiliates, \$76.50; TRB nonaffiliates, \$102. Subscriber categories: administration and management, maintenance and preservation, safety and human factors.

Practices for Balancing Safety Investments in a Comprehensive Safety Program

NCHRP Synthesis 592

Current state DOT practices for identifying, prioritizing, and evaluating projects for funding through the federal Highway Safety Improvement Program are described in this synthesis.

2022; 202 pp.; TRB affiliates, \$75; TRB nonaffiliates, \$100. Subscriber categories: administration and management, planning and forecasting, safety and human factors.

3D Digital Models as Highway Construction Contract Documents
NCHRP Synthesis 593

The current status of state DOT practices for delivering 3-D digital models to highway contractors and the use of these models as part of the legal construction contract document are detailed in this synthesis.

2022; 86 pp.; TRB affiliates, \$57.75; TRB nonaffiliates, \$77. Subscriber categories: highways, construction, data and information technology.

Technological Capabilities of Departments of Transportation for Digital Project Management and Delivery

NCHRP Synthesis 594

This synthesis describes advanced digital construction management systems and technologies, as well as their successful use by state DOTs. These technologies include components of building information modeling, automated machine guidance, 3-D models, digital documentation, and geospatial tools.

2022; 214 pp.; TRB affiliates, \$75; TRB

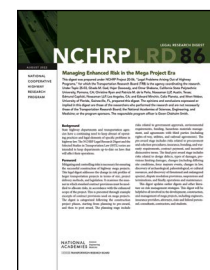
nonaffiliates, \$100. Subscriber categories: construction, data and information technology, highways.

Assessing and Mitigating the Moisture Susceptibility of Asphalt Pavements

NCHRP Synthesis 595

This synthesis describes practices used by state DOTs to prevent or minimize moisture damage in hot-mix asphalt pavements.

2022; 96 pp.; TRB affiliates, \$57.75; TRB nonaffiliates, \$77. Subscriber categories: highways, materials, pavements.



Managing Enhanced Risk in the Mega Project Era
NCHRP Legal Research Digest 86

This digest addresses the change in risk profiles of

large transportation projects and examines how to modify standard contract provisions to allocate risks in accordance with the enhanced scope of mega projects.

2022; 96 pp.; TRB affiliates, \$56.25; TRB nonaffiliates, \$75. Subscriber categories: law, construction, finance.

Encampments of Unhoused Individuals in Transportation Rights-of-Way

NCHRP Legal Research Digest 87

This digest examines the laws, statutes, cases, procedures, policies, and other resources that involve encampments of unhoused individuals within, around, under, or upon transportation rights of way, such as highway or freeway interchanges, overpasses, bridges, and tunnels.

2022; 60 pp.; TRB affiliates, \$36.75; TRB nonaffiliates, \$49. Subscriber categories: highways, law.

To order the TRB titles described in Bookshelf, visit the TRB online bookstore, <https://www.mytrb.org/MyTRB/Store>, or contact the Business Office at 202-334-3213.

MEETINGS, WEBINARS, AND WORKSHOPS

August

- 2–4 XXII Pan-American Conference on Transportation and Logistic Research**
San Francisco, California
For more information, contact Bill Anderson, TRB, 202-334-2514, WAnderson@nas.edu.
- 10–11 Bridging Transportation Researchers Conference***
Online
For more information, contact Anusha Jayasinghe, TRB, 202-334-2401, Ajayasinghe@nas.edu.
- 9–13 TRB 2023 Automated Road Transportation Symposium**
San Francisco, California
For more information, contact Bernardo Kleiner, TRB, 202-334-2964, BKleiner@nas.edu.
- 23–26 TRB Highway Capacity and Quality of Service Midyear Meeting**
Orange County, California
For more information, contact Cynthia Jones, TRB, 202-334-2964, Cjones@nas.edu.

- 23–26 TRB 13th International Conference on Low Volume Roads**
Cedar Rapids, Iowa
For more information, contact Nancy Whiting, TRB, 202-334-2956, NWhiting@nas.edu.
- 23–26 62nd Annual TRB Workshop on International Law**
Richmond, Virginia
For more information, contact Bob Shea, TRB, 202-334-3209, RShea@nas.edu.

Please contact TRB for up-to-date information on meeting cancellations or postponements. For Technical Activities meetings, visit www.TRB.org/calendar/calendar or e-mail TRBMeetings@nas.edu. For more information on a TRB webinar, contact TRBwebinar@nas.edu. For information on all other events or deadlines, inquire with the listed contact.

To subscribe to the TRB E-Newsletter and keep up to date on upcoming activities, go to www.trb.org/Publications/PubsTRBNewsletter.aspx and click on “Subscribe.”

September

- 18–20 TRB Managed Lanes Committee Midyear Meeting**
Washington, DC
For more information, contact Cynthia Jones, TRB, 202-334-2964, Cjones@nas.edu.
- 19–21 TRB Innovations in Freight Data Workshop**
Washington, DC
For more information, contact Scott Babcock, TRB, 202-334-3208, SBabcock@nas.edu.

November

- 13–15 TRB’s Transportation Resilience 2023: 3rd International Conference on Extreme Weather and Climate Change Challenges**
Washington, DC
For more information, contact Gary Jenkins, TRB, 202-334-2311, Gjenkins@nas.edu or Bill Anderson, TRB, 202-334-2514, WAnderson@nas.edu.
- 14–16 14th Annual Maritime Risk Symposium***
Bronx, New York
For more information, contact Scott Brotemarkle, TRB, 202-334-2167, SBrotemarkle@nas.edu.

*TRB is co-sponsor of the meeting.

IN MEMORIAM

Moira Harvey, chief executive officer of the Ontario Aerospace Council in Canada, former chair of the TRB Standing Committee on Light Commercial and General Aviation, and former member of TRB’s Aviation Group, died in March.

Tom Palmerlee, senior program officer and associate director for the Technical Activities Division, died on April 7. He had retired March 31.

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.

Note: Authors are responsible for the authenticity of their articles and for obtaining written permissions from publishers or persons who own the copyright to any previously published or copyrighted material used in the articles, **as well as any copyrighted images** submitted as graphics.

TRANSPORTATION RESEARCH BOARD

500 Fifth Street, NW
Washington, DC 20001

ADDRESS SERVICE REQUESTED

Let's Hear from You!



In each issue, we pose a sometimes light and fun transportation-related question that allows you to share your thoughts with other readers. To answer, **click here** or e-mail us at **TRNews@nas.edu** and follow these simple steps:



1. In the subject line, include **“Volunteer Voices: [the question you’re answering]”**;
2. Answer the question thoughtfully, but keep it brief—up to about 150 words;
3. Add whether you are a TRB member or volunteer, and list the committees you are involved with; and
4. Add TRNews@nas.edu to your contacts so we avoid your spam folder when we tell you you’re going to be published.

That’s it! Like all *TR News* content, your response may be edited for grammar, length, and TRB style. When the issue with your quote is published, you’ll get a PDF of the page featuring your response and photo.

Now that you have the details, here’s the question:

What is your favorite transportation mode for visiting a state or national park? And why?



Scan the QR code to answer our online survey question.

NATIONAL ACADEMIES *Sciences
Engineering
Medicine*

The National Academies provide independent, trustworthy advice that advances solutions to society’s most complex challenges.

www.nationalacademies.org

