

TR NEWS

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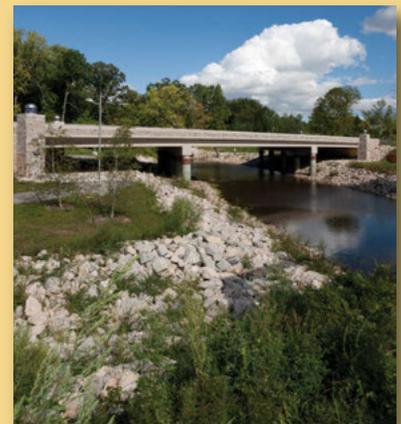
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COVER: Oneida Duck Creek Bridge in Wisconsin is an example of close collaboration between a sovereign tribe and state and federal agencies to produce a transformative, improved transportation facility with community and environmental benefits and cultural significance. (Photo: Mead & Hunt)

TR NEWS

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

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India's Highway Capacity Manual, and several recent research reports on such topics as smart growth and urban goods movement; new developments in the implementation of roundabouts; the use of geospatial data and mobile lidar in state department of transportation projects; active traffic management; and more.

(Left:) Traffic conditions in an urban center in India; researchers are developing a Highway Capacity Manual to address the heterogeneous mix of vehicles and the unique traveler characteristics and behaviors.

INTRODUCTION

Safe Journeys

Improving the Role of Tribal Communities in the Development of Transportation Facilities in Indian Country

RAQUELLE MYERS AND CINDI PTAK

This special theme issue of *TR News* addresses transportation in tribal communities within the United States. The Transportation Research Board's (TRB's) Native American Transportation Issues Committee developed the articles, working with its membership, tribal transportation professionals, and accomplished researchers to highlight and explore current transportation concerns in tribal communities.

The articles in this issue use the terms tribal, Indian, American Indian, and Native American to describe the communities—or nations, tribes, bands, and villages. Questions often arise about which terms are most appropriate. The communities should be referred to by specific tribal name, such as the Rincon Band of Luiseno Indians or the Navajo Nation. With 566 federally recognized tribes in the United States, using a single term such as tribal

or Native American to refer to all is common. Federal recognition of a tribe confers a legal status characterized by a government-to-government relationship between the tribe and the U.S. federal government. In addition, some tribes are state-recognized, and others remain nonrecognized.

Unique Issues

The transportation issues confronting tribal communities are unique and often include the development of roads, bridges, and pedestrian facilities that affect tribal lands, culture, and quality of life. The inclusion of tribal communities in the planning and construction of transportation infrastructure on and near tribal and historic lands is the primary means for preserving sacred sites and landscapes.

The authors are cochairs of the TRB Native American Transportation Issues Committee. Myers is Staff Attorney, National Indian Justice Center, Santa Rosa, California. Ptak is Tribal Transportation Program Manager, Federal Highway Administration, Washington, D.C.

A remote, rugged roadway in the Navajo Nation, a semiautonomous territory covering southeastern Utah, northeastern Arizona, and northwestern New Mexico.



The California Department of Transportation's policy of context-sensitive solutions involves all members of the community on a road project and is responsive to natural, cultural, and built environments. A Native American basket design is incorporated into this solid road barrier.

Historically, transportation infrastructure within tribal communities was under the purview of federal agencies, particularly the Bureau of Indian Affairs (BIA) through the Indian Reservation Roads (IRR) program. In 1983, BIA and the Federal Highway Administration (FHWA) entered into an agreement on planning for the IRRs; since then, state and federal agencies have consulted with tribes on regional and state transportation plans, and tribes have participated in drafting national transportation legislation affecting their communities. Transportation planning, construction, and maintenance are relatively new responsibilities for tribal governments, but tribes are becoming the primary managers of the transportation programs serving Indian Country.

Steep Learning Curve

The articles in this issue range from jurisdiction concerns in transportation project construction to transportation funding. The issues are complex and often are unique to tribal communities. Interjurisdictional collaborations among tribes, state departments of transportation, and federal agencies, including FHWA and BIA, are more frequent, but the learning curve is steep for understanding tribal sovereignty and the legal and political relationships with surrounding jurisdictions.

The articles include an overview of tribal transportation issues and address such topics as rights-of-way in Indian Country, the impacts of geographic information systems on tribal transportation planning, the development of tribally driven transportation programs within the framework of national transportation legislation, a project completed at the Oneida Nation, and examples of successful tribal transportation research projects.

The role of TRB in tribal transportation is significant. In 1993, TRB sponsored a conference,

Exploring Solutions to Native American Transportation and Economic Development Problems, on the Flathead Indian Reservation in Montana. One outcome of the conference was the establishment of the Intertribal Transportation Association to promote communication on transportation issues, to assist in the exchange of transportation information, and to represent tribal interests in transportation locally, regionally, and nationally.

Since 1993, the TRB Native American Tribal Transportation Issues Committee has initiated and coordinated important transportation research projects in Indian Country, leading to the publication of such titles as the *Guidebook for Successful Communication, Cooperation, and Coordination Strategies Between Transportation Agencies and Tribal Communities* and *Developing, Enhancing, and Sustaining Tribal Transit Services: A Guidebook*.

The Native American Transportation Issues Committee thanks TRB for the opportunity to develop this theme issue. The committee thanks the authors for their informative and insightful contributions, the members for their dedicated work, and TRB staff Martine A. Micozzi, Stephan A. Parker, and Monica A. Starnes for their support. The committee is thankful for the guidance and assistance of Russell W. Houston, Lea M. Camarda, and other members of the *TR News* editorial board in producing this issue.



Working closely with tribal partners and nearby property owners as part of a rebuilding project for SR-530 in North Snohomish County, Washington State DOT restored wetlands and installed fish-passable culverts.



The Rio Grande Gorge Bridge outside Taos, New Mexico, near the federally recognized sovereign territory of the Taos Pueblo.

PHOTO: CHRISTINE GREINCHER

Indian Country 101

History, Geography, Policies, and Initiatives Affecting Tribal Transportation Infrastructure

JOSEPH MYERS

The author is Executive Director, National Indian Justice Center, Santa Rosa, California, and a member of the TRB Native American Transportation Issues Committee.

Many Americans are not aware of the homelands within the United States that are separate and apart from mainstream America. These are lands occupied by the 566 Indian tribes recognized as holding a government-to-government relationship with the United States. Called Indian reservations, pueblos, villages, colonies, and rancherias, the lands are defined by federal law as Indian Country, and they are home to the cultures, traditions, and governments of Indian communities.

The 566 tribes of Indian Country are federally recognized and are considered limited sovereign enti-

ties. The tribes make their own laws for their territories and possess sovereign immunity from lawsuits. The U.S. Supreme Court recognized that this government shield applies to Indian tribes in *Santa Clara Pueblo v. Martinez*, decided in 1978.

Federally recognized tribes are eligible to have their lands placed in federal trust status; this prevents the state or the local county government from regulating or taxing tribal lands. Tribal lands not held in federal trust, however, are considered private property and are subject to state and local taxation and regulation.

A teepee, the signature dwelling of Great Plains tribes; today, real property of a tribe recognized by the U.S. government is held in federal trust.



PHOTO: DAVID LEVINE

Tribal Diversity

The tribal groups of Indian Country vary in population and land size. For example, the Navajo Nation has a population of more than 200,000 on territory in three states—Arizona, New Mexico, and Utah—the Navajo lands are comparable in size with West Virginia. In contrast, the Augustine Band of Cahuilla Indians in Riverside County, Southern California, is the smallest tribal group recognized by the federal government, with six members. Both tribes exercise tribal sovereignty, however.

Much of Indian Country is remote, located in rural areas like the windswept plains of the Blackfeet Reservation in Montana, the magical landscape of the Navajo, or the distant Native villages of Alaska. Two metropolitan areas of Nevada, however, are home to the North Las Vegas Paiutes and to the Reno–Sparks Colony of Indians.

Several other federally recognized tribes are located within huge urban centers in Southern California—for example, the Agua Caliente tribal members have trust allotments within the city limits of Palm Springs; some claim that Palm Springs is an Indian reservation, but others maintain it is not. Several federally recognized tribes live within the metropolitan area of the City and County of San Diego, California.

Policy Setbacks

Under federal law, the U.S. Congress possesses plenary authority—that is, broad legislative power—in Indian affairs; the federal recognition for Indian

Tribes that are organized and culturally active but are not federally recognized are subject to the jurisdiction of the state. These tribes may petition for federal recognition but remain subject to the state until the process is complete and recognition is gained. Petitions for recognition sometimes take years and may not result in the desired outcome—usually because of a political conflict.

With recognition, however, tribal members are eligible for federal benefits in health care and education. The tribe then stands in a government-to-government relationship with the federal government, and the tribal real property is eligible for trust status. Generally, only a federally recognized tribe can build an Indian casino on land held in federal trust.



PHOTO: TAVIS S. FLICKR

Infrastructure needs in Indian Country vary widely, from roads and bridges to the raised pedestrian boardwalks of Tununak, Alaska.

tribes can be terminated at the will of Congress. In the 1950s and 1960s, “Indian termination” became a goal of Congress, but President Richard Nixon ended that policy in the 1970s. Through litigation and federal statutes, tribes that had been terminated in the 1950s and 1960s were reinstated to federal recognition in the 1970s and 1980s. Since then, the policy of Indian termination has remained dormant.

In the early 1960s, the Bureau of Indian Affairs (BIA) in the U.S. Department of the Interior launched the Indian Relocation Program that moved Indians from Indian Country to big cities to pursue the American dream. The program provided employment assistance and vocational training. Relocation sites included the San Francisco Bay Area, San Jose, and Los Angeles in California, as well as Chicago, Illinois, and Dallas, Texas.

BIA representatives told Indians that the program was an opportunity to leave the poverty of Indian reservations for economic success in urban America. For many, however, the Indian Relocation Program was a dismal failure. Trade and labor union officials, for example, would not recognize the certificates that Indians earned in big city trade schools; moreover, union membership required political connections, which Indian applicants lacked.

Some of the relocated Indians found the program misleading and intolerable. Suicides, domestic violence, alcohol and drug abuse, and persistent despair were common. Some tried to return to the reservation, but San Francisco is a long way from Pine Ridge, South Dakota.

Turning Point

On the evening of November 20, 1969, a small group of Indian students from the University of California, Berkeley; the University of California, Los Angeles; and San Francisco State University began an occupation of Alcatraz Island, then an abandoned federal prison in San Francisco Bay. The students wanted to let the public know that the federal Indian policy of “termination and relocation” was destroying Indian people. Their message reached the world. Inquiries from abroad questioned this federal policy in Indian affairs.

On July 8, 1970, President Nixon ended the Indian termination policy and proposed Indian self-determination. Congress enacted the Indian Self-Determination and Education Assistance Act in 1975, and self-determination remains the federal Indian policy today.

Federal law provides that Indian tribes may contract with the federal government for the funds to administer services previously provided by the federal government for the communities of Indian

PHOTO: GOLDEN GATE NATIONAL RECREATION AREA ARCHIVES



Country. This includes funds to build, repair, and maintain reservation transportation facilities.

Questions of Trust

The federal–tribal trust relationship, defined in treaties negotiated between the United States and various tribes—as well as by federal statutes and U.S. Supreme Court decisions—was created to protect Indian lands and monies. For Indian lands, the fee patent deed for the technical ownership of Indian lands is recorded at a local county recorder’s office as owned by the United States, and the “beneficial ownership” remains with the federally recognized tribe or its members.

Indian monies collected by the federal government as revenues for the tribe or tribal members and derived from the exploitation of the natural resources of Indian lands are deposited into tribal and individual tribal member accounts for safekeeping by the federal government and eventual distribution to the beneficiary.

Historically, the safekeeping of these monies has proved questionable and became the object of a major lawsuit, known as the Cobell case, in which the United States was sued for the serious mismanagement of the funds. The settlement from this case was a small fraction of the amount claimed in the lawsuit, however, and was deemed unfair to the Indian people who comprised the class of plaintiffs.

Implementing Policies

BIA oversees Indian affairs for the federal government, with a mission to safeguard Indian assets and

PHOTO: NATIONAL ARCHIVES, NIXON LIBRARY



The occupation of Alcatraz Island in California by Indian students in the late 1960s drew worldwide attention to the inequities of the federal government’s Indian termination and relocation policy.

In the early 1970s, President Nixon met with Indian leaders and initiated policies that led to the Indian Self-Determination and Education Assistance Act of 1975.



PHOTO: WYOMING DOT

(Left to right:) Joe Dailey, FHWA; then-Federal Highway Administrator Victor Mendez; and John Smith, Shoshone and Arapaho Tribes Transportation Director, at the groundbreaking of new construction on Seventeen Mile Road on the Wind River Indian Reservation in Wyoming.

to improve the quality of life for Indian people. Although the agency has received blame for the chronic ills experienced by tribes, BIA only implements the Indian policies enacted by Congress—this can make BIA's mission to safeguard difficult.

For example, Congress initiated the Indian termination policy with House Resolution 108 in 1953, supposedly to free the Indians from federal dominance; the policy proved devious and destructive to the people of Indian Country. The resolution called for the abrogation of treaties, the conversion of trust lands to private ownership, the elimination of tribal governments, and the elimination of the legal status of federally recognized Indians. The Indian Self-Determination and Education Assistance Act of 1975 asserted the policy of Indian self-determination.

BIA historically has served as the steward of transportation facilities in Indian Country. After the self-

determination law was implemented, tribes were able to contract for the construction and maintenance of roads and bridges in Indian Country. Some tribes have contracted with BIA for these services.

BIA works with the Federal Highway Administration (FHWA) to provide federal funding and technical assistance to meet the transportation needs of Indian Country. In effect, this creates a three-way partnership, as each tribe with a transportation inventory must participate with BIA and FHWA to realize the maximum benefits of updated information, best practices, and local tribal ownership of the tribal transportation system.

Geophysical Adaptations

Each region of Indian Country presents geophysical diversity in territorial size, density of population, methods of travel, and infrastructure of facilities:

Tribal Road Management at the Bureau of Indian Affairs

The Division of Transportation of the Bureau of Indian Affairs (BIA) manages road maintenance and construction programs in Indian Country. Created in 1824, BIA is the oldest agency at the Department of the Interior; in 1869, Civil War General Ely S. Parker became the first Native American commissioner of Indian Affairs. LeRoy Gishi, an ex officio member of the TRB Executive Committee, heads the Division of Transportation, which also is responsible for the operation and maintenance of BIA roads and the Tribal Transportation Program (TTP), as well as for the TTP-related activities administered through the Federal Highway Administration (FHWA).

Operation and Maintenance

BIA regional offices administer funds for the maintenance of transportation facilities on Indian reservations and within tribal communities—and of roads in the BIA road system, which are public roads and are part of the National Tribal Transportation Facility Inventory (NTTFI). Along with providing access to tribal communities and trust and fee lands, BIA roads, bridges, ferry facilities, and trails often serve as major corridors for medical, educational, commercial, and recreational uses for tribal members and for the general public.

Although the road maintenance administered by BIA encompasses preservation of the roadway template and related structures constructed with Highway Trust Funds, it does not include new road construction, improvement, or reconstruction. Nonetheless, many of the roads were not built to adequate design standards or were not meant for vehicle use; most are in poor condition and have safety deficiencies. In FY 2012, only 17 percent of BIA roads were considered to be in acceptable condition, based on BIA Service Level Index condition assessment criteria. The NTTFI also includes 930 bridges; one ferry system; and

roadway signs, protective devices, guide posts, drainage structures, and fencing.

Tribal Transportation Program

In 2012, the Moving Ahead for Progress in the 21st Century Act (MAP-21) changed the name of the Indian Reservation Roads Program to the Tribal Transportation Program (TTP). Jointly administered by the FHWA Federal Lands Highway Office and the BIA Division of Transportation, TTP provides funds for planning, designing, construction, and maintenance activities for all public roads in accordance with an interagency agreement. The TTP regulations are published in the Code of Federal Regulations (25 CFR Part 170) but BIA is making revisions for the regulation to comply with the MAP-21 changes in the delivery of tribal transportation and to address concerns that have arisen since the rule was issued in 2004.

Tribal transportation facilities are public roads that provide access to and within Indian reservations, Indian trust land, restricted Indian land, and Alaska native villages. The inventory of proposed and existing roads in the NTTFI comprises approximately 157,000 miles. Along with the 31,400 miles of BIA system roads, 26,000 miles of roads are tribal system roads, and more than 100,000 miles are under state and local ownership. TTP funds can be used for eligible transportation-related activities on tribal transportation facilities and may also be used for state or local matching shares for apportioned Federal-Aid Highway Funds.

BIA and tribal governments administer most of the design and construction of TTP projects. Under tribal self-determination contracts, self-governance agreements, FHWA program agreements, or other appropriate agreements, tribal governments can perform, administer, and operate portions of all TTP functions except those categorized as inherently federal.

◆ The Native people of the villages of Alaska have ice roads, unique roadways maintained on and off major waterways. Methods of transportation include snowmobiles, dogsleds, boats, and bush planes.

◆ The Indians on Puget Sound in Washington State use a variety of boats for travel, work, and moving freight.

◆ The Yurok and Hoopa on the Klamath River in Northern California use jet boats and other types of boats to fish, travel, and deliver supplies, with the river serving as a core transportation facility.

◆ The Indians of the Southwest use on- and off-road vehicles, as well as animals, to travel the desert and the harsh High Plains areas.

◆ The Great Lakes tribes and the eastern seaboard tribes use on- and off-road vehicles, as well as boats, with surface facilities ranging from unpaved roadways to expansive waterway routes.

The geographical makeup and location of the reservation can make the construction, repair and maintenance of transportation facilities costly, and weather conditions can limit the time frames for the work. For example, Alaska's weather window for transportation-related construction is brief.

Trailblazing Networks

Europeans relied on many of the traditional transportation systems in exploring and claiming the homelands of Native Americans; the invaders



PHOTO: CHRISTINA DULOFF, FLICKR



PHOTO: DAVID LEVINE

Elements of transportation infrastructure in Indian Country are as varied as tribal communities themselves: ice roads in Alaska and northern Canada (*top*); off-road vehicles in the Southwest (*center*); and motorized jon boats, jet boats, and other vessels used by the Yurok to catch sturgeon in the Klamath River (*bottom*).

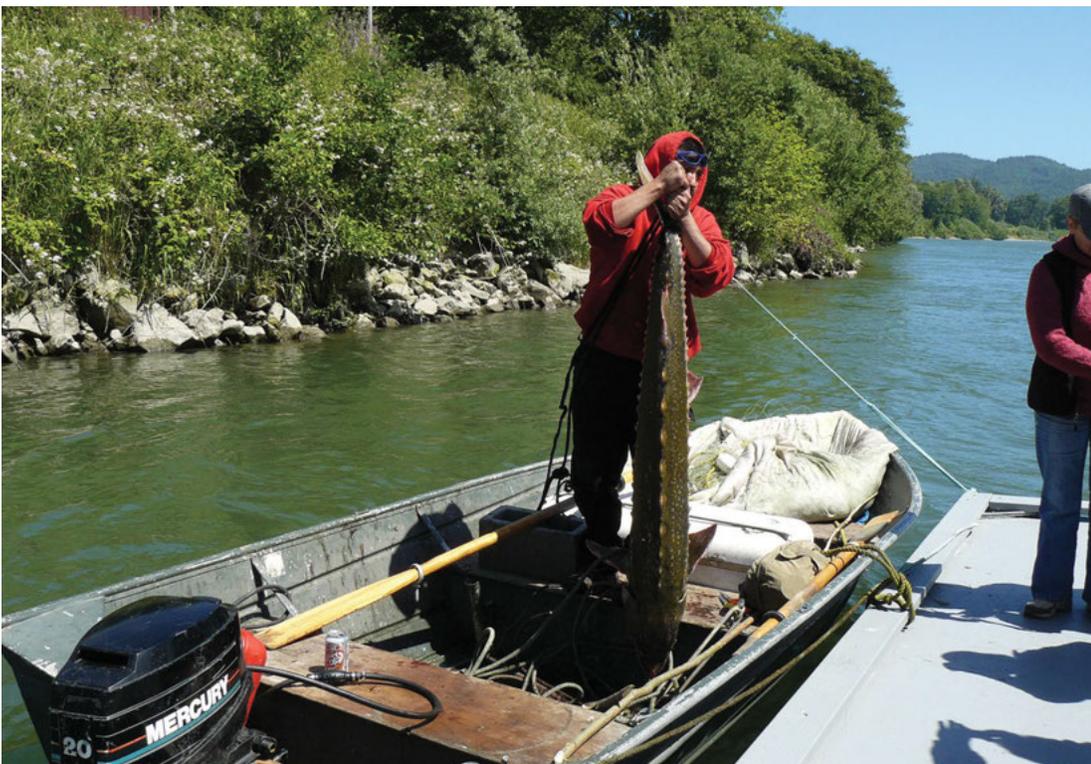


PHOTO: JOYCE CORN, FLICKR

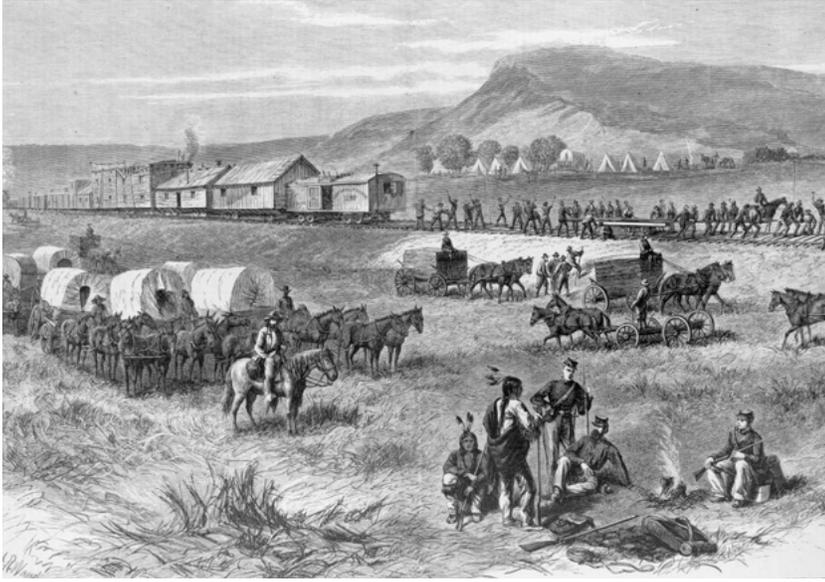


IMAGE: LIBRARY OF CONGRESS PRINTS AND PHOTOGRAPHS DIVISION

European settlers of the American West followed routes already established by Indians; drawing by A. R. Waud from an 1875 edition of *Harper's Weekly* magazine.

expanded the transportation networks already in place. Surface transportation systems were built on the many models in use before the arrival of the Europeans.

As the emerging American society moved westward across the continent, explorers, fur traders, and leaders of the wagon trains bearing settlers relied on Indian guides to blaze the trails. The expeditions named the trails after the destinations and their leaders—the California Trail, the Mormon Trail, and the Bozeman Trail, to name a few. Before the building of the transcontinental railroad, these trails and roadways were the key transportation networks. The so-called settling of the West would have consumed much more time without Indian guides following Indian trails established well before the arrival of the white man.

The Oregon Trail, the most famous of the Old West, spanned 2,000 miles from St. Louis, Missouri, to the Willamette Valley of Oregon, where Portland was founded. Initially traversed by foot or by horseback, the trails later were cleared for wagon trains. Historians estimate that 400,000 white settlers,

including farmers, ranchers, businessmen, miners, and families, traveled the Oregon Trail.

Countering Isolation

In the 19th century, the federal government's Indian policy called for treaties with Indian tribes. The treaties confined Native Americans to reservations, separated and kept apart from the emerging American society, usually with a military guard. The roads connecting new American cities and towns changed and compromised the traditional transportation systems of Native American groups, as did the railroad tracks connecting the East and West Coasts.

The isolation of Indian reservations in time, distance, and resources historically created a tremendous challenge for the transportation infrastructure. In recent years, with the development of technology and communication, these hardships are being addressed effectively. National, regional, and local services are becoming available. State departments of transportation are communicating with tribes, and some are providing tribes with resources, breaking with precedent.

Organizational Initiatives

The Transportation Research Board (TRB) helps support the development and management of high-quality transportation facilities in Indian Country, through the Native American Transportation Issues Committee. In 1993, TRB sponsored a conference, Exploring Solutions to Native American Transportation and Economic Development Problems, at the Flathead Indian Reservation in Polson, Montana.

The conference led to the creation of the Intertribal Transportation Association (ITA), a national organization to promote communication on transportation issues, to exchange transportation information, and to represent tribal transportation matters locally, regionally, and nationally. TRB continues to help support the goals of ITA, as the Native American association works to provide safety and quality-of-life enhancements for the communities of Indian Country through the improvement of on-reservation transportation systems.

The National Congress of American Indians also maintains a strong unit dedicated to tribal transportation issues, but ITA is the only Native organization dedicated exclusively to tribal transportation. ITA receives support from other national organizations and institutions seeking to improve the quality and safety of all American transportation systems.

Technical Assistance

In 1991, through the efforts of FHWA, federal legislation established the Tribal Technical Assistance



PHOTO: U.S. GEOLOGICAL SURVEY

Road repair in Indian country. Improved technology and communication have allowed tribes, state departments of transportation, and the federal government to address transportation needs more effectively.



PHOTO: CONNECTICUT STATE SENATE DEMOCRATS, FLICKR

Funds from the Mashantucket Pequot Tribal Nation, as well as from state, federal, and local sources, were used to replace a bridge on Shewville Road in Ledyard, Connecticut. The road carries local traffic as well as traffic to and from the Mashantucket Pequot reservation.

Program (TTAP) to assist tribal governments in improving the quality and safety of transportation systems through education, engineering, and enforcement.

The TTAPs cover all of Indian Country, with regional centers in Oklahoma, North Dakota, Colorado, California, Washington, Michigan, and Alaska. The TTAPs operate regionally to provide

Indian Country with training, technical assistance, and technology transfer. The TTAPs promote safe, efficient, and environmentally sound transportation systems in Indian Country by improving relevant skills and by increasing technical knowledge among the tribal workforce and its leaders.

Federal funding for the TTAP centers comes from BIA and FHWA. The TTAPs disseminate information through technical publications, training programs, technology transfer, information clearinghouses, and quarterly newsletters that update regional clients on a regular basis about developments in the field, particularly about technology advances relevant to tribal transportation. The TTAPs conduct a well-attended annual national conference that offers a range of workshops for transportation professionals from Indian Country and beyond.

Safe Infrastructure

The future of transportation facilities in Indian Country depends on capable leaders committed to improving the quality of life by ensuring a safe transportation infrastructure. The education of communities, the enforcement of traffic laws, the engineering of new facilities, and the reliance on emergency resources dedicated to transportation safety in Indian Country are the keys.

Tribal Technical Assistance Program

A Training and Technology Transfer Resource

In 1991, the Intermodal Surface Transportation Efficiency Act authorized the Federal Highway Administration (FHWA) to create the Tribal Technical Assistance Program (TTAP), recognizing the need to expand the Local Technical Assistance Program to serve tribal nations. Funded by FHWA and the Bureau of Indian Affairs, TTAP is a training and technology transfer resource for Native American tribes in the United States.

The program aims to

- ◆ Distribute technical assistance and conduct training at the tribal level,
- ◆ Help tribes implement administrative procedures and new transportation technology,
- ◆ Provide training and assistance in transportation planning and economic development, and
- ◆ Develop educational programs to encourage and motivate interest in transportation careers among Native American students.

TTAP engages in technology transfer and training, research, and consideration of cultural issues. In addition, the TTAP centers coordinate the Annual National Tribal Transportation Conference, recently held September 22–25, 2014, in Anchorage, Alaska. Seven TTAP centers serve U.S. regions; to learn more about TTAP, go to www.ltap.org/about/ttap.php.



PHOTO: EASTERN TTAP AT MICHIGAN TECHNOLOGICAL UNIVERSITY

The Eastern Tribal Technical Assistance Program provided forklift operation training to the Stockbridge–Munsee Band of Mohican Indians.



Context-Sensitive Solutions for an Oneida Nation Transportation Project

Teamwork and Community Involvement for Safety, Connectivity, Mobility, and Cultural Identity

JOHN A. RATHKE

The author is Senior Manager, Mead & Hunt, Inc., Green Bay, Wisconsin.

An Oneida Nation bridge replacement project in Wisconsin became the catalyst for the redevelopment of the community's core. The planning and design team leveraged the project to connect the community, to provide a gathering space, and to strengthen tribal identity by incorporating landscaping and artwork by local artists.

An iconic structure resulted from the interactions and coordination between the Oneida Nation staff, the Wisconsin Department of Transportation (DOT), and the design team at Mead & Hunt, Inc. The transportation project provided a stronger sense of place and improved mobility for the community and for the traveling public.

Before the project, the only safe and reliable way to travel between upper and lower Oneida was by automobile. The completion of the project has opened other opportunities for the community and the traveling public to enjoy the natural beauty of the

area. The comprehensive endeavor required the commitment to open, frequent, and honest communication by the project team.

Establishing Principles

Wisconsin DOT's core team scheduled regular meetings to maintain clear communication with agency officials. The Oneida Nation's government, like all others, operates under intricate procedures and bureaucracies. The core team therefore engaged representatives from the departments that would be essential for communicating and implementing a complex project on Oneida tribal lands, covering such concerns as land management, environmental issues, planning, cultural issues, and engineering.

Under the guidance of the Oneida Nation's general manager and chief of staff, the importance and urgency of the bridge replacement was kept front and center. In addition, Wisconsin DOT's dedication

(Above:) The Duck Creek Bridge is the result of collaboration between the Oneida Nation of Wisconsin, the Wisconsin Department of Transportation, and contractor Mead & Hunt, Inc.

The new Duck Creek Bridge, the preserved and converted old bridge, the connecting trail systems, and the green space developed in the Oneida project.

of staff time and adoption of a flexible approach to problem solving was essential in the project visioning and implementation.

Consulting engineers from Mead & Hunt were able to work directly with Oneida staff to assure clarity of communication and a shared understanding of the project goals established by the core team. The guiding principles revolved around a commitment to pedestrian safety, slower traffic speeds, and landscaping and design that appealed to the Oneida community.

Community Involvement

Community involvement in the Oneida Duck Creek Bridge project involved consistent efforts by the project team, outreach to internal departments and commissions, and the open exchange of information with the Oneida community. The project not only required the replacement of the failing bridge but also addressed the multifaceted details of a highway shift and the design of a new entrance to a residential area, as well as roundabouts, trails, landscaping, and connections to local roads. Consistent outreach and communication facilitated consensus building on these varied and complex topics. The table at the right highlights several important communication meetings during the project.

The outreach was comprehensive and included groups from the Oneida government, such as the Business Committee, the General Tribal Council (GTC), and the Land Commission, as well as representatives from the community organizations that were equally and intimately involved in the day-to-day activities affected by the bridge, such as the school board, the library, a veterans group, the housing agency, and police.



At a 2009 open-house meeting, community members viewed renderings of the proposed designs and provided feedback.



TABLE 1 Community Meetings

2006	
March	Presentation for the Veterans
November	Oneida Land Commission
2007	
January	Civic Center staff, Library Board, and Norbert Hill Center Parent Breakfast
February	Tsyuhakwa Harvest Supper, Honor the Youth Pow-Wow, Oneida Library, Oneida Police Department, School Board, Land Commission
September	Fall Festival
December	Oneida Land Commission
2008	
January	Oneida Land Commission, to finalize highway shift
2009	
February	Radisson Open House: Community Meeting
April	Site 1 Community Meeting
May	Community Development Planning Committee
May	Oneida Business Committee approves entire project plan
November	Oneida Land Commission, to finalize easements
2010	
January	Oneida Land Commission
February	Oneida Land Commission
March	Community Development Planning Committee
March	Oneida Land Commission
April	Community Development Planning Committee and General Tribal Council (GTC)
August	Business Committee Resolution of Support
November	GTC
2011	
February	GTC Outreach
April	GTC Outreach
May	GTC Outreach
June	DOT Public Meeting regarding STH-54 and Oneida Cultural Festival
November	Community Development Planning Committee

The Oneida project converted and restored the failing bridge—a local historic landmark—into a pedestrian and bicycle crossing.



Beginning with the open house meeting at the local Radisson Hotel in February 2009, the proposed design was presented via comprehensive visual displays and renderings. The detailed images of the proposed bridge, trails, lighting, railings, and landscaping garnered clear feedback, as did several community surveys; the survey at the April 2010 GTC meeting on the proposed design obtained the largest number of responses, 104. Finally, the Oneida artists responsible for creating and transmitting the image of Oneida through the community-sensitive design process participated in focus group meetings.

The early and continuous planning and coordi-

nation efforts by Oneida Nation staff provided a framework to facilitate improvements to the bridge replacement project in accordance with the guiding principles established through community involvement. Through these efforts, a simple bridge replacement project transformed a community.

Shaping the Project

The primary improvements included the following:

1. Safety measures for roadway users and the community,
2. Public spaces enhanced to provide functional and safe areas,
3. Public works to improve water quality, and
4. The integration of community-identifying features into project elements.

Early on, the Oneida Nation planning staff realized that an alignment for a temporary bridge that would route traffic around the replacement could serve as the alignment for the main highway. This insight into realignment was the genesis of the project's transformation—the proposal provided a separation allowing for green space, stormwater management features, and trails. The separation of the main highway also improved safety by moving traffic away from the community and making space for trails and highway underpasses.

Constructing the new bridge downstream also made it possible to preserve the old Duck Creek Bridge, which had provided historical context to the community and was considered an important cultural resource. Preservation of the bridge included conversion for pedestrian and bicyclist traffic and allowed the development of a completely separated trail system connecting lower and upper Oneida.

Oneida Duck Creek Bridge Project Team

Loretta Metoxen, Tribal Historian, Oneida Cultural Heritage
Jeff Witte, Community Planner, Oneida Planning
Fred Muscavitch, Director, Oneida Division of Land Management (DOLM)
Diane Wilson, Property Manager, Oneida DOLM
Mary Jo Nash, Area Manager, Real Estate, Oneida DOLM
Paul Witek, Senior Architect, Engineering
Laura Manthe, Director, Oneida Environment Resource Board (ERB)
Mike Finney, Manager, Eco-Services, Oneida Environmental Health and Safety Division (EH&SD)
Leanne Doxtater, Community Planner, Oneida Planning
Stacie Danforth, Community Planner, Oneida Planning
Gene Schubert, Policy Analyst, Oneida ERB
Mike Finn, Transportation Planner, Oneida Department of Public Works
Debbie Thundercloud, General Manager, Oneida Tribe of Indians of Wisconsin
Bill Gollnick, Chief of Staff, Oneida Tribe of Indians of Wisconsin
Chad Wilson, Project Manager, Oneida ERB
Tim Skenandore, Director, Oneida Facilities
Jim Snitgen, Water Resources Supervisor, Oneida EH&SD
Tony Kuchma, Wetland Program Coordinator, Oneida EH&SD

Safety Improvements

Roundabouts

The interactive design process identified opportunities to incorporate carefully placed and expertly designed safety features. Methods were investigated to achieve speed reduction, a priority. The solution was to bookend the project corridor with roundabouts at the eastern and western intersections.

Although normally not used to reduce speed, the roundabouts provided safe intersections that marked a change in the roadway to a more residential area in between, distinct from the rural roadways leading into and coming out of the area. The roundabouts also offered a unique opportunity to incorporate community-identifying elements into the project.

After ensuring the safety and efficiency of the roundabouts design, the project team focused on adding community-identifying elements. A working session with artists advanced the concept of a roundabout representing a turtle. Achieving the vision was tricky, however, because the design had to retain safety features such as low clearance for errant vehicles.

Low-profile concrete shapes that would not become safety hazards mimicked turtle shells and were placed in a pattern in the landscaping to create the appearance of a turtle in a grassy area. The color scheme provided a natural look. The turtle is readily identified from an aerial view, but the ground view is subtle. Renderings and visuals were key in transferring the artist's intent into construction drawings.

Sidewalks and Trails

Before completion of this project, safe and reliable pedestrian and bicycle facilities between upper and lower Oneida were lacking. Children attending the elementary school in upper Oneida, for example, had no safe way to travel to the library in lower Oneida. A safe connection was mandatory.

A combination of sidewalks and trails was designed to provide direct, safe, and reliable access. Because of the limited space and the intent to minimize disturbance outside the roadway corridor, sidewalks were placed adjacent to the roadway on the western end in upper Oneida. In lower Oneida, a complete trail system was designed to accommodate bicyclists and pedestrians; the trail system is expandable, because most of it fit within the original roadway alignment. Moreover, the careful placement of the trails avoided intrusion into the many sensitive cultural and historic sites along the roadway.

To provide safe access across the highway, the trails were connected through underpasses beneath the new bridge. These underpasses are located on each side of Duck Creek and connect over the bridge with a shared-use path separated by a concrete bar-



rier to provide safe crossing for pedestrians and bicyclists across Duck Creek.

This led to the construction of a trail system on the north side of the highway to provide for future connections in the Oneida community. The combination of trails and underpasses allows safe access to the library from the north side of the highway without having to cross the highway.

Crosswalks

At each end of the corridor, crosswalks at the roundabouts were designed for pedestrian safety. Vehicles slow down when approaching and navigating a roundabout, which also offers improved visibility; this increases safety for pedestrians crossing the roadway.

The crosswalks through the roundabouts were located to maximize visibility and to take advantage of low speeds. A safety island reduces the length of pedestrian crossings. The crosswalks connect into the trail and sidewalk system, providing continuity and improving safety.

An aerial view of the Seminary Road roundabout reveals a landscaped turtle. The Turtle Clan is one of the three Oneida clans.

Designed by local artists, a mural along one side of the pedestrian underpasses depicts an Oneida creation story.





Salt-tolerant trees and prairie grasses provide a buffer to the highway. The green space connects directly to the trail system for safe pedestrian access.

Improvements to Public Spaces

Engineers, landscape architects, and planners collaboratively selected native prairie grasses and salt-tolerant trees and shrubs for placement throughout the project. The concept was to place native species in a way that appeared random and natural. Extensive consultations helped to avoid incursion into sensitive historic and archaeological sites within the project area and nearby.

The project created a green space in front of the library as a buffer from the highway and for use as a learning area in a natural setting. The green space has direct access to the trail network, so that children can safely cross State Trunk Highway (STH) 54 under the new bridge. The green space blends into the terrain yet screens off the view of the highway from the library. The salt-tolerant trees, prairie grasses, and low shrubs enhance the visual aesthetics and provide additional screening.

The collaborative and interactive design process made use of visual tools at coordination meetings with stakeholders and the public to communicate the design objectives throughout the project develop-

Lighting along the trails and underneath the bridge improve safety and highlight the artwork incorporated into the structure.



ment. The trail network layout was coordinated carefully with Oneida Nation planners to provide logical and useful connections to public buildings and tribal neighborhoods.

Trails were extended to the project limits for future connections. The south trail eventually will connect to the community's senior center, and the north trail eventually will provide access to neighborhood sites.

Public Works Improvements

Water Management

Downstream from the project site, Duck Creek becomes a degraded waterway with generally high turbidity. The project therefore included stormwater management features to improve the water quality.

On the west side of Duck Creek, runoff from the Seminary Road intersection is diverted to vegetated swales located behind the curb and gutter in the terrace area for pretreatment before collection into the storm sewer system. The runoff then flows to a swale system that discharges via dual-split biofilters into treatment ponds, which discharge to a tributary swale of Duck Creek. On the east side, a combination of biofilters, detention basins, and vegetated swales stores and filters the runoff before it enters Duck Creek.

Intersection Safety

The realignment and widening of the roadway improved the intersection and the turning lanes. Previously, the intersections had experienced higher-than-average crash rates. The improved intersection alignment established desirable sight distances.

Eliminating the Artley Street intersection adjacent to the bridge and improving the East Service Road intersection, combined with improvements to the turn lanes, greatly increased the safety of the roadway. The Artley Street roadway became a secondary access point to the adjacent neighborhood in case of emergency. The roadway has breakaway gates and articulated blocks covered with grass to provide access that does not look like a roadway but can support emergency vehicles in the neighborhoods south of STH-54.

Lighting

Trailside and underdeck lighting enhances the safety of the area at night, particularly for the trail network. The shared-use trails were designed to fit the topography yet provide grades that meet the requirements of the Americans with Disabilities Act. The trails minimize the environmental impacts and provide a separation from traffic, but do not increase the footprint of the project.

The trail lighting was designed with intensity models to ensure that every segment had adequate light and to avoid significant areas of shadow. The light intensity model also was applied to the trails beneath the bridge so that users of the underpass trails would feel safe and comfortable. The trail lighting devices and fixtures were carefully coordinated with Oneida Nation planning staff to provide aesthetically pleasing and functional fixtures.

Community Identity

Because of the project's location in the heart of the Wisconsin Oneida Indian Reservation, project aesthetics, context-sensitive solutions, and sustainable design practices were a priority. Throughout the project development, the Mead & Hunt team coordinated extensively with Wisconsin DOT staff, Oneida Planning staff, and Oneida artists to incorporate community-identifying elements into the new bridge, the retaining walls, the roundabouts, the lighting, and the landscaping. Iroquois artwork produced key visual elements expressing stories and themes significant to the Oneida people.

The success of this project required working closely with the Oneida community and artists to reproduce drawings accurately for the engineering plans and for final incorporation into the bridge, retaining wall, and roadway structures. The process involved computerized methods—computer-assisted design and drafting (CADD) replicas were prepared from electronic scans of artists' drawings and were reviewed by the artists for accuracy. The structural designers and detailers used these CADD drawings to incorporate the artwork accurately into the bridge plans. From the CADD drawings, the bridge contractor developed the form liners, applying laser production techniques.

The project team created a focus group to work through the vision and details for the artwork. The focus group expedited decision making and served as a conduit to disseminate information to the community, to achieve community acceptance of the bridge and the project. The focus group included Oneida Nation planners and artists, members of the Mead & Hunt design team, and Wisconsin DOT staff. The group collaborated to improve multimodal transportation opportunities and to incorporate community-identifying artwork and aesthetics into the project.

Decorative Elements

With abutment wall heights of more than 8 feet, measures were necessary to discourage graffiti. The solution was to place Iroquois artwork from local Oneida artists depicting themes, stories, and history



Bridge pilaster artwork by Brenda John-Stevens depicts the Standing Stone, a central figure in Oneida tradition. The word *Oneida* derives from an Iroquoian name meaning "People of the Standing Stone."

meaningful to the Oneida Nation. The design team worked with local artists to create unique artwork for the bridge and to create an aesthetically pleasing design with which the community could identify.

The design of the front faces of the abutments called for a variety of reliefs to accentuate the artistic elements. A color key was assigned to each relief level or artistic element, adhering to the artist's intent. Pilasters in the abutment corners combine stone veneer and reinforced concrete and include lighting. The Oneida artwork in the pilasters consists of panel inserts that fit with the stone veneer and simplify the form work for the pilaster cores. Each panel depicts a selection from a traditional Iroquois story.

The pier columns replicate cattails. The Oneida culture's reverence for the earth and its creatures inspired the Oneida artists. The unusual design features of the architectural elements added to the complexity of the column detailing.

The specialized treatments were necessary to satisfy stakeholders' expectations of an aesthetically pleasing and community-identifying structure. By managing expectations and the design process, the team produced an iconic structure for the Oneida Nation that did not greatly increase construction costs.

The continual involvement with the Oneida planners, artists, and community stakeholders facilitated success. The design team shared the graphics and the cost information of the aesthetic features and struc-

A group of artists collaborated on the mural on the retaining wall depicting the progress of the seasons.



ture types, to assist the group in making fiscally responsible decisions.

A Large Canvas

The retaining wall graphics were the result of many sessions with the artists. At first, the goal was to tell a story of the Oneida people on a large canvas. The artists submitted original ideas in highly detailed drawings and continued to explore a variety of stories, producing many detailed pieces.

Finally the decision was made to simplify and to portray the change of seasons through the position of the sun and moon and with wind patterns including symbols of each season. For example, a leaf represents fall; a snowflake, winter; and a strawberry,

summer. To add texture to the wall, rolling hills and a variety of sky patterns were added, with a setting and rising sun. The artists carefully identified the color schemes for the four seasons.

Working together to understand Oneida culture, history, and connections to the land reinforced a sense of place for the Oneida people. The design team maintained flexibility in meeting schedules and locations. Much of the abutment artwork, for example, was created in working sessions at night in an artist's home, at the kitchen table, to facilitate timely completion.

The new bridge was constructed to carry three different modes of transportation safely—pedestrians, bicycles, and motorized traffic. Trail connections extending from the bridge were designed to provide the community with safe and accessible bicycle and pedestrian travel. The outcome offers a balance between the built and natural environments.



Iconic Structure

Innovative partnerships, collaborative efforts, and team commitment resulted in a new bridge, improved safety, better neighborhood connections, a strong sense of place, and improved mobility. A simple bridge replacement project developed into an iconic structure that provided identity to a community—a transportation facility that connected the community without relying on the automobile.

This project provided a framework for effective coordination with tribal communities. Through clear and understandable graphics, the project team was able to communicate planned improvements and to facilitate understanding and acceptance. The community was able to participate significantly in the development of the project. This involvement has resulted in great pride and acceptance of a project that portrays the Oneida culture for travelers through the area for generations to come.

The Transformation to Tribal Self-Governance in the Transportation Arena

A Progress Through Legislative Milestones

JAMES GLAZE AND NATHANIEL AMDUR-CLARK

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Not long ago, the federal government fully controlled transportation systems in Indian Country, from major road projects to the smallest maintenance project. Today, tribes have assumed this role, exercising sovereignty to serve as the main providers of transportation services in their communities. The federal government still plays an oversight role, but tribes staff and run their own transportation departments.

Why these changes occurred and why they matter reveal much about the complicated evolution of the government-to-government relationship between the United States and tribal nations. These changes are not simply the result of changes to federal law; visionary tribal leaders decided that the old ways of doing business were not working for their citizens and pursued legal and policy improvements over decades with bold strategies and innovative thinking.

Shift to Tribal Control

Two parallel developments in federal law and policy enabled the shift to tribal control of transportation programs. Most significant was Congress' passage of the Indian Self-Determination and Educational Assistance Act (ISDEAA) in 1975. Instead of breaking up

and terminating the sovereign status of tribal governments—the federal policy in the 1950s and early 1960s—President Richard Nixon and congressional leaders agreed with tribal leaders to support tribal self-determination, self-governance, and capacity building.

The ISDEAA required the Bureau of Indian Affairs (BIA) and the Indian Health Service to transfer to the tribal governments the funding and authority to manage federal Indian programs. Today, tribal governments directly manage more than one-half of the annual federal budget supporting federal Indian programs.

By all measures, supporting tribal self-determination and self-governance has been the most successful federal Indian policy in U.S. history. Many tribal nations have overcome poverty, unemployment, and desperation to become the leading job creators and economic drivers in their regions of the country.

How did this seismic shift in federal Indian policy come about? According to anecdote, Nixon was following the advice of a Native American high school football coach to “do something good for the Indians” if he ever came into a position of power. As

PHOTO COURTESY OF JAMES GLAZE AND NATHANIEL AMDUR-CLARK



Two segments of Ariwite Road in Idaho, one before (left) and the other after (right) a Shoshone–Bannock Tribes repair project.



PHOTO: NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

A Bureau of Public Roads horse team grades roads on the Wind River Indian Reservation in the early 1920s. Until passage of the Indian Self-Determination and Educational Assistance Act of 1975, the federal government controlled transportation systems in Indian Country.

with all positive developments in Indian Country, however, tribal leaders worked tirelessly with members of Congress to pass the historic legislation and later to amend it twice with much-needed improvements. The ISDEAA made possible many of the later changes in federal transportation policy.

Building Tribal Roads

The second important development was the growth and maturation of the federal Indian Reservation Roads (IRR) Program, established by Congress in 1928 for transportation improvements in Indian Country. The IRR Program started largely as a farm road program, reflecting federal policy to turn members of rural tribes into farmers and ranchers. In the early years, funding was spotty, but in 1950, Congress started to appropriate annual construction and maintenance funds to BIA to maintain and construct roads and bridges.

The Ketchikan Indian Community in Alaska entered into an agreement with FHWA to plan, design, construct, and maintain routes in the Indian Reservation Roads (IRR) program that provide access to the tribal community.

Since 1979, BIA and the Federal Highway Administration (FHWA) have operated under an interdepartmental stewardship agreement for planning, designing, and building tribal roads and bridges “that are important to overall public transportation needs of the reservations as recommended by the tribal governing body.” Although the stewardship agreement formally recognized the role of sovereign tribal governments in setting their own transportation priorities, decades of tribal advocacy and several rounds of federal transportation legislation were needed to transition the IRR Program to a tribally driven program relying on federal agencies only for limited support, oversight, and technical assistance.

Until 1982, Congress appropriated funding for the IRR Program annually through the Department of the Interior. The Surface Transportation Assistance Act of 1982 (Public Law 97-424), however, created the Federal Lands Highway Program and reestablished the IRR Program as part of the Federal Highway Administration–Federal Lands Program, with annual funding coming from the Federal Highway Trust Fund. Eligible IRR Program projects included the construction or reconstruction of any public road providing access to or within Indian reservations, pueblos, and rancherias, as well as former reservation lands in Oklahoma and Alaska Native villages. Although these legal changes were significant, the biggest changes in federal law and policy started in the 1990s.

Exercising Self-Determination

With the passage of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), Congress recognized the need for sustained government-to-government consultation and collaboration with tribal governments on transportation issues. Tribal leaders advocated for reforms and were pleased that Congress took their concerns seriously.

ISTEA mandated changes in state, regional, and metropolitan planning to include tribal concerns about transportation issues; the law required states to consult with tribes in developing State Transportation Improvement Programs. ISTEA also authorized Indian preference in the hiring of workers on federal-aid transportation projects near Indian reservations.

ISTEA increased IRR Program funding from \$80 million per year in Fiscal Year (FY) 1987 through FY 1991 to \$159 million per year for FY 1992 and \$191 million for FY 1993 through FY 1997. The legislation also included funding for tribal transportation planning and established Tribal Technical Assistance Programs (TTAPs) to increase the capacity of tribal governments to plan, design, construct, and maintain transportation facilities within their territories.

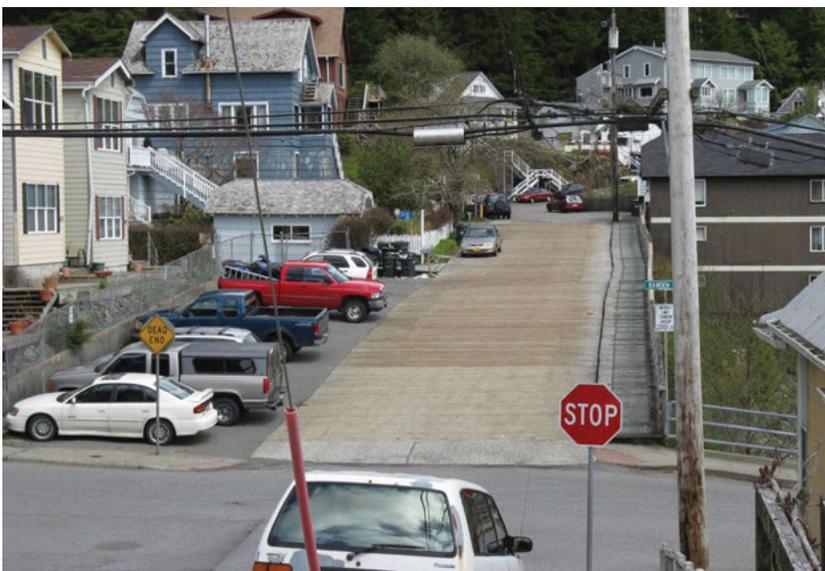


PHOTO: JASPERBO, FLICKR



Children cross a busy road in Indian Country. Surface transportation legislation in the late 1990s compelled FHWA to develop safety management systems for tribal roads.

Tribally Driven Programs

Emboldened by this success, tribal advocates worked to include more protribal provisions in the next comprehensive surface highway legislation, the Transportation Equity Act for the 21st Century (TEA-21), enacted in 1998. TEA-21 raised IRR Program funding to \$225 million and then to \$275 million per year, strengthened tribal consultation mandates for state, regional, and metropolitan transportation planning, and separated tribal bridge funding from state-based bridge funding. The law also required FHWA to develop safety management systems for tribal roads on a par with those for state roads.

In a key provision, TEA-21 authorized tribes to assume nearly all of BIA's IRR Program responsibilities under the ISDEAA, except for certain "inherent federal functions." Tribal advocates had claimed for years that the ISDEAA allowed tribes to contract for individual road and bridge design and construction projects; BIA maintained, however, that the IRR Program was exempt because the funding came from the Highway Trust Fund, not from Department of the Interior appropriations.

Some BIA officials argued that IRR projects were too complex for tribes to manage, although tribes had built schools, hospitals, and clinics under the ISDEAA for years. TEA-21 clarified that tribes could take over the management of IRR projects and eventually the IRR Program.

In another key provision, TEA-21 required BIA and FHWA to create a tribal-federal negotiated rule-making committee to draft regulations for the IRR Program and to develop an allocation formula to distribute program funds to tribes. Tribal, BIA, and FHWA representatives worked together on this rule-making for several years across two presidential administrations; the comprehensive regulations that emerged created a new funding formula to distribute IRR Program funds to all tribes.

Funding Formulas

The new distribution formula, known as the Tribal Transportation Allocation Methodology (TTAM), became final in November 2004. Before that, BIA Regional Offices generally made IRR Program funding decisions. Tribes worked with BIA regional roads engineers to prioritize transportation projects based on tribal needs; IRR Program funds were allocated to each BIA region with a "relative needs" funding formula.

Some of the 12 BIA regions allocated IRR Program funds based on the historical allocation amounts for each tribe; other regions pooled the available funds for all of the tribes. In the BIA Pacific region of California and in the Alaska Region, for example, only a few tribal projects would be funded each year, and many tribes waited for decades.

Under the TTAM formula, every tribe had the right to its own annual share of IRR Program funding. The BIA Regional Offices could no longer pool IRR Program funds or decide which tribal projects to fund. Instead, each tribe was assured a mathematically determined amount of IRR Program funding.

The TTAM formula has had its share of controversy within the tribal transportation community;



County and Bureau of Indian Affairs (BIA) road signs in Buffalo Gap, South Dakota. Tribal Transportation Allocation Methodology formerly assigned IRR program funding by mathematical formula, and BIA played a larger role in allocation decisions.



PHOTO COURTESY OF JAMES GLAZE AND NATHANIEL AMOUR-CLARK

Many tribal transportation departments, such as the Oglala Lakota tribe on the Pine Ridge reservation in South Dakota, run public transportation systems.

many large, land-based tribes in particular believed BIA and FHWA did not implement the formula fairly or accurately across the country. Nevertheless, the TTAM tribal shares funding system shifted the balance of power from BIA toward the tribes. Large and small tribes now can make long-term transportation planning decisions, hire transportation staff, and establish transportation departments with the fairly stable annual funding.

Protribal Legislation

The intensive negotiated rulemaking process united tribal leaders and advocates more than ever before. In the mid-2000s, tribal leaders worked together to craft a package of legislative proposals for tribal transportation and advocated for the proposals to then-Transportation Secretary Norman Y. Mineta and the congressional committees writing the new highway bill.

The tribal proposals included substantial funding increases and new legal authority for tribes to administer transportation programs, avoiding intermediaries and bureaucratic roadblocks wherever possible. Tribes and their advocates achieved nearly all of their major objectives in the transportation legislation enacted in 2005, known as the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU).

SAFETEA-LU increased IRR Program funding from \$275 million per year to \$450 million per year; separately funded the IRR Bridge Program at \$14 million per year; created a new Tribal Transit Grant Program starting at \$8 million and increasing to \$15 million per year; established a new Tribal Scenic Byways Program allowing tribes to designate scenic byways with funding from FHWA and without state involvement; and nearly doubled tribal traffic safety funding to more than \$4.2 million per year.

SAFETEA-LU drastically decreased BIA overhead costs, authorized tribes to approve their own project

designs, and for the first time allowed tribes to use a portion of their IRR Program funds for road maintenance, augmenting the underfunded BIA Road Maintenance Program. Before SAFETEA-LU, BIA often had used \$60 to \$70 million of the available \$275 million for administrative expenses, but the legislation restricted total BIA program and project-related administrative costs to \$27 million per year.

Choosing Agencies

SAFETEA-LU also authorized tribes to enter into IRR Program funding agreements directly with FHWA, instead of working through BIA exclusively. For most government programs, federal dollars are accessed only through one designated agency, but SAFETEA-LU allowed eligible tribes to choose to work with BIA or FHWA to gain the best service and technical support.

The FHWA IRR Program agreements proved successful and radically changed the perception within the U.S. Department of Transportation (DOT) of tribal governments as transportation providers. In 2006, only five tribes negotiated for the first FHWA IRR Program funding agreements, but by 2013, more than 110 tribes had entered into agreements with FHWA.

So many tribes chose to leave BIA for FHWA after 2006 that BIA adopted nearly identical IRR Program agreements in 2011. For a change, tribal governments seemed to be calling the shots, with BIA and FHWA trying to find better ways to serve them.

Gaining Grants

SAFETEA-LU also opened the eyes of U.S. DOT officials to the needs, capacity, and growing effectiveness of tribal transportation departments to deliver much-needed public transportation services in largely underserved Indian Country. U.S. DOT began to ensure that tribal governments were eligible for direct federal transportation grants, including Safe Routes to School grants, Livable Community grants, and Transportation Investment Generating Economic Recovery, or TIGER, grants.

Before SAFETEA-LU, tribal governments rarely received grants outside the narrow range of Public Lands Discretionary grants and others that state DOTs were not eligible to receive. Now tribal governments regularly and successfully compete with state DOTs for grants.

Falling Short

But not everything in SAFETEA-LU worked perfectly. For example, SAFETEA-LU required BIA to transfer IRR Program funding shares to tribes within 30 days after receiving funds from FHWA, but this



Funds from the American Recovery and Reinvestment Act of 2008 have allowed tribes to maintain and rebuild transportation assets such as bridges: (left) before and (below) after restoration.

almost never happened. Tribes working with BIA typically had to wait until close to the end of the fiscal year to receive the funds, contrary to the mandate.

The law also required the U.S. Secretary of Transportation to appoint a Deputy Assistant Secretary of Tribal Governmental Affairs to oversee tribal programs and ensure that U.S. DOT honored the federal trust responsibility. Despite promises from several U.S. Secretaries of Transportation, an appointment still awaits.

Tribal leaders also hoped that the SAFETEA-LU mandate for FHWA to conduct a comprehensive inventory of the IRR Program might weed out data errors and ensure that BIA's calculation of funding shares was as fair and accurate as possible. The inventory update never occurred. Disagreements about the IRR Program funding formula hampered tribal unity during the reauthorization of the next surface transportation legislation, the Moving Ahead for Progress in the 21st Century Act (MAP-21).

In the meantime, the United States faced its most serious financial crisis since the Great Depression. The Great Recession hit Indian Country especially hard and increased poverty rates on many reservations and tribal communities.

Proving Capacity

SAFETEA-LU demonstrated the effectiveness of united tribal advocacy for legislative changes to correct the long-standing infrastructure gap in Indian Country. When the Obama Administration and Congress started to address the economic calamity, tribal nations worked fairly well together to advocate for tribal economic stimulus legislation.

The Obama Administration's initial economic stimulus bill, however, did not include any additional funding for tribal transportation but designated all transportation stimulus funds to flow through state DOTs. Tribal leaders and advocates once again mobilized to make a persuasive case for





PHOTO COURTESY OF JAMES GLAZE AND NATHANIEL AMOUR-CLARK

Lack of available funding can lead to infrastructure deterioration in Indian Country—and to costly replacements.

the important role of tribal nations in improving a decaying infrastructure and putting unemployed tribal members back to work.

Congress and the Obama Administration responded by adding \$310 million in IRR Program funds to the American Recovery and Reinvestment Act (ARRA), along with \$142.5 million in additional tribal road maintenance funds, and \$17 million for tribal transit projects. The ARRA projects brought much-needed jobs and economic activity to tribal communities in the Great Recession.

The ability of tribal nations to apply ARRA stimulus funds to build and maintain infrastructure and expand transit programs demonstrated the growing capacity of tribal transportation departments to manage major transportation projects efficiently and effectively. Although BIA was slow in developing the ARRA-based funding agreements, which often proved cumbersome and difficult to use, tribes still made productive use of 99.97 percent of all available ARRA tribal transportation funds to construct, maintain, improve, and operate transportation projects and programs.

Tribes worked hard to turn the ARRA funds into transportation projects that employed thousands of people in tribal communities. The federal government audit awarded tribal ARRA projects a “green report,” indicating that the projects were highly successful and encountered minimal problems in applying stimulus funds efficiently and effectively—a testament to the advances made by tribal transportation departments in the past decades.

A Step Backward?

MAP-21 was signed into law by President Barack Obama on July 6, 2012, and is scheduled to end in May 2015. Before MAP-21 became law, former Senator Byron Dorgan (Democrat, North Dakota), then Chair of the Senate Indian Affairs Committee, asked tribal leaders to comment on the proposed Tribal Reauthorization of Indians Programs (TRIP) legislation, hoping for support across Indian Country.

Many tribes, however, thought that TRIP did not sufficiently address concerns about the IRR Program funding formula. With a difficult Congressional budget climate and without the unified backing of all tribes, most of the TRIP provisions never made it into MAP-21. For the first time in more than 30 years, Congress cut tribal transportation funding. Congress also imposed new bureaucratic requirements on tribes instead of streamlining tribal transportation programs as had been done in the past.

MAP-21 renamed the IRR Program the Tribal Transportation Program (TTP), to reflect the many different types of modal programs and to acknowledge that many tribes do not occupy formal Indian reservations. The IRR Road and Bridge Programs were combined, removing the \$14 million per year previously set aside for the bridge program.

The consolidated IRR Bridge Program became a 2 percent set-aside from the total TTP funding; as a result, this program receives \$9 million per year—a \$5 million cut to a program already underfunded. Tribes also lost the Tribal Scenic Byways Program when Congress consolidated scenic byways functions into other transportation programs, and the Public Lands discretionary grant program, which had become an important source of transportation grant funding for tribes.

Nevertheless, Congress created a new \$9 million per year tribal transportation safety grant program, funded as a 2 percent set-aside from the TTP’s \$450 million annual allocation. Congress also increased tribal transit grant funding from \$15 million to \$30 million per year, the only actual funding increase for tribal transportation in MAP-21.

Although the previous highway bills had increased funding for tribal transportation, the majority of the MAP-21 changes were funding cuts, nominal increases, or transfers of funds among tribal stakeholders. For example, Congress replaced the IRR High-Priority Projects Program, created through the TEA-21 negotiated rulemaking, with the Tribal High-Priority Projects (HPP) Program. The authorized funding of \$30 million per year was not provided from the Highway Trust Fund; instead, Congress required appropriation from the general fund of the U.S. Treasury.

With the budget battles that have deadlocked Congress, however, this program has never been funded. Smaller tribes, in particular, rely on the HPP Program because many do not receive TTP funding shares large enough to complete their highest-priority projects.

An Opportunity Lost

The most controversial change in MAP-21 was the

funding formula for calculating tribal shares. Congress eliminated the TTAM funding formula created through the negotiated rulemaking process and adopted a new statutory funding formula that largely holds in place the historical funding levels. It also mandates that future TTP funding increases be driven by tribal population increases and by adding roads directly owned by tribes or BIA. The MAP-21 funding formula is being implemented gradually each year, and the full impact is yet to be felt.

Except for these major changes, MAP-21 kept in place most of the tribal provisions of SAFETEA-LU. Despite the ever-increasing backlog of unmet tribal transportation needs, Congress has failed to increase the base TTP funding level from \$450 million per year and effectively has cut it by \$14 million. MAP-21 was an opportunity lost; tribes were not able to follow their successful formula of advocacy, competency, and unity that had led to the growth of tribal transportation funding from \$80 million per year in 1991 to \$479 million per year at the end of SAFETEA-LU.

Addressing the Backlogs

As tribes and tribal leaders have pushed for and successfully applied greater legislative authority to exercise their inherent sovereignty in the transportation arena, advocating for a common set of legislative objectives has proved difficult. Despite tribal legislative and programmatic success over the past 30 years, much work remains as Congress gears up for another reauthorization of surface transportation programs.

Tribal transportation advocates agree that current funding levels for the TTP are not sufficient to meet the minimum transportation, maintenance, transit, and traffic safety needs of tribal communities. Even with the efficiencies and program improvements brought about by the transition to more tribally directed laws and policies, the transportation infrastructure serving most tribal communities remains the most unsafe, rudimentary, and undermaintained network in the country.

The unsafe condition of tribal transportation infrastructure traces directly to the lack of available federal funding. Tribal transportation facilities have a construction backlog of more than \$60 billion and a maintenance backlog so severe that tribal roads and bridges often deteriorate years before they should. This wastes taxpayer dollars and increases the construction backlog. Maintaining a road or bridge is far cheaper than full replacement.

Unless Congress can assure the solvency of the Highway Trust Fund, significant funding increases for tribes will be difficult in the next highway reauthorization. History indicates, however, that tribes

could achieve many more successes by working on a common set of legislative objectives benefiting all.

United Front

A group of tribal transportation leaders have formed the Tribal Transportation Unity Caucus and proposed a new highway bill to address many of the lingering bureaucratic and funding issues on the federal side of tribal transportation systems. The Tribal Transportation Unity Act (TTUA) would increase funding for the TTP to \$800 million for FY 2015, with annual step increases of \$50 million to reach \$1.05 billion in FY 2020; the TTUA also would reallocate or increase funding for the other related programs to meet the realities of transportation systems in Indian Country.

In addition, the TTUA would streamline the process for tribes to assume responsibility for their own transportation projects, creating a Tribal Self-Governance Program within U.S. DOT and ensuring tribal eligibility for all federal discretionary and competitive transportation grants.

The National Congress of American Indians, the Intertribal Transportation Association, and many tribal governments and organizations have endorsed the TTUA. This united front is working to move a reasonable bill forward to support tribal transportation systems and to deliver a positive message for job creation, economic empowerment, and a dramatic decrease in traffic fatalities in Indian Country.



PHOTO: KEVIN DOOLEY, FLICKR

A roadside memorial on the Gila River Indian Reservation in Arizona. By making it easier for tribes to fund their own transportation projects, the Tribal Transportation Unity Act could help increase safety on tribal roads.

Transportation Fellowship Helps Young Researcher Examine Maintenance Policies for Tribal Roads

Sherwin Racehorse, a member of the Shoshone–Bannock Tribes of the Fort Hall Indian Reservation in Idaho, received a Dwight David Eisenhower Transportation Fellowship in 2011 and 2012 from the Federal Highway Administration's (FHWA's) Universities and Grants Program to research and evaluate the problems of the Indian Reservation Roads (IRR) maintenance program. His findings presented strategic options and a preferred alternative for federal and tribal decisions about the allocation of funds for road maintenance projects.

Inadequate maintenance funding for the IRR program—a long-term problem—has resulted in dilapidated Indian roads nationwide. The number of deteriorated roadways has escalated, creating a backlog of road reconstruction and paving projects, a national highway safety problem, and livability issues for tribal communities.

The failure to maintain roadways and extend their service life has counteracted substantial investments in new road construction. Inadequate funding for maintenance of the IRR system is a long-recognized problem, and the effects of recent changes in regulatory programs to provide alternative sources of maintenance funding have not yet been evaluated.

The Eisenhower research project explored the history of appropriations for IRR maintenance, analyzed conditions on reservation roadways, researched Bureau of Indian Affairs (BIA) policies, evaluated and compared state versus federal and tribal appropriations, identified recent changes in surface transportation programs, and reviewed the regulations regarding the IRR maintenance program.

The report noted that tribal roadways are in poor condition because of inadequate annual funding for maintenance during the past 30 years. The research found an increasing backlog of deferred maintenance and the need for more reconstruction and paving projects with a total price tag in billions of dollars.

The research indicated that tribes did not understand the complicated process of appropriations for road maintenance by the U.S. Department of the Interior, which relied on the controversial Tribal Priority Allocation (TPA) formula; the work-



PHOTO: CHRISTINE GERENCER

Research by Eisenhower Fellow Sherwin Racehorse revealed a growing backlog of deferred road maintenance in Indian Country, an indication that the Tribal Priority Allocation formula is not well understood by tribal transportation departments.

ings of the department's annual appropriation of \$25 to \$26 million also were poorly understood. Moreover, the effects of the surface highway legislation that limited maintenance funding to not more than 25 percent of a Highway Trust Fund grant have not been determined.

The research recommendations called for tribal leaders to take a more active role in the preservation of tribal roadways, for an increase in Department of the Interior appropriations, for ending use of the TPA formula to determine maintenance funds, and for the funding of reservation roads maintenance based on documentation of unmet need. FHWA and BIA were asked to analyze results and determine if the 25 percent program was working and to incorporate the findings in decision making for forthcoming reauthorizations of the highway bill.

The only Native American selected for the Eisenhower Fellowship in 2012, Racehorse conducted his research at Eastern Washington University, Cheney, working

with Dick Winchell, Professor of Urban and Regional Planning, who suggested the research framework and techniques. In August 2013, Racehorse received a bachelor's degree in Urban and Regional Planning from the university's College of Business and Public Administration. He plans to enter a graduate program in planning, architecture, or law in fall 2016.

The Eisenhower Fellowship allowed Racehorse to complete in-depth research with key information gathered from the BIA Division of Transportation. The grant also enabled him to participate in Annual Meetings of the Transportation Research Board in Washington, D.C., and to present research results in poster sessions.



Racehorse

In addition to the Eisenhower Fellowship, Racehorse received a 2012 Udall Scholar award from the Morris K. Udall and Stewart L. Udall Foundation, which supports research and studies in tribal policy, among other topics. In addition, he was selected to provide video testimony for the Fast Forward initiative funded by FHWA to enhance awareness of transportation industry career opportunities among middle school, high school, and community college students and faculty (see <http://fastforward.unl.edu/issues/issue2/sherwinracehorse.html>).

—Raquelle Myers



PHOTO: CHRISTINE GERENCHER

Fixing the Potholes

Tribes Exercise Practical Sovereignty to Assume Control of Tribal Transportation Systems

JAMES GLAZE AND NATHANIEL AMDUR-CLARK

The authors are with Sonosky, Chambers, Sachse, Endreson & Perry, LLP; Glaze is Partner, in the San Diego, California, office; and Amdur-Clark is Policy Advisor, in the Washington, D.C., office.

(Above:) The Moki Dugway in Utah, an unpaved but well-graded switchback road, offers views over the Valley of the Gods near Navajo tribal lands.

Ask what governments are supposed to do, and a common answer is “fix the potholes.” For most of the 20th century, the Bureau of Indian Affairs (BIA) was the government agency charged with fixing the potholes on tribal lands. But after decades of federal underfunding, roads and bridges on tribal lands—commonly called Indian Country—were some of the most dangerous and least reliable of any transportation network in the United States.

Too many citizens have lost their lives and too many businesses have limited their investments because of the poor condition of tribal transportation infrastructure. Tribal leaders therefore decided that their nations must exercise their own governmental authority to fix the potholes—and much more—instead of relying on the federal government.

Making the Impossible Happen

The elected leaders of the Standing Rock Sioux Tribe, for example, decided to address the unreliable and dangerous road conditions in the eight tribal communities on the Standing Rock Sioux Reservation. As of 2000, community streets on the 2.3-million-acre reservation straddling the border of North and South Dakota had not received major road improvements in decades, and the transportation network was in crisis.

Most streets were unpaved, and the few paved routes were marred with deep potholes and periodic washouts. Ambulances struggled to respond to health emergencies, school buses had difficulty transporting students safely, and tribal economic development suffered.

Charles W. Murphy, then Tribal Chairman, tasked



PHOTO: SAMANTHA ERICSON, U.S. DEPARTMENT OF AGRICULTURE

Charles Murphy (left), past Tribal Chairman of the Standing Rock Sioux tribe, at a 2012 summit of tribal leaders. In the early 2000s, Murphy advocated for a solution to replace deteriorated roads on the reservation and to maximize limited federal funding for improvements.

Pete Red Tomahawk, the architect of an innovative funding plan for the Standing Rock Sioux Tribe's community streets project, addresses the 2013 National Tribal Transportation Conference.

Transportation Director Pete Red Tomahawk, the tribe's engineers, and the tribe's attorneys to find an innovative solution that would serve all Standing Rock Sioux citizens better. The goal was to fix all streets at the same time, instead of selecting winners and losers among the eight tribal communities.

Although common in many American communities, paved streets, sidewalks, curbs, and streetlights are rare on most rural Indian reservations. The tribe's engineers estimated that modern paved streets, sidewalks, streetlights, and a well-functioning curb-and-gutter system would cost more than \$26 million. The Standing Rock Sioux Tribe, however, only received approximately \$1 million dollars annually from the Indian Reservation Roads (IRR) Program,

Chairman Murphy directed Red Tomahawk to make the impossible happen for the good of the tribe and its people. The plan required several years of hard work, rounds of negotiations with officials from BIA and the U.S. Department of the Interior, and pressure from the North Dakota and South Dakota congressional delegations before ultimate success.

Innovative Agreement

Although states and counties have used bond financing for large construction projects, no tribal government had ever used its annual IRR Program funding to finance a large tribal road construction project over several years. Pay-as-you-go financing was required, even if bonds and other sources made good financial sense.

For nearly two years, attorneys in the Department of the Interior refused to approve an award instrument for construction funding to cover the full estimated cost for the community streets project. In 2003, however, the Standing Rock Sioux Tribe broke the federal logjam and financed a \$26.5 million reconstruction of all community streets through an innovative advance construction agreement with BIA. Under the agreement, the tribe leveraged a portion of its future allocation of IRR Program dollars and other tribal funds to secure a bank loan for the project.

The completed project has resulted in a decrease in traffic accidents, increased economic development, and a renewed sense of pride and accomplishment on the reservation. One tribal member, quoting the old television show *The Jeffersons*, said that the project made everyone feel they "were moving on up."

Moreover, by improving all the community streets simultaneously with a relatively low-interest loan, the tribe saved money. Only a few years after completion of the project, the engineering firm estimated that construction cost inflation and other factors would have nearly doubled project costs under the traditional pay-as-you-go financing.

The Standing Rock Sioux Tribe's success is more than a story of one tribe's efforts to increase the safety, pride, and well-being of its members. This exercise of practical sovereignty illustrates how visionary tribal leaders and advocates are creating opportunities for all tribes by pushing the evolution of federal transportation laws and policies toward greater tribal self-determination and self-sufficiency.

Expanses and Diversity

Indian Country—the Indian reservations and other types of uniquely tribal communities—comprises lands governed by the 566 federally recognized Indian tribes in the United States. Nonetheless, the more than 145,000 miles of public roads and more than 4,400 public bridges serving the Indian Country communities are owned by an assortment of public authorities, including tribal governments, federal agencies, states, and county governments. These roads log more than 26 million vehicle miles every day yet suffer from a construction backlog that



PHOTO: EASTERN TPAP AT MICHIGAN TECH



Roadway in the Four Corners area of the Navajo Nation. In the past 30 years, tribal governments have assumed greater control over planning, construction, and maintenance of transportation systems, as well as over federal transportation funds.

would cost more than \$60 billion to reach a minimally safe condition.

Indian Country is large and diverse; by most estimates, the total population exceeds 7 million. Indian reservations cover more than 55.7 million acres, or 2.3 percent of the total acreage of the United States—that is, more than 87,000 square miles or approximately the size of Minnesota. With other tribal lands included, the figure approaches 3 percent of the U.S. land mass or approximately 113,000 square miles—roughly the size of Arizona, the sixth largest state. Twelve Indian reservations are larger than Rhode Island, and nine are larger than Delaware. The Navajo Nation Reservation encompasses parts of four states and is approximately the size of West Virginia.

Many tribal nations occupy lands they first settled thousands of years ago. Other tribes were forcibly relocated; the Cherokee Nation's infamous Trail of Tears is one of the best-known examples. Indian Country includes portions on the East Coast, the West Coast, the Great Plains, the Rocky Mountains, the Midwest, the Southwest, and Alaska. Treaties, executive orders, federal statutes, and federal land grants from the public domain have reserved the lands for tribal jurisdiction and self-government.

Finding the Funding

Historically, federal, state, and local transportation officials dealt with BIA on issues related to tribal lands, roads, and bridges; they did not deal directly with the sovereign tribal governments or coordinate transportation planning with tribal officials. BIA officials often felt comfortable speaking on behalf of tribal governments on transportation matters

because they had filled that role for many years.

But before 1990, relatively few tribal governments were equipped to address transportation issues if consulted by other government officials. Only the largest tribes had well-established transportation departments, with transportation directors and planners on staff. Other tribes often relied on BIA engineers and transportation planners. Many BIA officials worked hard to improve the road conditions within tribal communities, but government bureaucracy often resulted in Indian Country roads and bridges falling further behind the rest of the country, becoming more dangerous, outdated, and “functionally deficient.”

The lack of much-needed funding from Congress did not help. Indian Country roads and bridges make up more than 6 percent of the combined road mileage of all Federal-Aid Highways and federally owned roads, but tribal transportation programs receive less than 2 percent of federal transportation funding.

Former Senator Byron Dorgan (Democrat, North Dakota) summed up the situation at a congressional oversight hearing in the mid-2000s:

A transportation system is the lifeline for a community, making it possible for our children to get to school and for our families to travel to work, hospitals, and health clinics. A sound transportation system is essential to economic growth and civic activity. Unfortunately, in Indian Country, the majority of the roads are unsafe and unreliable. The statistics are alarming. Motor vehicle injuries are the leading cause of death for Native Americans ages 1 to 34, and the third

The Shoshone–Bannock Tribes Public Transit Program was started with grants from the American Recovery and Reinvestment Act and from the Federal Transit Administration.



PHOTO: DEPARTMENT OF TRANSPORTATION, SHOSHONE-BANNOCK TRIBES

leading cause of death overall for Native Americans. The death rate from motor vehicle accidents for American Indians is nearly twice as high as other races.

Today, tribal governments are working to solve these problems themselves. Even the smallest tribes have at least a part-time transportation planner, and some of the larger tribes have transportation departments and staffs that rival state transportation departments. That this has happened in a span of 30 years is not an accident.

Tribal Transportation Today

During the past three decades, tribal governments have abandoned the outdated BIA-dominated model to become the primary deliverers of transportation services for tribal members and others who use these public roadways. The tribal transportation landscape today is as varied as the tribes themselves, but with a few themes in common.

Tribal governments now administer more than 90 percent of the \$450 million per year in federal funding made available for the Tribal Transportation Program, formerly called the Indian Reservation Roads Program. Tribes design, construct, and rehabilitate road, bridge, scenic byways, bicycle, and pedestrian pathway projects with Federal Highway Administration (FHWA) grants and occasionally with the larger, highly competitive Transportation Investment Generating Economic Recovery, or TIGER, grants.

Tribes also run local transit programs and directly administer Federal Transit Administration grants. They conduct roadway safety audits and administer traffic safety grants from the National Highway Traffic Safety Administration.

Most tribes establish their own transportation

project priorities through the development of long-range transportation plans and Tribal Transportation Improvement Plans (TTIPs). Although BIA and FHWA still review and approve TTIPs before spending federal funds on tribally prioritized projects, an array of federal laws and regulations now firmly have established tribal governments as the leading force in the development and delivery of tribal transportation programs and services within their territories.

Tribes now develop and approve their own project designs; acquire their own project rights-of-way; hire their own engineers, construction workers, and contractors; and enter into intergovernmental agreements with states, counties, municipalities, and federal agencies, largely free from BIA control.

Moving Forward

The growth of tribal transportation programs and the increase in tribal self-determination, self-governance, and professional capacity in the transportation arena in the past few decades have been impressive. As tribal governments gain experience planning, designing, building, and operating transportation projects and programs, tribal leaders can press for more freedom from federal bureaucracy to exercise practical sovereignty and assume primary responsibility for delivering transportation services in their own communities. Tribal nations increasingly are recognized by federal, state, and county transportation officials as the primary providers of transportation service in their communities.

This growing recognition and respect for tribal transportation capacity has led to greater collaboration with state and local governments and to greater acceptance of tribal sovereignty in this key area. Sustaining this progress is a win-win scenario for tribal, federal, state, and local transportation departments, as well as for the public traveling on the roadways.

Tribal Transportation Planning and Geographic Information Systems

Applying High-Tech Tools and Expertise to Advance Initiatives

GARET COUCH AND LETISHA COUCH

The National Tribal Geographic Information Support Center (NTGISC), also known as Tribal GIS, is a nonprofit organization assisting Native American tribal governments and Native American organizations to apply geographic information technology. The center brings together novice and advanced GIS users in an organized environment and works to enable those who have had experience and success with GIS to help other tribal communities and programs.

Tribal GIS addresses the challenges for tribal governments in adopting GIS as a tool for critical decision making in the stewardship of lands, resources, and the health and well-being of their people. The center aims to increase awareness of the advantages of implementing and maintaining a successful GIS program and is establishing best practices and standards for GIS within Indian Country.

The Chickasaw Nation, located in Oklahoma, recently completed a successful tribal transportation effort assisted by GIS in creating the Rising Waters Ancient Mountains Scenic Byway, serving visitors to such sites as Turner Falls and the Chickasaw National Recreation Area. The 73.6-mile road was declared a state scenic byway in May 2011 and offers a range of cultural, historical, and recreational experiences.

The Chickasaw Nation spent more than a year collaborating with local officials, the Oklahoma Department of Transportation (DOT), and the National Park Service to identify the route and to document the required intrinsic qualities—scenic, archaeological, cultural, historic, and natural—to gain support for designation as a state scenic byway. The Chickasaw Nation's Roads Department first requested assistance from the state's Department of GeoSpatial Information (GSI) to use GIS in identifying the route and spurs. GIS played a significant role in the planning stages by helping to determine the local, state, and federal agencies that should be involved.



GIS workshops helped the Chickasaw Nation and collaborators develop the route for the scenic byway.



Photo: Jose Joseph, Flickr

Turner Falls in Oklahoma is a stop on the Rising Waters Ancient Mountains Scenic Byway, which was designed and established using geographic information systems.

After the route and the spurs were identified, along with the requisite intrinsic qualities of the area, GSI reviewed the scenic byway application in detail. When the assessment was complete, data collection began by creating a data dictionary for each intrinsic quality resource identified in the application. A Trimble GeoXH GPS unit drove along the route and collected data on all relevant sites. The unit exported information from 358 sites into a geodatabase to create intrinsic quality resource maps of the route and its spurs.

GSI's analyst and two interns worked on the project for seven months. The team sorted the intrinsic quality features into the following categories: scenic resource features, cultural resource features, recreational resource features, natural resources, and nonscenic and economic development features. GSI created 35 maps to accompany the application.

After gaining the scenic byway designation for the route, the Chickasaw Nation immediately applied for grants to install wayfinding signage. GSI coordinated with the Roads Department to determine the signage needed along the route and provided detailed aerial maps for the precise location of each sign. The grant was awarded, and the Chickasaw Nation has been working with Oklahoma DOT to install the signs.

G. Couch is Business Manager, Wind Environmental Services, Inc., Bonne Terre, Missouri. L. Couch is Vice President, National Tribal Geographic Information Support Center, Bonne Terre.

The Turtle Mountain Scenic Byway in St. John, North Dakota, runs near the Turtle Mountain Band of Chippewa Indians Reservation in Belcourt. Federal roads on tribal trust lands raise complex right-of-way issues.



PHOTO: PEGGY LANGRAN

Right-of-Way Through Indian Country

The Complexities of a Commonplace Arrangement

RAQUELLE MYERS AND RON HALL

Myers is Staff Attorney, National Indian Justice Center, Santa Rosa, California, and Cochair, TRB Native American Transportation Issues Committee. Former Director, Tribal Technical Assistance Program, Colorado State University, Hall is President, Bubbar and Hall Consulting, Fort Collins, and Chair, National Cooperative Highway Research Program Project Panel on Identification of Results-Oriented Public Involvement Strategies Between Transportation Agencies and Native American Tribal Communities.

Securing right-of-way is common when constructing a road or maintaining utilities. Obtaining right-of-way through Indian Country, however, is a complex process, subject to various rules and regulations related to the timing, purpose, and scope of the request. Tribes that have obtained the title for lands transferred from a federal agency may be subject to the rights-of-way already in effect.

What Is Right-of-Way?

Right-of-way has several meanings. In the context of property law, right-of-way is the right to travel over someone's land and to have the reasonable use and enjoyment of the property consistent with the owner's use and enjoyment of the land. Generally, the landowner transfers the right to use the land but not the ownership of the land. The right-of-way may be a specific grant of land or pathway or it may be an easement, which is a right or a permission to pass across another's land. Some rights-of-way are for a specific use, such as the repair of telephone lines.

Normally, tribal, local, state, or federal governments seek a right-of-way for a public purpose, such as roads, railroads, utilities, or other public access needs. For example, utility companies seek rights-of-way for the placement of telephone poles, power lines, and other equipment, to provide services to customers.

Rights-of-way through Indian Country create unique jurisdictional conflicts between tribal, state, and federal governments. Determining which jurisdiction has the authority to give, revoke, or patrol a right-of-way is often difficult, as is the resolution of disputes that may arise.

Right-of-Way Authority

Indian Country has changed with treaties, land cession agreements, and the establishment of tribal reservations, rancherias, and colonies. Authority to grant right-of-way through Indian Country often was established by acts of Congress during the early settlement years of the United States.

The first step in determining the authority or

authorities that pertain to a right-of-way in Indian Country is to inquire into the category of land or lands that the right-of-way crosses. Indian Country comprises a variety of land types:

- ◆ Trust lands held by the federal government for the benefit and use of Indian tribes were established through treaties, Executive Orders, or Congressional Acts.

- ◆ The 1887 Allotment Act and Federal Assimilation Policy was applied to tribal trust lands in an effort to break up tribal communities and force tribe members into mainstream America. The policy removed the lands from trust, to be divided among identifiable heads of households. This resulted in the following land types in addition to tribal trust lands within tribal reservation boundaries:

- Individual trust lands, held by the federal government for the benefit and use of an individual Indian;
- Fee lands owned by an individual who may be Indian or non-Indian; and
- Restricted fee lands that often conveyed the title on the condition that the fee owner would not alienate, encumber, or convey the land by judgment, decree, or order of a court for a stated period of time. The prohibitions often included a prohibition against taxation of the land.

Restricted fee lands and individual trust lands are treated similarly under many federal regulations.

Defining Indian Country

The next step in identifying the potential authorities over a given right-of-way is to ask: Is the right-of-way considered Indian Country? Several statutory definitions, used for various purposes, apply to the term Indian Country. The most commonly used definition is found in the U.S. Criminal Code, Title 18 USC § 1151:

- [T]he term “Indian Country” ...means
- (a) all land within the limits of any Indian reservation under the jurisdiction of the United States government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation,
 - (b) all dependent Indian communities within the borders of the United States, whether within the original or subsequently acquired territory..., and whether within or without the limits of a state, and
 - (c) all Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through....

Tribal Interests in Right-of-Way

In the 1997 case of *Strate v. A-1 Contractors*, the U.S. Supreme Court, in determining tribal jurisdiction over parties to an automobile collision on a right-of-way, characterized the right-of-way as fee land with non-Indian ownership. The court did not discuss the validity or the purpose or scope of the right-of-way.

Tribes therefore should locate the documentation for current rights-of-way over tribal lands, determine the date of expiration, and determine if the original purpose of the right-of-way is still in place or has changed. A right-of-way that has changed may be renegotiated at market value. Asserting tribal jurisdiction over the right-of-way ensures that the Tribal Employment Rights Ordinances apply to projects that take place on the right-of-way.

The case of *Strate v. A-1 Contractors* complicates the determination of whether a right-of-way can be deemed Indian Country. In *Strate*, the U.S. Supreme Court found that for purposes of civil jurisdiction over a non-Indian plaintiff and a non-Indian defendant, the right-of-way running through a reservation could be treated as fee land owned by non-Indians. This ruling, however, is limited to the case and is not applicable to situations that involve right-of-way for road construction and maintenance (see box, above).

Historic Precedents

Federal legislation established historic rights-of-way in Indian Country and in some instances confirmed the right-of-way afterward. The process for obtaining a right-of-way through Indian lands has changed significantly and differs from that for obtaining a right-of-way through private property under state jurisdiction.

PHOTO: NATIONAL ARCHIVES AND RECORDS ADMINISTRATION



Federal government logging in the 1970s destroyed salmon spawning grounds on Quinalt Reservation lands in Washington State. In 1983, the U.S. Supreme Court determined in *United States v. Mitchell* that the government was responsible for damages. Federal legislation clarified the responsibility—and liability—of the U.S. government to Native American tribes and for actions taken on tribal land.

A 1943 photograph shows a Santa Fe Railroad train stopping in Laguna, New Mexico. In the 1880s, members of the Laguna Pueblo agreed to allow the railroad to pass through the reservation if the railroad employed tribal members.

The General Allotment Act of 1887 initiated a series of federal right-of-way statutes. Tribal lands were declared surplus and were opened for homesteading and acquisition by settlers. The settlers developing these lands needed transportation infrastructure and, later, utilities. Before 1899, most rights-of-way through Indian lands were obtained through direct agreements with tribes or with individual landowners and then ratified by Congress.

Exercising these new-found plenary powers over Indian affairs, Congress enacted a series of laws in the early 20th century that delegated to the Secretary of the Interior the authority to grant rights-of-way without landowner consent. Railroad rights-of-way were the first easements to cross Indian lands, starting in 1899.

The grants of railroad easements set the precedent for individual congressional acts authorizing right-of-way through Indian lands. On March 11, 1904, for example, Congress authorized “the Secretary of the Interior to grant a right-of-way in the nature of an easement for the construction . . . of pipelines for the conveyance of oil and gas through any Indian reservation or through any lands which have been allotted.”¹

The law was silent about tribal consent on creating rights-of-way but may have required consent for renewals. Documentation of the rights-of-way and renewals from this era is difficult to locate. On March 4, 1911, Congress authorized the “head of the department having jurisdiction over the lands” to grant rights-of-way for electric transmission lines across Indian reservations.²

¹ 25 USC § 321 (1904).

² 43 USC § 961 (1911).

Right-of-Way in the 20th Century

The congressional legislative approach to right-of-way created confusion for the federal agencies responsible for managing tribal trust assets. During the early 20th century, tribal lands transitioned from trusts to private ownership. New private land owners could provide others with right-of-way within the boundaries of a tribal reservation without notifying the tribe or the U.S. Department of the Interior.

In 1928, the Secretary of the Interior released comprehensive regulations governing right-of-way over Indian lands. The regulations covered rights-of-way for oil and gas pipelines, electricity transmission lines, railroads, telephone and telegraph lines, roads, drainage and irrigation projects, and other purposes.

Six years later, Congress passed the Indian Reorganization Act (IRA) of 1934. The IRA ended the allotment process and set forth policies that recognized tribal authority and encouraged tribal control of reservation land and resources. Although including provisions on compensation and damages for rights-of-way, the IRA did not require tribal or landowner consent for establishing a right-of-way.

The first mention of tribal consent to right-of-way appears in the definition section of 25 CFR § 256.83 (circa 1939), “Consent of Allottees or Tribe.” The provision required that right-of-way applications be presented to a tribal government but did not require tribal consent to the right-of-way.

The Indian Right-of-Way Act of 1948 added another level of complexity.³ The provisions limited the power of the Secretary of the Interior over right-of-way on trust or restricted fee lands but did not explain the relationship to the original statutes.

³ 62 Stat. §17, 25 USC §§323-328.



PHOTO: LIBRARY OF CONGRESS PRINTS AND PHOTOGRAPHS DIVISION



Trains transport coal from the Kayenta Mine to the Navajo Generating Station in Arizona. The railroad runs on 78 miles of right-of-way on Navajo Nation tribal lands.

Nonetheless, the 1948 statutes had positive outcomes for tribes. The most significant was that tribes organized under the IRA must give consent for right-of-way across Indian lands. Moreover, the regulations expanded the consent requirement beyond IRA tribes to all tribes. The 1948 laws also made clear that landowners must be compensated justly at fair market value for a right-of-way. In 1951, the Department of the Interior developed the regulations governing right-of-way and established a unified procedure for applications, whether for pipelines or other purposes.⁴

In 1971, the Bureau of Indian Affairs (BIA) *Manual for Rights-of-Way on Indian Lands* stated the need to consider tribal communities and landowners in obtaining right-of-way through Indian country. The regulations gave landowners opportunities to negotiate new or renewed rights-of-way. The compensation section required that not less than fair market value must be paid, unless waived in writing, and that the Interior Secretary “shall obtain and advise the landowners of the appraisal information to assist them...in negotiations for a right-of-way or renewal.”⁵ The regulations further stated that the applicant must pay the landowners for all damages caused by surveys or by the construction and maintenance of the facilities.

Right-of-Way Today

Today, the regulations governing right-of-way over Indian lands are found in the *Code of Federal Regulations* (see box at right). These regulations cover all types of easements, including those required for state and local highways.

⁴ 16 Fed. Reg. 8578 (1951).

⁵ 16 Fed. Reg. 8578 (1951).

The process of acquiring easements over Native American lands is similar to the steps to obtain property not held in trust: the acquiring agency identifies land requirements; surveys the proposed acquisition; identifies ownerships; appraises the property; and conducts negotiations.

When lands are held in trust for Native Americans, however, eminent domain is generally not available, except in rare instances. No authority allows the condemnation of property to acquire tribal lands, and allotted lands are rarely condemned, because federal courts retain jurisdiction.

The most recent legislation addressing right-of-way over Indian lands is the Energy Policy Act of 2005. The legislation contains new provisions that authorize tribes in certain circumstances to “grant a right-of-way over tribal land for a pipeline or an electric transmission or distribution line without approval by the Secretary.” This is a significant departure from preceding law and is designed to encourage tribes to develop their own energy resources.

Right-of-Way over Indian Lands

Code of Federal Regulations, Title 25

169.23 – Right-of-Way for Railroads

169.24 – Right-of-Way for Railroads in Oklahoma

169.25 – Right-of-Way for Oil and Gas Pipelines

169.26 – Right-of-Way for Communications

169.26 – Right-of-Way for Public Highways

169.27 – Right-of-Way for Power Projects

Working with tribal nations to preserve and protect Native American cultural resources, Washington State DOT chose the Aberdeen Log Yard outside of Seattle as a staging site for the SR-520 floating bridge project.



Often a state will obtain right-of-way from a federal agency or tribal community for transportation infrastructure in Indian Country. The state may have laws that allow it to own the right-of-way—in some instances, in perpetuity. The primary question is whether the state has removed the property associated with the right-of-way from tribal jurisdiction for all matters. This is a difficult question that may determine liability for accidents on problem roads or determine jurisdiction over civil and criminal matters arising on the right-of-way.

Transportation agencies responsible for developing tribal transportation infrastructure prefer to have long time frames for the right-of-way. This allows the agency to plan, construct, and maintain the road without having to obtain right-of-way repeatedly. One concern, however, is that state rights-of-way may prohibit a tribal transportation agency from performing immediate or emergency maintenance without permission of the state—for example, after a rockfall that blocks ingress and egress to a tribal community.

Addressing the Issues

Agencies that develop transportation infrastructure in tribal communities should address the following primary issues for right-of-way on tribal lands:

- ◆ Documentation for current right-of-way over tribal lands should be part of the tribal archives.
- ◆ Tribal communities should develop their own rules and regulations for obtaining, transferring, and concluding right-of-way and for managing the impacts on local landowners.
- ◆ Documented right-of-way should be reviewed for a date of expiration. If no documentation is available, the purpose, scope, date of expiration, and mar-

ket value should be renegotiated.

- ◆ A memorandum of agreement should establish jurisdiction over a right-of-way and activities on a right-of-way. Any excavation for new or current rights-of-way, for example, should not start before the completion of tribal consultation.

- ◆ The location of cultural resources may not be obvious to anyone outside the tribal community. Although mapping technology has made great strides, only tribal geographic information systems professionals may know all the cultural resources data. Payment for damages to tribal cultural resources and burial sites cannot be quantified.

More recently, questions have arisen about the application of Tribal Employment Rights Ordinances (TERO) to state transportation projects on a right-of-way on or near tribal lands. Some states notify the contractor that TERO may apply and request that the competitive bid include the cost of the training required under the ordinances. Other states negotiate the training cost agreements with the tribes so that the contractor does not shoulder the expense.

Research Focus

Issues of right-of-way through Indian Country have generated a variety of research projects. BIA is developing a Land Title Record Digitization project that could include information about right-of-way through Indian lands. This would improve the capacity for title searches, as well as public access to the information.

While this project is under development, tribes and states should begin identifying rights-of-way, documented and undocumented. The rights-of-way that are documented should be shared among tribal, state, and federal transportation agencies.

Kevin Dayton (center), Washington State DOT Olympic Region Administrator, greets Zelma McCloud, Nisqually Tribal Elder, at a ceremonial groundbreaking for two new roundabouts on SR-510 in Yelm.



PHOTO: WASHINGTON STATE DOT

Transportation Research in Indian Country

Lessons Learned from Recent Projects

GIOVANNI MIGLIACCIO AND ALBERT T. STODDARD III

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Efforts to involve tribal communities in transportation planning and project implementation have increased in the past decade. Research on tribal transportation, however, has not kept pace with the large amount of transportation research produced for state agencies on a variety of topics, creating a knowledge gap on tribal transportation issues.

Recently, the TRB Native American Transportation Issues Committee has begun a significant effort to fill the gap. The committee has organized sessions and workshops at TRB Annual Meetings on tribal transportation issues and has worked with other committees to promote research on shared issues.

Two recent efforts supported by the committee, working in conjunction with others, received funding and guidance from TRB's National Cooperative Highway Research Program (NCHRP) and Transit Cooperative Research Program (TCRP). The products of these research projects included guidebooks, reports, information brochures, and PowerPoint presentations.

Tribal-Agency Collaboration

NCHRP Project 8-65, initiated by the Native American Transportation Issues Committee jointly with the TRB Public Involvement Committee, produced NCHRP Report 690, *A Guidebook for Successful Communication, Coordination, and Cooperation Strategies Between Transportation Agencies and Tribal Communities*. The research explored effective strategies for tribal-agency collaboration and identified communication, coordination, and cooperation (the 3Cs) between stakeholders as the keys to a successful project environment. Incorporating the 3Cs into imple-

Washington State DOT developed a Tribal Transportation Planning Guide to aid in coordinating transportation projects with tribes.

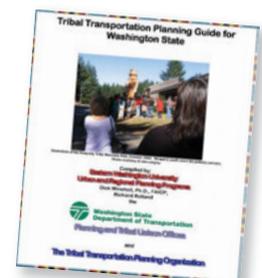




PHOTO: EASTERN BAND OF CHEROKEE INDIANS PUBLIC TRANSIT

An effective transit system website, such as that of the Eastern Band of Cherokee Indians Public Transit—highlighted in TCRP Report 154—provides schedules, updates, and links to more information about specific services.

mentation strategies facilitates transportation project delivery and working relationships among stakeholders.

The research reviewed the literature on programs and initiatives to enable collaboration between transportation agencies and tribal communities. Initiatives were categorized as communication, coordination, or cooperation best practices.

The project then surveyed professionals in tribal transportation about the effectiveness of each practice with respect to commonly encountered issues on transportation projects. The resulting guidebook provides a description of the effective practices identified, as well as the lessons learned from each of the practices.¹

Tribal Transit Project

Since the establishment of the Federal Tribal Transit Program, the number of tribes with a public transit service has grown to more than 100, and additional

tribes are planning and implementing new services. Although many tribes have started transit programs, some had to overcome challenges, and others have not proved successful. TCRP Project H-38, Planning, Developing, and Sustaining Tribal Transit Programs, sought to identify the characteristics of successful tribal transit programs and to develop materials to help tribes improve transit services.

In Phase 1 of the project, researchers contacted tribes to determine if a public transit service was operating and to gather basic information about the service. In Phase 2, researchers conducted a more detailed interview about the transit service or the reasons that the tribe had been unable to implement a transit service. Several tribes were selected for site visits and case studies for inclusion in the guidebook, published as TCRP Report 154.²

Project Challenges

Researchers encountered two challenges in these projects. First was overcoming a pervasive unwillingness among tribes to participate. The research for TCRP Project H-38, for instance, required collecting detailed data and information from tribes with and without transit programs. The data focused on transit operations. In Phase 1, 95 tribes received questionnaires, and although only two explicitly stated that they would not participate, other tribes failed to respond. In all, 67 submitted the information—a response rate of 71 percent.

The second challenge was obtaining the data and information in a timely manner. In Phase 1, tribes were asked if they would be willing to participate in Phase 2. Of the 67 tribes that responded in Phase 1, 54 continued into Phase 2, and 48 provided the information—a response rate of 89 percent. Again, obtaining the data in Phase 2 required several contacts and in some cases many follow-ups with individual tribes to obtain the information.

Overcoming the Challenges

To overcome the challenges of obtaining the data for TCRP Project H-38, researchers used a personal approach. Members of the research team were assigned responsibility for all contacts with individual tribes. The assignments were based as much as possible on past work experience with the tribes and personal knowledge of the tribe.

The first step was to determine the appropriate contact person at each tribe. In some cases, the identification took nearly two months. Communication with the tribal representative to obtain the information was by follow-up phone calls and e-mails. Many



For more information on NCHRP Report 690, visit www.trb.org/Publications/Blurbs/165472.aspx. For more information on TCRP Report 154, visit www.trb.org/Publications/Blurbs/166797.aspx.



¹ www.trb.org/Main/Blurbs/165472.aspx.

² <http://www.trb.org/main/blurbs/166797.aspx>.

tribes responded promptly, but others took much longer. In some cases, responses were not received for several months. The high response rate ultimately achieved was the result of personal contact and persistent follow-up.

Attending events in which the tribal transit representatives participated was another help. Members of the research team traveled to several conferences and events, made brief presentations about the research project, and took the opportunity to contact the selected tribes and encourage participation.

Research Approaches

These research projects have yielded four suggestions for conducting transportation research programs with tribes:

1. **Design the research program with elements that will mitigate some of the challenges.** For example, allow sufficient time in the schedule to revise the research program and to afford flexibility in collecting data. If the research requires approval by an academic institution's or tribe's review board, include the time to obtain the approvals. Similarly, staff and panel members who may be overseeing the progress of the research—as with TRB's NCHRP and TCRP projects—should expect the need for extensions.

2. **The importance of personal contact cannot be overemphasized.** Research projects in the past have not always been forthright with tribes, provoking justified skepticism about outside agencies conducting research. Establishing personal relationships and being up front and honest are extremely important. Building trust was beneficial in obtaining data and information from the tribes.

3. **Researchers must be patient in working with tribes.** Participating in research may not be a priority for tribal staff, who often are overburdened with other pressing tasks. Finding the correct contact person and obtaining a response may take time. Patience and personal relationships are two keys to success in collecting data.

4. **The research plan should provide sufficient time to overcome challenges, particularly in collecting data.** In both the NCHRP and TCRP projects, the data collection required more time than anticipated. Data collection may take twice as long as normally anticipated for other similar projects, because of the need to make contact, build a personal relationship, and obtain the information.

NCHRP Project Findings

According to the findings in NCHRP Report 690, transportation projects that affect tribal communities encounter issues unique to the tribal environment.

PHOTO: OREGON DOT



These issues include cultural competency, sovereignty, the protection and preservation of sensitive resources, the confidentiality of tribal matters, land ownership, and monetary matters. Collaboration among stakeholders becomes critical to a project's success.

To improve understanding, the final NCHRP report describes each issue and presents a process for identifying the particular issues that may be encountered on a given project. Because methods of implementation are not always clear, case studies in the guidebook illustrate best practices in communication, coordination, and cooperation. Summaries of situations in which states and tribes successfully collaborated on projects are coupled with statements of the lessons learned. Interviews with transportation officials provided the data and information for the case studies.

The results were presented as a tool for collaboration among stakeholders on tribal transportation projects. With the validation and case studies, agencies can identify practices of communication, coordination, and cooperation that are appropriate for specific issues. The recommendations, along with the lessons learned, provide guidance for improving current practice and enhancing transportation programs.

Five Keys

The TCRP project found five keys to sustainability and success for tribal transit programs:

◆ **Draw up a plan.** Tribes that had undertaken a planning effort had identified the transportation needs and available resources and were able to implement the planned transit service.

◆ **Involve local leadership.** A sustainable transit system requires a person dedicated to the implementation and operation of the service. Wherever transit was an additional—not the primary—job responsibility, the program struggled.

Caroline Cruz, a member of the Confederated Tribes of Warm Springs, discusses tribal sovereignty at an Oregon DOT diversity conference. Cooperative Research Program reports have emphasized the importance of communication and personal contact—and understanding issues of sovereignty—when building relationships between transportation agencies and tribes.



PHOTO: AECOM

The Turtle Mountain Tribal Transit Service (*above*) is operated directly by the Turtle Mountain Band of Chippewa tribal government; the Pahto Public Passage free bus (*below*) is provided under contract with the Yakama Nation.



PHOTO: PAHTO PUBLIC PASSAGE

◆ **Coordinate services.** Tribes that coordinated transportation services, internally or externally, were more successful. Pooling limited financial resources improved the sustainability of tribal transit programs significantly.

◆ **Train key staff in the skills necessary to operate a transit program.** A thorough understanding of financial management, for example, is critical to the long-term sustainability of a tribal transit program. In some cases, tribes lost funding because of poor financial management.

◆ **Gain multiple funding sources.** Tribes that tapped into a variety of funding sources had programs that were much more sustainable than those that relied on only one or two sources of funding.

Forthcoming Research

TRB has funded other research projects that will yield products geared to transportation issues in Indian Country:

◆ NCHRP Project 25-25, Task 79, Successful Practices for Effective Tribal Consultation, has assembled a report showcasing approaches to consulting with federally recognized tribes. The report offers guidance on how to build and maintain successful tribal consultation programs and has been submitted to the American Association of State Highway and Transportation Officials' (AASHTO's) Standing Committee on the Environment.³

◆ NCHRP Project 17-49, Guide for Effective Tribal Crash Reporting (see article, page 41), produced a guide for the development and implementation of crash reporting programs to improve transportation safety planning and programs on tribal territory.⁴ The guide assists state agencies in working with tribal law enforcement.

³ <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3312>.

⁴ <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2973>.

Ron Hall presents information on the start-up of NCHRP Project 8-65 to the Native American Transportation Issues Committee at the 2008 TRB Annual Meeting.



PHOTO: RON HALL PHOTOGRAPHY

Developing Research Topics

These projects originated in the work of standing committees of TRB or AASHTO. A good way to develop and propose research topics relevant to transportation in Indian Country is to discuss the topics with the practitioners who attend the meetings of the Native American Transportation Issues Committee at the TRB Annual Meeting every January in Washington, D.C.⁵ The committee also conducts a midyear meeting, which varies in location and schedule, often in conjunction with related events, such as the National Tribal Transportation conference, or with other committees that share issues, such as the Historic and Archeological Preservation in Transportation Committee.⁶

After committee discussion, a formal problem statement may be submitted to a funding group; volunteers recruited at the committee meetings may assist in the process. Research topics may address issues of concern to other committees; working through the Native American Transportation Issues Committee facilitates relationships with other committees through appointed liaison members.

Topics for Research

NCHRP Project 8-65 identified additional topics for research:

◆ Identify issues related to establishing an inter-governmental network among tribal and nontribal stakeholders—including local government and private entities—focusing on success stories and past missteps, to establish lessons learned.

◆ Develop guidelines for states starting the consultation process with tribes and covering the iterative, ongoing procedures.

◆ Identify sensitive events for tribes—such as the disturbance of traditional tribal practices, the unearthing of burial sites, or the disruption of natural resources—that may occur during the construction of a transportation project, and understand how these occurrences may affect the project's success. Develop a guidebook that provides details on successfully conducting construction activities while protecting tribally sensitive resources, and include a set of tools and resources that transportation agencies can use to train contractors and staff.

Findings from these research endeavors can add to the body of knowledge and can have immediate, practical impact on the day-to-day implementation of transportation projects and initiatives that affect state, local, and tribal governments.

⁵ www.trb.org/AnnualMeeting2015/AnnualMeeting2015.aspx.

⁶ www.trb.org/Calendar/Calendar.aspx.

NEW NCHRP REPORT

Guide for Effective Tribal Crash Reporting

DAVID NOYCE, ZHIXIA LI, KEVIN CHESNIK, ALYSSA MACY, AND XIAO QIN

The authors are members of the research team for NCHRP Project 17-49, *Guide for Effective Tribal Crash Reporting*. Noyce is Director, Traffic Operations and Safety (TOPS) Laboratory, University of Wisconsin–Madison, and Principal Investigator for NCHRP Project 17-49. Li is Traffic Safety Engineering Researcher at the TOPS Laboratory and Lead Researcher for the NCHRP Project. Chesnik is Principal, Chesnik Transportation Group, Middleton, Wisconsin. Macy is Owner–President, Indigenius Communications, Portland, Oregon. Qin is Associate Professor, Department of Civil and Environmental Engineering, South Dakota State University, Brookings.



Photo: Richard Bauer, Flickr

The Native American population is disproportionately represented in the highway fatality and crash statistics of many states across the United States. National tribal transportation safety summit meetings consistently identify inadequate crash data as a significant barrier to the development of effective safety programs.

Underreporting or nonreporting of data for crashes on tribal lands creates a significant void in information to support decision making and initiatives by state departments of transportation (DOTs) and tribal safety programs. Underreporting also leads to tribes receiving disproportionately inadequate resources from state and federal programs that identify and target transportation safety issues.

Comprehensive tribal crash reporting would allow tribes to gain the support and resources to develop necessary safety countermeasures and improvements and would enable tribes to apply more successfully for state and federal safety improvement funding.

In July 2011, under the auspices of the Transportation Research Board, the National Academies awarded a National Cooperative Highway Research Program (NCHRP) contract to a team based at the University of Wisconsin–Madison to develop guidance for effective reporting of crashes on tribal terri-

Umatilla Tribal Police at the scene of a car crash on the Confederated Tribes of the Umatilla Indian Reservation in Oregon. Crash data are integral to effective road safety programs.

tory. Working closely with the NCHRP research project panel, the team developed NCHRP Report 788, *Guide for Effective Tribal Crash Reporting*, based on collected data, as well as on best practices, lessons learned, and success stories identified in the research.

Nationwide Data Collection

The project implemented a query-based data collection and analysis research approach. The data collection tool included two distinct sets of queries: one for tribes and the other for state agencies.

The research team developed the data collection methods to identify key issues, best practices, and other information necessary for the guide. The selection of tribes and state agencies to query began with data from the Indian Reservation Road (IRR) system administered by the Bureau of Indian Affairs. Tribes identified in the IRR system as managing more than 25 routes were selected for query.

This prioritization yielded a total of 221 of the 566 federally recognized tribes. Each of the 221 tribes received a data query document, and 48 returned

TABLE 1 State Distribution of Returned Tribal Query Forms

State	Respondents
Alaska	8
Idaho	1
Kansas	1
Maine	2
Michigan	4
Minnesota	6
Montana	1
Nevada	3
New Mexico	2
North Dakota	1
Oklahoma	3
Oregon	1
South Dakota	5
Washington	3
Wisconsin	7

States Selected for Data Query

- Alaska
- Arizona
- California
- Idaho
- Michigan
- Minnesota
- Montana
- New Mexico
- North Dakota
- Oklahoma
- Oregon
- South Dakota
- Utah
- Washington
- Wisconsin
- Wyoming

comprehensive data (Table 1, left); this included a joint response with partial or aggregated data from more than 20 tribes, which was counted as one tribe.

Because 94 percent of the IRR roadway mileage is located in 16 states, those state agencies were selected for data query (see box, below left). All 16 states completed and returned the query.

Analysis Findings

Analysis of responses showed that 81 percent of the responding tribes did not collect or report crash data to their respective state agencies; some tribes collected but did not report crash data. The reasons identified included a lack of communication between the agency and the tribe, a lack of personnel, a lack of training and equipment for collecting crash data, sovereignty issues, fear of double jeopardy, concerns among tribal members about privacy and legality, and cultural issues.

In many cases, tribes were not well aware of government funding available for projects related to transportation safety—such as for the development of a crash reporting system—or the tribes did not have staff experienced in grant writing and other necessary procedures to access funding. The query responses from the tribes and states provided information about current practices in tribal crash reporting; the analysis of the responses assisted in identifying best practices, lessons learned, and suggestions for improvement.

Guide Contents

NCHRP Report 878 assembles and draws guidance from best practices, success stories, lessons learned, published literature, and data from the tribes and states that were involved in the data collection and analysis phase of the research. The guide conveys the knowledge gained from the research in a format that can be used by all involved in building effective tribal crash reporting systems.

The two-part guide presents the entire process of tribal crash reporting (Table 2, above right). Part 1 provides self-assessment tools for state agencies and tribes for a quick examination of the effectiveness of

NCHRP Report 788, *Guide for Effective Tribal Crash Reporting*, is available for download or purchase from the Transportation Research Board website at www.trb.org/Main/Blurbs/171540.aspx.



TABLE 2 Outline of NCHRP Report 788

Task	Chapter
Conduct state and tribal self-assessment	Part 1, Chapters 1 and 2
Build relationships between state and tribes	Part 2, Chapter 1
Develop a tribal crash data system	Part 2, Chapter 2
Implement state and tribal crash data sharing	Part 2, Chapter 3
Improve tribal traffic safety using crash data	Part 2, Chapter 4

practices in crash data collection and management and of the level of communication and collaboration between tribes and state agencies.

Results of the self-assessment will lead users to the appropriate chapters in Part 2, which focuses on establishing, building, and maintaining communicative relationships between tribes and states, establishing an effective crash data collection system, creating a state-tribe crash data sharing system, and improving tribal traffic safety using crash data. Each chapter in Part 2 concludes with case studies, providing practical information to tribes and states throughout the process of implementing an effective tribal crash reporting system.

Using the Guide

NCHRP Report 788 is an informational tool designed for tribal communities and for state agencies that collect and process statewide crash data to inform decisions about funding and safety improvement. The intended audience is any tribal member involved in law enforcement, crash data collection, crash data dissemination and analysis, or communication with state agencies, as well as any member of a state DOT or agency who works with tribal communities in obtaining crash data and improving roadway safety.

The guide can be used in several ways. The reader should first complete the self-assessment in Part 1, which requires answering a few questions to identify areas of strength and areas for improvement to achieve an effective tribal crash reporting system. The results of the self-assessment then lead to the appropriate chapters in Part 2.

Alternatively, a reader can follow a more random approach by referring to the summary tables at the beginning of each chapter in Part 2 or by turning directly to the case studies at the end of the chapters to identify applicable information. Whatever approach is chosen, readers will find useful information that can lead to a more effective tribal crash reporting system.

TRB Titles on Tribal Transportation Topics

Books and Electronic Reports

◆ *Paratransit Emergency Preparedness and Operations Handbook*, Transit Cooperative Research Program (TCRP) Report 160, includes guidance, strategies, tools, and resources to help paratransit service providers plan and prepare for, respond to, and recover from a range of emergencies. The guidance applies to urban, suburban, rural, and tribal paratransit operating environments. www.trb.org/main/blurbs/168321.aspx.

◆ *Developing, Enhancing, and Sustaining Tribal Transit Services: A Guidebook*, TCRP Report 154, traces the steps in planning and implementing a tribal transit system. The guidance applies to planning a new transit system, enhancing a service already in operation, or taking action to sustain services. The report includes an overview of the tribal transit planning process. www.trb.org/main/blurbs/166797.aspx.

◆ *A Guidebook for Successful Communication, Cooperation, and Coordination Strategies Between Transportation Agencies and Tribal Communities*, National Cooperative Highway Research Program (NCHRP) Report 690, offers guidelines to help departments of transportation and tribal communities work together to achieve success in transportation projects on tribal lands. The report explores a range of issues and topics for consideration and offers a flexible approach adaptable to most situations. Case studies illustrate successful practices. www.trb.org/main/blurbs/165472.aspx.

◆ *Selected Studies in Transportation Law, Volume 8: Transportation Law and Government Relations*, a CD-ROM also available in print in a three-ring binder format, reviews civil rights and transportation agencies, transportation and the U.S. constitution, Indian transportation law, and motor vehicle law. Section 3 explores Indian Transportation Law. The series is a joint publication of NCHRP and TCRP. www.trb.org/main/blurbs/159372.aspx.

◆ *Tribal Transportation Programs*, NCHRP Synthesis 366, explores innovations and model practices developed and implemented by tribal transportation programs. The report reviews the history and the legal and administrative evolution of tribal transportation programs within the larger context of tribal sovereignty and relationships with federal, state, and local governments and with regional and local planning agencies. www.trb.org/main/blurbs/158883.aspx.

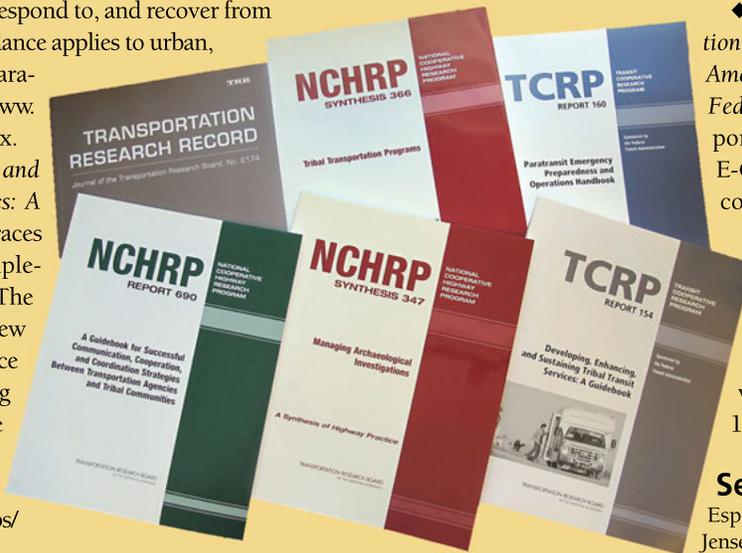
◆ *Managing Archaeological Investigations*, NCHRP Synthesis 347, describes practices that improve archaeological investigations by streamlining the transportation project delivery process and by enhancing stewardship of archaeological resources. The report examines practices that improve and maintain communi-

cation and coordination at all stages of transportation programs, for example, between agencies and Native Americans, as well as in efforts for public outreach. www.trb.org/main/blurbs/156146.aspx.

◆ *Conference on Transportation Improvements: Experiences Among Tribal, Local, State, and Federal Governments*, Transportation Research Circular E-C039, is the proceedings of a conference held in October 2001 in Albuquerque, New Mexico, focusing on the complexities of transportation issues important to Native American nations. www.trb.org/main/blurbs/153351.aspx.

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Roadway Safety on Indian Reservations

DEBBIE S. SHINSTINE, KHALED KSAIBATI, MATT CARLSON, AND JOHN SMITH

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Work crew inspects newly constructed portion of Seventeen Mile Road.

Reducing fatal and injury crashes on tribal lands has been a recognized need for years. In 2006, the Wind River Indian Reservation, located in central western Wyoming, obtained funding for safety improvements on Seventeen Mile Road, the most hazardous road on the reservation. In 2011, the tribe decided to develop a comprehensive safety improvement program.

Problem

According to a report by the National Center for Statistics and Analysis, fatal crashes in the United States declined by 2.2 percent between 1975 and 2002—from 39,161 to 38,309. On Indian reservations during the same period, however, the annual number of fatal crashes increased by more than 50 percent—from 181 in 1975 to 276 in 2002.

Limited resources, a lack of crash data, and inadequate coordination across jurisdictions have made it difficult for Native American communities to address roadway safety concerns. Tribal communities face challenges similar to those of other rural communities with low volumes of traffic, vehicles traveling at high speeds, alcohol consumption, and inadequate roadway geometrics.

Solution

The Wyoming Technology Transfer–Local Technical Assistance Program (WYT²-LTAP), in cooperation with the Wyoming Department of Transportation (DOT) had developed the Wyoming Rural Road Safety Program (WRRSP) to help local governments improve safety at high-risk locations (1). Indian reservation roads have similarities to rural local roads; therefore the research adopted the following objectives:

- ◆ Modify the WRRSP to fit the needs of Indian reservations, identify low-cost safety improvements, and allocate funds for the improvements.
- ◆ Determine the gaps in crash data on Indian reservations, recommend ways to bridge the gaps, and identify the high-risk locations.
- ◆ Assist tribes in developing a strategic highway safety plan to address safety concerns.

Road Safety Program

The WRRSP developed and implemented a five-step methodology for the Wind River Indian Reservation to address the unique challenges on tribal lands (2):

- ◆ Crash data analysis,
- ◆ Level I field evaluation of roadway conditions,
- ◆ Combined ranking of crash and field ranks to identify potential high-risk locations,
- ◆ Level II field evaluation to identify countermeasures, and
- ◆ Benefit–cost analysis.

Crashes on the Wind River Indian Reservation during the 10-year period from 2002 through 2011 were analyzed. Gaps were immediately discovered in the crash data. The Wind River Indian Reservation law enforcement agency had no way to upload crash reports to the state crash database. Once this was remedied, several years of backlogged data were uploaded manually into the state system.

Crashes on Indian Reservation Roads (IRRs), however, could not be tied to a specific location because they were not linked to Wyoming DOT's inventories. Wind River Indian Reservation contracted to have the IRRs inventoried on a geographic



PHOTO: WYOMING DOT



Seventeen Mile Road before construction of safety improvements.

information system (GIS) platform that would link to the Wyoming DOT database.

Benefit–Cost Ratios

The five-step methodology was applied to the county roads within the Wind River Indian Reservation; 12 county roads were identified for safety improvements. To calculate the expected benefit–cost ratio, researchers used Wyoming DOT’s standard crash costs for fatal, injury, and property-damage-only crashes, the cost reduction factors for each improvement, and the estimated cost of each type of project. Preliminary cost estimates normalized over the 10-year crash period were used to calculate the project cost.

The benefit–cost ratios ranged from 2.0 to 399.5. The proposed improvements were submitted to Fremont County for action.

With no locations specified, the crashes on IRRs were analyzed separately, and the following trends were identified:

- ◆ Crash severity was higher on the reservation than throughout the state.
- ◆ Fixed objects most frequently were the first harmful events.
- ◆ Most crashes were run-off-the-road crashes.

Systemic Approach

Because of these trends, the similarities to county roads, and the tribes’ knowledge of crashes on these roads, a systemic approach was recommended for improvements to the IRRs. Systemwide improvement projects addressing signage and pavement markings were submitted to Wyoming DOT and gained approval for funding.

With no specific locations identified for crashes

on IRR roads, a systemwide benefit–cost analysis was performed. Improvements were proposed for only 37 of the 209 miles of IRRs; therefore the expected benefit of reduced crashes was based on 17.7 percent of the total crashes for the 10-year period of 2002 to 2011. The benefit–cost ratios were 20.3 for signs and 8.1 for pavement markings (Table 1, below).

Highway Safety Plan

The Wind River Indian Reservation recognized the need to develop a strategic highway safety plan and requested assistance from WYT²-LTAP to apply for a grant from the Federal Highway Administration; the project was selected as one of three pilots. Stakeholders included tribal leadership, WYT²-LTAP, the Northern Plains Tribal Technical Assistance Program, the Bureau of Indian Affairs, law enforcement, Indian Health Services, and other local partners.

The first step in developing a tribal safety management program was to analyze the crash data to identify problem areas. The crash trends confirmed that alcohol, young drivers, and the nonuse of safety equipment were main concerns. These findings were consistent with themes discussed at the transportation safety summits conducted annually by tribes from across the nation.

The tribal community has envisioned raising safety awareness and improving safety for all users of

TABLE 1 Estimated 10-Year Benefit, Cost, and Benefit–Cost Ratio for Indian Reservation Roads

Project	Benefit	Cost	B-C Ratio
Signs	\$4,861,629	\$240,000	20.3
Pavement marking	\$2,026,650	\$249,480	8.1

Note: B-C = benefit–cost.

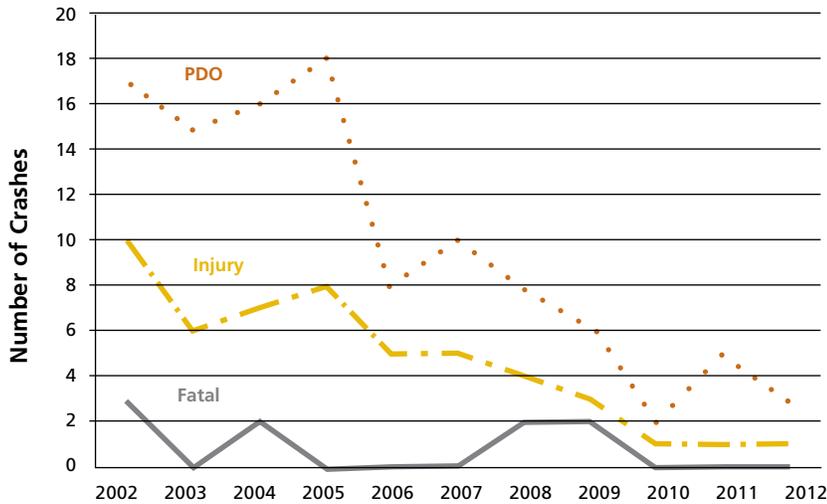


FIGURE 1 Crash history on Seventeen Mile Road, Wind River Indian Reservation, 2002–2012. (Note: PDO = property damage only.)

the roadways. Behavioral, roadway, vehicle, weather, and nonmotorized transportation were among the safety issues to be addressed. Behavioral issues, however, were recognized as the greatest concern, and the goals included strategies to change the safety culture of the tribal people.

The Wind River Indian Reservation developed a strategic plan using the available crash data, identifying ways to improve crash reporting, and incorporating the five-step safety improvement program into the strategic plan.

Crew member signals traffic during construction on Seventeen Mile Road near Riverton.



PHOTO: WYOMING DOT

Benefits

The Wind River Indian Reservation now has a comprehensive safety program. With the improvements to the Seventeen Mile Road, starting in 2006, the number of crashes has dropped by approximately 50 percent (Figure 1, left). The roadway previously had the highest number of crashes on the reservation.

The projected reduction in the annual crash rate—and in injuries and fatalities—by 50 percent across the Wind River Indian Reservation would yield a potential savings of more than \$4 million per year (Table 2, below). By itself, the signage project for IRRs, with a benefit–cost ratio of 20.3, could produce more than \$4.6 million in benefits.

The methodology developed in the research can be adapted to the specific needs of tribes across the United States. WYT²-LTAP has been working with Tribal Technology Assistance Program centers across the country to facilitate implementation.

For more information, contact Khaled Ksaibati, Director, Wyoming Technology Transfer Center, 1000 East University Avenue, Department 3295, University of Wyoming, Laramie, WY 82071-3295; Khaled@UWyo.edu; or 307-766-6230.

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2. Shinstine, D., and K. Ksaibati. *Indian Reservation Safety Improvement Program: A Methodology and Case Study*. Report No. FHWA-WY-13/07F. Wyoming Department of Transportation, Cheyenne, October 2013. http://ntl.bts.gov/lib/51000/51800/51853/FHWA_1307F_RS09211.pdf.

EDITOR'S NOTE: Appreciation is expressed to G. P. Jayaprakash, Transportation Research Board, for his efforts in developing this article.

Suggestions for Research Pays Off topics are welcome. Contact G. P. Jayaprakash, Transportation Research Board, Keck 488, 500 Fifth Street, NW, Washington, DC 20001 (202-334-2956; gjayaprakash@nas.edu).

TABLE 2 Expected Annual Cost Savings from Reducing Crashes

Crash Type	Crashes, 2002–2011	Annual Crash Rate	Annual Crash Costs	Annual Benefit of Reduced Crashes		
				10% Reduction	25% Reduction	50% Reduction
Fatal	28	2.8	\$7,000,000	\$700,000	\$1,750,000	\$3,500,000
Injury	206	20.6	\$1,236,000	\$123,600	\$309,000	\$618,000
PDO	394	39.4	\$236,400	\$23,640	\$59,100	\$118,200
Total	628	62.8	\$8,472,400	\$847,240	\$2,118,100	\$4,236,200

TRB Meetings

October

26–29 21st National Conference on Rural Public and Intercity Bus Transportation: Setting Our Course for the Future*
Monterey, California

29–31 Shaping the New Future of Paratransit: An International Conference on Demand-Responsive Transit
Monterey, California

November

3–7 3rd International Conference on Connected Vehicles and Expo*
Vienna, Austria

December

4–5 National Accelerated Bridge Construction Conference*
Miami, Florida

10–11 8th University Transportation Center Spotlight Conference on the Role of Transportation in Economic Competitiveness
Washington, D.C.

2015

January



11–15 TRB 94th Annual Meeting
Washington, D.C.

For information, visit
www.trb.org/AnnualMeeting2015/AnnualMeeting2015.aspx.

29–30 Shifting International Trade Routes Workshop
Tampa, Florida

February

15–18 Geosynthetics 2015 Conference*
Portland, Oregon

March

23–26 2015 Joint Rail Conference*
San Jose, California

April

13–14 Moving Active Transportation to Higher Ground: Opportunities for Accelerating the Assessment of Health Impacts
Washington, D.C.

16–17 Ferry Safety and Technology: Design and Operations Conference
New York, New York

20–24 International Highway Transportation Summit Innovative Approaches and Best Practices*
Beijing, China

May

7–8 Transportation for Sustainability: An International Conference
Washington, D.C.

17–19 9th National Aviation System Planning Symposium
Charleston, South Carolina

17–21 15th TRB National Transportation Planning Applications Conference
Atlantic City, New Jersey

18–22 9th International Conference on Managing Pavement Assets*
Alexandria, Virginia

24–26 5th International Symposium on Nanotechnology in Construction*
Chicago, Illinois

31– June 2 5th International Conference on Transportation Systems Performance Measurement and Data
Denver, Colorado

June

7–10 American Society of Civil Engineers 2015 Airfield and Highway Pavements Conference
Miami, Florida

10–12 6th International Conference on Bituminous Mixtures and Pavements*
Thessaloniki, Greece

22–24 5th International Symposium on Highway Geometric Design*
Vancouver, British Columbia, Canada

TBD Workshop on 2015 Highway Capacity Manual Update
Little Rock, Arkansas

Additional information on TRB meetings, including calls for abstracts, meeting registration, and hotel reservations, is available at www.TRB.org/calendar. To reach the TRB staff contacts, telephone 202-334-2934, fax 202-334-2003, or e-mail TRBMeetings@nas.edu.

*TRB is cosponsor of the meeting.

Patricia Mokhtarian

Georgia Institute of Technology

As a professor in the School of Civil and Environmental Engineering at the Georgia Institute of Technology (Georgia Tech), Patricia Mokhtarian studies the interactions between telecommunications and transportation, the impact of land use on travel behavior, and travel attitudes and motivations. She applies econometric, psychometric, and statistical methods to travel behavior evaluation, modeling, and forecasting, and teaches courses on discrete choice modeling, transportation survey methods, and more. Her current research focuses on travel-based multitasking (TMT)—the activities people perform while traveling—and on the role of residential self-selection in travel behavior.

For Mokhtarian, the human behavior underlying travel networks and systems is especially crucial. “Many an invention

versity of California (UC), Irvine, Institute of Transportation Studies, teaching courses on travel demand analysis and participating in several research projects with Will Recker and Genevieve Giuliano. The next year she joined the Southern California Association of Governments as a transportation planner and was encouraged to explore the implications of rapidly developing telecommunication technologies for regional transportation and air quality planning. While there, she developed a strategic telecommunications plan and monthly newsletter, a regional telecommunications planning seminar, a telecommuting pilot project, and a demonstration teleconference. She also founded the Telecommuting Subcommittee of the Central City Association Telecommunications Task Force.

In 1990, Mokhtarian was recruited by Ryuichi Kitamura and Paul Jovanis to join the Department of Civil and Environmental Engineering at UC Davis as an assistant professor, moving up the ranks to full professor in 1999. She also served as acting director and as associate director for education at the Institute of Transportation Studies, and as chair and as graduate adviser of an innovative interdisciplinary master’s–doctoral program in transportation technology and policy. Mokhtarian became professor emerita at UC Davis in 2013, the same year she joined the faculty at Georgia Tech.

“As my career has progressed, I’ve been more and more struck by the contrast between the standards of rigorous science and the messiness of real-world applications of research,” Mokhtarian comments, noting



“The better we can understand the factors that influence behavior, the better we will be able to predict societal trends, the adoption of new technologies, and responses to policies.”

and policy have foundered because of the failure to predict the public’s reaction to it. Conversely, we have been surprised by trends that we failed to see coming,” she observes. “The better we can understand the factors that influence behavior, the better we will be able to predict societal trends, the adoption of new technologies, and responses to policies, and the better we will be able to design practical policies and socially responsible technologies.”

Mokhtarian’s family background may have influenced her career interests in travel and behavior—her father was a U.S. Army helicopter pilot and her mother has a Ph.D. in marriage and family therapy. After graduating from Florida State University with a degree in mathematics, Mokhtarian sought to apply her math skills to socially relevant issues.

“While earning my master’s degree and Ph.D. in operations research at Northwestern University in Evanston, Illinois—living in a big city for the first time and getting along reasonably well without a car—I became interested in urban transportation planning and modeling,” Mokhtarian recalls. Her interest was cultivated by such mentors as Joseph L. Schofer and Peter Stopher, and especially by her major professor, Frank Koppelman.

In 1981, Mokhtarian was a visiting researcher at the Uni-

versity of California (UC), Irvine, Institute of Transportation Studies, teaching courses on travel demand analysis and participating in several research projects with Will Recker and Genevieve Giuliano. The next year she joined the Southern California Association of Governments as a transportation planner and was encouraged to explore the implications of rapidly developing telecommunication technologies for regional transportation and air quality planning. While there, she developed a strategic telecommunications plan and monthly newsletter, a regional telecommunications planning seminar, a telecommuting pilot project, and a demonstration teleconference. She also founded the Telecommuting Subcommittee of the Central City Association Telecommunications Task Force.

“At a minimum, current travel behavior models provide valuable insight that can inform and influence decision making,” Mokhtarian observes. She is exploring approaches to incorporate such factors as user attitudes into broader regional forecasting models.

At TRB, Mokhtarian is an emeritus member of the Traveler Behavior and Values Committee, which she joined in 1988, and the Effects of Information and Communication Technologies on Travel Choices Committee, which she chaired when it was a subcommittee and through its promotion to a full committee in 1993. She also is a member of the Transportation Demand Forecasting Committee. She has served on two National Research Council studies and currently is vice chair and chair-elect of the International Association for Travel Behaviour Research.

Maren L. Outwater

RSG

While working abroad in Switzerland, Maren L. Outwater admired the robust, efficient, multimodal transportation system. She pursued a career in transportation demand forecasting after returning to the United States and has focused on communicating and visualizing complex technical models into useful information for decision making. “As travel models become more complex, this need for translation becomes even more essential,” she observes.

Outwater received a bachelor’s degree in civil engineering and a master’s degree in transportation planning from the University of Michigan, Ann Arbor, in 1984 and a Professional Engineering license in 1992. She joined the firm DeLeuw Cather & Company in San Francisco, California, working on transportation plans and bridge designs; she then moved to

depends on agency partners to test and to implement these new capabilities,” she comments.

Outwater is leading a National Cooperative Highway Research Program project to develop a decision support system for selecting travel forecasting methods and tools, designed for state departments of transportation (DOTs) and metropolitan planning organizations. “This system is envisioned to provide guidance to agencies struggling to respond to a more complex environment of analysis without spending scarce resources to research the possible methods and their benefits to address future needs of the agency,” she adds.

Outwater pioneers research on national travel forecasting models of passenger and goods movement, including developing prediction methods for supply chains of long-haul freight shipments across the United States and annual scheduling models for long-distance passenger travel. These methods are based on simulating households and firms across the country—an extension of earlier work developing activity-based passenger models for urban areas. In 2001, she led the creation of the first activity-based model used in practice for San Francisco County.

Outwater also led a recent Transit Cooperative Research Program project on how premium transit service characteristics affected mode choice. The project quantified 20 transit amenities—onboard, in the station, or elsewhere—that users contemplated when choosing their mode of travel. Based on the ways in which users determined their routes, the research provided a new, unbiased structure of mode choice.

“The world of travel forecasting has expanded well beyond travel models in recent years, to integrate land use, air quality, and dynamic traffic and geographic information systems with travel models and to provide a system of models that can better meet planning agency needs for information,” Outwater notes.

Outwater is a member of the Urban Transportation Data and Informational Systems Committee, serving as its communications coordinator, and a member of the Travel Behavior and Values Committee, serving as chair of the Behavioral Processes: Qualitative and Quantitative Methods Subcommittee. Outwater was a longtime member of the Transportation Demand Forecasting Committee and chaired the Innovations in Travel Modeling Conference in 2010. She is a member of the Travel Behavior and Values Committee and a past member of the National Research Council’s Committee for Review of the Federal Transit Administration’s Transit Economic Requirements Model.



“The world of travel forecasting has expanded to integrate land use, air quality, and dynamic traffic and geographic information systems with travel models and to provide a system of models that can better meet planning agency needs for information.”

Comsis Corporation to focus on travel demand modeling and to gain more experience in federal research projects. She continued to develop land use, travel, and air quality models at JHK & Associates, KJS Associates, and Cambridge Systematics before she joined the Puget Sound Regional Council in 2007 as Director of Data Systems and Analysis.

“I benefited greatly from working in the public sector,” Outwater recalls. “It provided an understanding of budget pressures, workload challenges, the importance of communicating with elected officials and the public, and the need for visualization to deliver technical information more efficiently.” This experience guides her current role as Vice President at RSG, leading the Transportation and Environment practice.

She has designed many large-scale forecasting and analysis models for activity-based passenger travel, land use, tolling, rail and transit ridership, environmental and economic impacts, and commercial and freight mobility. With a focus on bridging the gap between academic research and practical applications, Outwater seeks to develop forecasting tools to assist transportation agencies in answering policy questions, to produce performance metrics, and to evaluate innovative transportation investments. “Appropriately, much of this new research

AASHTO's CENTENNIAL Leading the Way with Collaborative, Applied Research

CHRISTINE BECKER

The author is President, Christine Becker Associates, Washington, D.C.



In November 1914, a small group of state highway engineers met at the Georgian Terrace Hotel in Atlanta, Georgia, to discuss the creation of an association to address the concerns of the public officials responsible for “getting America out of the mud.” The 14 engineers formed the American Association of State Highway Officials (AASHO) as a forum to address highway issues and to promote state transportation priorities at the national level.

Since then, the association—renamed the American Association of State Highway and Transportation Officials (AASHTO) in 1973—has built on the state–federal relationship to strengthen and sustain the national highway and transportation system. Efforts have included advocacy of landmark federal legislation, such as the act that launched the Interstate Highway System in 1956. Among other AASHTO milestones are the following:

- ◆ The production of standards and specifications for highway design, construction, and safety;
- ◆ The establishment of uniform symbols for road maps and the creation of nationwide route numbering of the primary U.S. highways and the Interstate and Defense Highway System;
- ◆ The coordination of such key research efforts as the AASHO Road Test in the 1950s, sponsorship

of the National Cooperative Highway Research Program since 1962, and cosponsorship of the second Strategic Highway Research Program;

- ◆ The formation of a materials reference laboratory program; and
- ◆ The development of computer software programs to facilitate highway and bridge analysis, design, and construction management.

Throughout its 100-year history, AASHTO has worked to meet critical highway and transportation needs. The following description of the association’s role in research and innovation is excerpted from *AASHTO 1914–2014: A Century of Achievement for a Better Tomorrow*.

Laboratory of Ideas

From its earliest days, AASHTO viewed itself as an incubator—a laboratory with 52 experimental stations—for new ideas and best practices to improve the nation’s transportation system. Early leaders emphasized collaborative work among skilled engineers to address transportation challenges. “Finer roads will be built as they are needed,” said Warren W. Mack, Chief Engineer of Delaware and AASHO president in 1939. “Engineering skills can produce the desired result.”

AASHTO launched a nationwide celebration of the 50th anniversary of the Interstate Highway System at the 2006 TRB Annual Meeting. (Left to right:) William W. Millar, American Public Transportation Association; Gary Ridley, Oklahoma DOT; Gloria J. Jeff, Los Angeles DOT; TRB Executive Director Robert E. Skinner, Jr.; then–Secretary of Transportation Norman Y. Mineta; John Horsley, then Executive Director of AASHTO; and T. Peter Ruane, American Road and Transportation Builders Association.



PHOTO: RISSON PHOTOGRAPHY

AASHTO's commitment to collaboration helped shape the research infrastructure that has led to comprehensive and significant transportation advances and that provides a foundation for the next 100 years. "Research drives innovation, and innovation strengthens our transportation system," notes Michigan Department of Transportation (DOT) Director Kirk Steudle. "Sustained investment in research is vital to the future of our transportation system."

Cultivating Research

In 1920, AASHTO, the state highway departments, and the Bureau of Public Roads joined together with the National Research Council to create the National Advisory Board on Highway Research for the exchange of technical information and research results. The advisory group was renamed the Highway Research Board (HRB) in 1925 and became the Transportation Research Board (TRB) in 1974, reflecting an increasingly multimodal focus and research agenda.

Collaborative transportation research made a major advance in 1962, when the state highway departments, the federal government, and AASHTO created the National Cooperative Highway Research Program (NCHRP) financed by pooled state and federal funds and managed by HRB. NCHRP's mandate was to advance the state of highway technology for all states and to provide technical guidance.

In its first year, NCHRP launched 34 projects valued at \$3.5 million. For more than 50 years, NCHRP has coordinated projects to help solve complex transportation problems, carry out research on emerging challenges, and develop standards for highway design, construction, operation, and maintenance, often working through AASHTO's network of standard-setting committees. NCHRP has carried out countless applied research projects that have contributed to safer, greener, smarter, and more cost-effective highway solutions.

The partnership that led to and supports NCHRP is as significant as the transportation innovations the research has produced. By pooling funds to address shared challenges, state DOTs leverage their research investment to produce broader and deeper impacts. "For a small state like North Dakota, the collaborative research is vital," observes Grant Levi, Director of North Dakota DOT. "We're not big enough to have a large research department, and yet we benefit from and participate in the most advanced and innovative research."

Early Road Tests

Beginning in 1909 and continuing through the early 1960s, road tests were the primary research method for



Photo: Garrett Flicker

assessing optimal materials and design to produce long-lasting roads. The first well-documented, state-administered road test was the Bates Experimental Road in 1920 and 1921 in Illinois. With up to \$100 million authorized to construct a statewide rural highway system, the Illinois Division of Highways built a 2.5-mile test segment near Springfield to determine the best materials for rural roads carrying truck traffic.

The experimental road had 63 sections, each approximately 200 feet long, built with paving materials then in use or recommended. The Bates road test concluded that concrete was the best material for highway building and provided a precise design to maximize the life of concrete roads, including use of a longitudinal center joint to eliminate center line cracking. The Bureau of Roads conducted loading tests on concrete pavement in the early 1930s.

With AASHTO's leadership and support, systematic efforts to gauge the service life of highway pavements and the impact of wheel loads regained momentum after World War II. In 1948, AASHTO established procedures for launching and managing road tests, generally financed by two or more states to provide factual data for developing longer-lasting pavements.

The first project, known as Road Test One—MD, took place in Maryland in 1950 and 1951, administered by HRB and financed by the District of Columbia and 11 states—Maryland, Connecticut, Delaware, Illinois, Kentucky, Michigan, New Jersey, Ohio, Pennsylvania, Virginia, and Wisconsin. The Maryland study used a road near LaPlata to test the impact of round-the-clock truck traffic on concrete pavements.

At the suggestion of the AASHTO Highway Transport Committee, the Western Association of State Highway Officials (WASHO) sponsored a road test in 1953 and 1954 in Idaho to study the impact of heavy truck traffic on flexible asphalt pavements. HRB administered the WASHO Road Test, financed by the Idaho, California, Colorado, Nevada, New Mexico, Oregon, Texas, Montana, Utah, Washington, and Wyoming highway departments.

AASHTO developed the uniform route numbers and signs on America's Interstates.



AASHTO publishes such research-based standards as the *Highway Safety Manual* and the *Mechanistic-Empirical Pavement Design Guide*.



IMAGES: TAB ARCHIVE

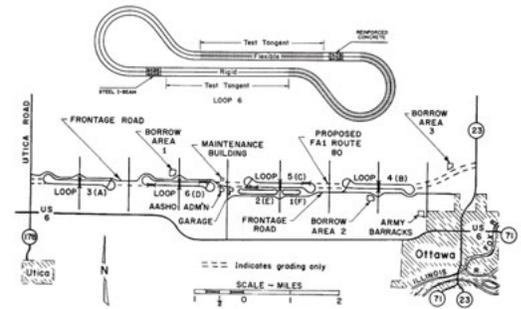
Engineers on the AASHO Road Test constructed a series of loops (above right) in a variety of pavement materials and designs (above).

Landmark Project

The AASHO Road Test, the largest and most significant pavement research in the 20th century, was the primary source of information for the design and construction of the Interstate system. Carried out from 1958 to 1960 at a cost of \$27 million (in 1960 dollars) along a 7-mile loop of two-lane highway between Ottawa and LaSalle, Illinois, the road test focused on the impacts of moving truck loads on various asphalt and concrete pavement designs.

Six test loops of two double-lane tangents included 16 bridges and 836 segments built with different materials and engineering concepts. The U.S. Defense Department provided cars and heavy-duty trucks that drove relentlessly over the road test loops to see which pavement segments lasted the longest.

Information on the best-performing segments was crucial in advancing knowledge about structural design, pavement performance, climate effects, and



the impact of heavy loads. Findings were used to develop the AASHO Interim Guide for the Design of Rigid and Flexible Pavement in 1960 and 1962.

Results from the AASHO Road Test, a landmark in highway and bridge research, continue to influence pavement design and have led to other essential resource guides, including the AASHTO Guide for Design of Pavement Structures. The road test provided the foundation for more recent and similarly comprehensive technical studies, including the Long-Term Pavement Performance program, which began in 1987 as part of the first Strategic Highway Research Program.

Answering Challenges

As the transportation system evolved in the second half of the century, the need for sustained research became even more important, and AASHTO has led the way in sponsoring, developing, and applying solutions. The success of the AASHO Road Test reinforced the need for and value of collaborative, applied research, so that today, public, nonprofit, and private organizations carry out research projects to promote transportation excellence. Many state DOTs continue to expand their research capacities to respond to needs and challenges and to share practical information and approaches with other states.

For more information about AASHTO's centennial, visit <http://centennial.transportation.org/>.

AASHTO provided strong support for the establishment of the second Strategic Highway Research Program (SHRP 2) and is playing a leadership role in the implementation of the program's products. Horsley (center) shakes hands with J. Richard Capka (left), then Federal Highway Administrator, in January 2006, after the signing of the three-way memorandum of agreement creating SHRP 2, with National Academy of Sciences President Ralph J. Cicerone (right).



PHOTO: RISSON PHOTOGRAPHY

Signage for Safer Lane Closure

Field studies sponsored by Missouri DOT tested new signage for temporary traffic control at short- and long-term work zones. The highest crash rates in highway work zones occur in the advance warning areas approaching a closed lane, from which vehicles must merge into the neighboring lane. Most highway agencies use the graphical closed-lane sign featured in the *Manual on Uniform Traffic Control Devices* (MUTCD) to alert drivers to upcoming work zone lane closures.

Researchers from the University of Missouri–Columbia tested the MUTCD signage and alternate signage in a short-term work zone involving a left-lane closure on a two-lane segment of westbound I-70 near Boonville. The alternate plan comprised a pair of signs, one on each side of the roadway: on the left side, a “Merge” sign with an arrow pointing in the direction of the merge, and a “Left Lane Closed” sign on the right side.

The tests were conducted on the same stretch of road on two separate days; both days were sunny and clear, and the tests were conducted at approximately the same time of day. Speed and lane-occupancy data were captured by using video monitoring and radar guns.

Open-lane occupancy—the proportion of traffic in the open lane at a given location—was calculated upstream and downstream of the merge signage and tested using a standard statistical z-test. According to researchers, approximately 11 percent more traffic reached the open lane upstream of the alternate signage than with the MUTCD signage. A higher rate of open-lane occupancy generally is associated with fewer severe crashes in the work area. Researchers also found that passenger cars tended to stay in the closed lane longer than trucks, and that differences in vehicle speeds between the tests were minor.

To see the full report, visit <http://library.modot.mo.gov/RDT/reports/TRyy1318/cmr14-018.pdf>.

Strategies for Overcrowded Commuter Parking Lots

With park-and-ride lots in the Central Puget Sound region of Washington State nearing capacity, the Washington State Department of Transportation (DOT) conducted a study on ways to maximize the space at the facilities. Researchers from the Thomas D. Larson Pennsylvania Transportation Institute conducted an on-site audit of 10 of the 17 lots and surveyed users.

In the audit, researchers recorded the numbers of vehicles and people entering and leaving each lot, then estimated the percentage of occupied spaces



PHOTO: WASHINGTON STATE DOT

and the average number of people per vehicle. According to researchers, most people drove alone to the park-and-ride facilities—average occupancy was less than 1.10 persons per vehicle—and most drivers used the lots to access public transportation.

Researchers also conducted in-person and electronic surveys of park-and-ride lot users, asking about trip purpose and origin–destination, mode of entry and exit, and reasons for using the lots. Most respondents stated they use the facilities to save money and to relax during the commute.

Also included on the survey were questions about strategies to increase capacity at the lots: fees for single-occupant vehicles, guaranteed parking spaces for vanpools, and improvement of bicycle and pedestrian facilities. These methods received relatively low support—approximately 25 percent of respondents answered that they would be willing to pay to use the lots. If a parking space would be guaranteed, however, nearly half of the respondents were willing to accept fees.

According to Washington State DOT, strategies to increase lot capacity include parking fees for single-occupant vehicles, dedicated space for carpools and vanpools, permits that allow users to reserve spaces, increased transit service to the lots, and added overflow parking in nearby lots.

To see the full report, go to www.wsdot.wa.gov/research/reports/fullreports/830.1.pdf.

Researchers conducted audits of more than a dozen park-and-ride facilities in Washington State’s Central Puget Sound region, including the South Everett Freeway Station in Snohomish County.

Previewing the 2015 Annual Meeting Program

MARK R. NORMAN



For the first time in almost 60 years, the TRB Annual Meeting will be moving to a new venue. TRB's 94th Annual Meeting will be held at the Walter E. Washington Convention Center in Washington, D.C., January 11–15, 2015. This is the fifth in a series of articles on the move.

Program Overview

Although the Annual Meeting's venue is changing, attendees can expect the same unparalleled quality and quantity of sessions, meetings, and workshops. The meeting's spotlight theme is "Corridors to the Future: Transportation and Technology" and the program will cover all transportation modes—with more than 4,500 presentations in nearly 800 sessions on topics of interest to attendees, from policy makers, administrators, practitioners, and researchers, to representatives of government, industry, and academic institutions. Sessions and workshops will address the most critical issues facing transportation professionals today—including connected and autonomous vehicles, big data, and resiliency.

Tailoring the Program in Advance

Tools will help attendees to choose sessions and meetings that best meet their interests and needs and to set up schedules in advance. The online interactive program and the mobile application, or app, will both launch by early November 2014; these tools will enable attendees to search meeting events chronologically or by major topic area, using key words, names of presenters, and more. Users also can create a personalized program and schedule

using either tool. Prospective attendees are encouraged to select either the interactive program or the app early on to create and maintain a schedule, as security considerations do not allow the calendars in these tools to sync with each other.

Shortly before the Annual Meeting, each registrant will receive access to the fully searchable *Compendium of Papers* through TRB Annual Meeting Online. The 2015 *Compendium of Papers* will be available online only—no DVD or flash drive will be distributed or sold.

At the Meeting: Welcome to the Neighborhoods

The vast majority of sessions will be held in the Convention Center itself, and most committee meetings will take place in the Marriott Marquis Hotel across the street. The two facilities are connected by an underground walkway. In consideration of the size of the facilities, sessions and meetings will be clustered into "neighborhoods" by discipline and mode. Of course, there are no fences—all neighborhoods are open to anyone who is registered for the meeting.

Access After the Meeting

In addition to the *Compendium of Papers*, registrants will be able to access slides and posters of more than 3,000 program presentations after the meeting.

To learn more about the meeting and to register, visit the TRB 2015 Annual Meeting webpage at www.TRB.org.

The author is Director, Technical Activities, TRB.



PHOTO: RUSON PHOTOGRAPHY

Users can create a personalized TRB Annual Meeting program and can search meeting events using the Annual Meeting mobile app.

Navigating Your First TRB Annual Meeting

NICOLAS NORBOGE

For most transportation professionals, the Transportation Research Board (TRB) Annual Meeting in Washington, D.C., is a major event. For past attendees, navigating the Annual Meeting can seem like second nature. Experienced attendees know the best lectern sessions and networking receptions to attend as well as the most engaging poster sessions and the most interesting committee meetings. They know which airport to fly into; how to navigate the Washington, D.C., Metro system; and which hotel offers the best Wi-Fi.

For some attendees, the 2015 Annual Meeting—Sunday, January 11, through Thursday, January 15—will be their first.

Fortunately for them, everyone will be in the same circumstance at the upcoming meeting: to accommodate the growing attendance, TRB has moved the 2015 Annual Meeting from the trio of hotels near the Dupont Circle neighborhood to the Walter E. Washington Convention Center. The 2.3-million-square-foot Convention Center and the adjacent Marriott Marquis Hotel and its five levels of meeting space are better equipped to handle an Annual Meeting of more than 11,900 and provide a central location for sessions and meetings. Experienced Annual Meeting attendees now will have to gain acquaintance with a different convention facility in a new section of the city.

When I attended my first TRB Annual Meeting in 2012, I was overwhelmed by the number of people who seemed to know what they were doing. I felt alone in my need for help. This year, everyone else will be learning how to navigate the meeting.

Navigation Tips

As you start your inaugural TRB Annual Meeting journey, a few pointers may help. First, see if you can link up with someone you



Attendees can get the most out of the TRB Annual Meeting by planning ahead for daily activities.

know who has been to the Annual Meeting before. This could be your professor, a mentor, or even a colleague at your organization. Having someone there to provide insight on the right lectern and poster sessions to attend will save considerable time and possible frustration.

Second, keep in mind that the contacts you make at the meeting can be as important to you as what you will learn in the sessions. Getting to know people in the profession will provide significant benefits throughout your career, therefore take advantage of networking opportunities—including attending TRB committee meetings—and volunteer to participate in committee activities. Take

time to enjoy meeting people and to brush up on your networking skills. A good general rule is to spend twice as much time listening as speaking. Follow up with key contacts as soon as you can.

Planning Ahead

Although some attendees plan their schedule when they arrive at the conference, it is easier to plan which sessions and meetings you want to attend before leaving for Washington. Take advantage of the helpful conference planning tools on the TRB website and download the TRB Annual Meeting app before you arrive—and keep time in your schedule open, since you never know what new opportunities may arise.

If you are presenting a paper in a lectern or poster session, remember these three rules: *practice, practice, practice*. Take time to practice your presentation several times. This will help ensure that you are sufficiently prepared. TRB attracts the best of the best in the transportation industry—do not be surprised if someone asks specific, in-depth questions about your research. Anticipate and prepare for those questions before your presentation.

Learn and Network

Finally, enjoy the ride. Some attendees have claimed that the Annual Meeting is nothing but work, but most find it a genuinely fulfilling experience and an opportunity to learn new things and to meet people in the transportation industry.

The TRB Annual Meeting is a unique learning and networking experience and can be great fun. With the conference in a new location this year, new attendees will be on a relatively even level with those who are more experienced. Plan, prepare, and bring business cards—you will need them!



The Welcome Session, held on the Sunday afternoon of the Annual Meeting, provides a broad orientation to sessions, workshops, meetings, and other events.

The author is Assistant Research Scientist, Infrastructure Investment Analysis, Texas A&M Transportation Institute, Houston.



EXECUTIVE UPDATES—(Left to right:) Susan Hanson, Chair of the Subcommittee for National Research Council (NRC) Oversight; Bruce Darling, NRC and the National Academy of Sciences; and TRB Executive Director Robert E. Skinner, Jr., share updates on National Academies activities at a meeting July 26 in Washington, D.C. The subcommittee meets twice a year to ensure that TRB holds to institutional standards.

COOPERATIVE RESEARCH PROGRAMS NEWS

Environmental Justice Analyses in Toll Implementation or Rate Changes

Although becoming more prevalent as a funding mechanism and as an operations strategy for transportation facilities, tolling can have an impact on low-income and minority populations. Under Executive Order 12898, Order 5610.2(a), and Title VI of the Civil Rights Act of 1964, the U.S. Department of Transportation requires transportation agencies to consider environmental justice in all transportation programs, policies, and activities. Guidance is needed on incorporating environmental justice analysis in assessing equity concerns of pricing, as well as consensus on the mitigation measures appropriate to offsetting the effects of tolling on minority and low-income populations.

The Louis Berger Group has received a \$499,915, 24-month contract (National Cooperative Highway Research Program Project 08-100, FY 2014) to develop a toolbox that practitioners can use to evaluate and address environmental justice issues that arise when implementing tolls or changes in toll rates.

For more information, contact Gwen Chisholm-Smith, TRB, at 202-334-3246 or gsmith@nas.edu.



RESEARCH ON THE RUNWAY—Kitty Freidheim, Freidheim Consulting, discusses possible Airport Cooperative Research Program (ACRP) projects for FY 2015. The ACRP Oversight Committee met July 20–21, 2014, and selected 20 projects, addressing such topics as perfluorocarbon impacts at airports, the influence of demographic factors on passenger demand, and commercial spaceport noise and sonic boom.

SECOND STRATEGIC HIGHWAY RESEARCH PROGRAM NEWS

Early Findings from Naturalistic Driving Study Data

Researchers, policy makers, and other transportation professionals investigated the results from the first three research projects to use data from the second Strategic Highway Research Program (SHRP 2) Naturalistic Driving Study (NDS), the largest such study ever undertaken, at the 9th—and final—SHRP 2 Safety Symposium, July 10–11 in Washington, D.C. These early projects have pioneered procedures for accessing processed data from the NDS that reveals new information and insights on such critical issues as safety on rural two-lane curves, driver inattention, and offset left-turn lanes. The symposium also offered demonstrations of the NDS InSight website (<https://insight.shrp2nds.us>), the Roadway Information Database (RID), and the use of GPS coordinates to link NDS driving behavior data with road characteristics.

Information about international NDS studies also was presented at the symposium. These included UDRIVE, a large-scale, European NDS incorporating data from seven countries that focuses on crash causation and risk, everyday driving, driver distraction and inattention, pedestrians and cyclists, motorcycle behavior, and eco-driving. Findings from the UDRIVE study are expected in 2016.



Omar Smadi and Zach Hans, Center for Transportation Research and Education at Iowa State University, demonstrate RID capabilities to a capacity crowd at the 9th SHRP 2 Safety Symposium, July 10–11 in Washington, D.C.

Researchers also shared updates on NDS progress in Canada, Australia, and China.

Findings from the first three projects to use NDS data also were presented in a SHRP 2 Tuesday webinar. The recording can be found online at www.trb.org/Calendar/Blurbs/170939.aspx. A proof-of-concept report is available at www.TRB.org/Main/Blurbs/168727.aspx.

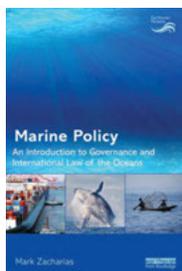
SHRP 2 Naturalistic Driving Study by the Numbers

Primary drivers	3,073
Data years	4,000
Data miles	50 million
Trip files	5 million
Crashes	>1,100
Roadway data (new)	12,542 centerline miles
Roadway data collected from departments of transportation	200,000 centerline miles

Marine Policy: An Introduction to Governance and International Law of the Oceans

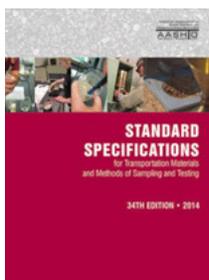
Mark Zacharias. Routledge; 2014; 336 pp.; \$49.95; 978-04-1563-308-6.

This volume presents a foundation in policy development and analysis, describes how policy is applied to marine environments, and offers a systematic treatment of all aspects of marine policy.



Standard Specifications for Transportation Materials and Methods of Sampling and Testing, 34th Edition

American Association of State Highway and Transportation Officials (AASHTO), 2014; 4,576 pp.; AASHTO members, \$625; nonmembers, \$750; 1-56051-606-4.



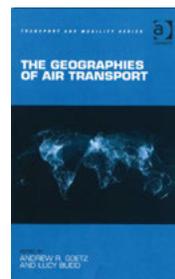
The 34th edition of the Materials Book contains

403 materials specifications and test methods commonly used in the construction of highway facilities, including 63 revised and 7 new specifications and test methods. Also included is an updated edition of the single-volume AASHTO Provisional Standards.

The Geographies of Air Transport

Edited by Andrew R. Goetz and Lucy Budd. Ashgate, 2014; 283 pp.; \$109.95; 978-14-0945-331-4.

This text examines the practices and processes that produce particular patterns of regional and local air transportation throughout the world. Thematic chapters cover such topics as historical and urban geographies, sociocultural mobility, and sustainability of the global air transport industry.



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

TRB PUBLICATIONS

Asphalt Materials and Mixtures 2013, Volume 1
Transportation Research Record 2370

Authors present research on blending-zone morphology, a surface performance-graded specification for chip seal binders, binder aging in HMA mixtures, antistripping agents in asphalt mixtures, and more.

2013; 150 pp.; TRB affiliates, \$56.25; nonaffiliates, \$75. Subscriber categories: materials; pavements.

Asphalt Materials and Mixtures 2013, Volume 2
Transportation Research Record 2371

The papers in this volume address such topics as the environmental susceptibility of bituminous mastic viscosity, reacted and activated rubber, and the cracking of New Jersey's Long-Term Pavement Performance Specific Pavement Study sections.

2013; 132 pp.; TRB affiliates, \$53.25; nonaffiliates, \$71. Subscriber categories: materials; pavements.

Asphalt Materials and Mixtures 2013, Volume 3
Transportation Research Record 2372

Explored in this volume are low-noise pavements, an airport runway forensic study, a mechanical damage model for asphalt concrete, and the cooling effect of permeable asphalt pavement.

2013; 115 pp.; TRB affiliates, \$48.75; nonaffiliates, \$65. Subscriber categories: materials; pavements.

Asphalt Materials and Mixtures 2013, Volume 4
Transportation Research Record 2373

Cyclic viscoplastic responses of asphalt concrete, laboratory hot-mix asphalt cracking testing, and permanent deformation characterization of asphalt mixtures are among the topics examined in this volume.

2013; 142 pp.; TRB affiliates, \$43.25; nonaffiliates, \$71. Subscriber categories: materials; pavements.

Railroads 2013

Transportation Research Record 2374

Authors present research on the competitiveness of high-speed rail, dynamic wheel loads of high-speed rail, strategies for rail transport of hazardous materials, ultrasonic tomography for three-dimensional imaging of internal rail flaws, and more.

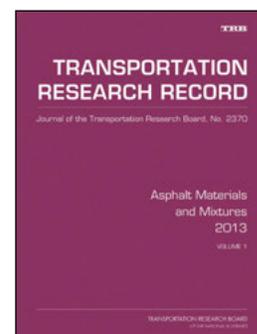
2013; 200 pp.; TRB affiliates, \$61.50; nonaffiliates, \$82. Subscriber category: rail.

Energy and Global Climate Change 2013

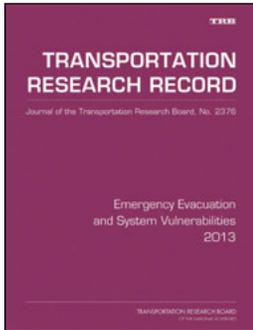
Transportation Research Record 2375

Topics covered in this volume include transportation efficiency measures, heterogeneous speeding behavior and gasoline prices, smart growth and emissions, and climate change effects on infrastructure.

2013; 81 pp.; TRB affiliates, \$45.75; nonaffiliates, \$61. Subscriber categories: energy; environment.



TRB PUBLICATIONS (continued)

**Emergency Evacuation and System Vulnerabilities 2013**

Transportation Research Record 2376

Authors present research on evacuation response, multimodal transportation resource coordination, bus transit driver availability for effective emergency evacuation, and transportation system vulnerabilities.

2013; 80 pp.; TRB affiliates, \$45.75; nonaffiliates, \$61. Subscriber categories: operations and traffic management; security and emergencies.

**Roadside Safety Design 2013**

Transportation Research Record 2377

The papers in this volume cover such topics as the Midwest guardrail system, guardrail-to-bridge rail transitions, and motorcyclist impacts into roadside barriers.

2013; 91 pp.; TRB affiliates, \$47.25; nonaffiliates, \$63. Subscriber categories: design; safety and human factors.

Freight Modeling and Logistics 2013

Transportation Research Record 2378

Explored in this volume are ancillary functions for smartphone weight-mile tax truck data, dynamic collection scheduling, geographic scalability and supply-chain elasticity analysis, empty trips in freight transportation, and other topics.

2013; 139 pp.; TRB affiliates, \$53.25; nonaffiliates, \$71. Subscriber category: freight transportation.

Freight Operations 2013

Transportation Research Record 2379

Among the subjects included in this volume are freight trip generation models, best practices in urban freight movement, unassisted off-hour deliveries, and wholesale hub locations in food supply chains.

2013; 102 pp.; TRB affiliates, \$47.25; nonaffiliates, \$63. Subscriber category: freight transportation.

Intelligent Transportation Systems 2013, Volume 1

Transportation Research Record 2380

The relationship between application scale and maximum time latency, U.S.–Mexico land border crossings, work zone information systems, and variable speed limits on a German autobahn are some of the topics examined in this volume.

2013; 119 pp.; TRB affiliates, \$48.75; nonaffiliates, \$65. Subscriber categories: operations and traffic management; planning and forecasting; vehicles and equipment.

Intelligent Transportation Systems 2013, Volume 2: Connected Vehicles and Cooperative Systems

Transportation Research Record 2381

Research is presented on a roadway reservation system, modeling safe driving distances, path clearance for emergency vehicles, virtual traffic lights, bidirectional control characteristics of car-following models, and other topics.

2013; 119 pp.; TRB affiliates, \$48.75; nonaffiliates, \$65. Subscriber categories: operations and traffic management; vehicles and equipment; safety and human factors.

Travel Behavior 2013, Volume 1

Transportation Research Record 2382

Examined in this volume are travel time frontiers, intrahousehold motorized vehicles, the equity effects of congestion charges, the effects of teenagers' attitudes toward walking and cycling on mode choice behavior, and more.

2013; 180 pp.; TRB affiliates, \$48.75; nonaffiliates, \$65. Subscriber category: planning and forecasting.

Travel Behavior 2013, Volume 2

Transportation Research Record 2383

Authors present research on dynamic route choice behavior, the geographic distribution of e-shopping, automated travel data collection using smartphones and sensor technologies, peak car travel trends for industrialized countries, and more.

2013; 61 pp.; TRB affiliates, \$48.75; nonaffiliates, \$65. Subscriber category: planning and forecasting.

Improving the Quality of Motorcycle Travel Data Collection

NCHRP Report 760

Analyzed in this volume are traffic counting technologies and data collection protocols to improve the reliability of motorcycle travel data: infrared classifiers, inductive loops and piezoelectric sensors, magnetometers, multisensor technologies, and tracking video.

2014; 57 pp.; TRB affiliates, \$36.75; nonaffiliates, \$49. Subscriber categories: highways; data and information technology; operations and traffic management.

Reference Guide for Applying Risk and Reliability-Based Approaches for**Bridge Scour Research**

NCHRP Report 761

This guide helps identify and evaluate the uncertainties associated with bridge scour prediction, including hydrologic, hydraulic, and model or equa-

The TRR Journal Online website provides electronic access to the full text of approximately 14,000 peer-reviewed papers that have been published as part of the Transportation Research Record: Journal of the Transportation Research Board (TRR Journal) series since 1996. The site includes the latest in search technologies and is updated as new TRR Journal papers become available. To explore the TRR Online service, visit www.TRB.org/TRROnline.

TRB PUBLICATIONS (continued)

tion uncertainty. Included is a step-by-step procedure providing scour factors for site-specific conditions.

2013; 164 pp.; TRB affiliates, \$51; nonaffiliates, \$68. Subscriber categories: bridges and other structures; hydraulics and hydrology.

Laboratory Validation of an Endurance Limit for Asphalt Pavements

NCHRP Report 762

This report presents models for the hot-mix asphalt fatigue endurance limit that are responsive to asphalt binder and mixture properties and healing between load cycles.

2013; 26 pp.; TRB affiliates, \$30.75; nonaffiliates, \$41. Subscriber categories: highways; design; materials.

Evaluation of the Moisture Susceptibility of Warm-Mix Asphalt (WMA) Technologies

NCHRP Report 763

Proposed guidelines for identifying potential moisture susceptibility in WMA, along with potential revisions to the Appendix to AASHTO R35.

2014; 110 pp.; TRB affiliates, \$43.50; nonaffiliates, \$58. Subscriber categories: highways; materials.

Using Peer Exchanges to Improve the Effectiveness of Strategic Highway Safety Plans

NCHRP Report 764

This report contains guidance—and a template—on conducting state-level peer exchanges for state departments of transportation to implement, evaluate, and update strategic highway safety plans.

2014; 138 pp.; TRB affiliates, \$48; nonaffiliates, \$64. Subscriber categories: highways; planning and forecasting; safety and human factors.

Nonnuclear Methods for Compaction Control of Unbound Materials

NCHRP Synthesis 456

Documented in this synthesis are information on national and international experience with nonnuclear devices and methods for measuring compaction of unbound materials.

2014; 157 pp.; TRB affiliates, \$51; nonaffiliates, \$68. Subscriber categories: construction; highways.

Implementation of the AASHTO Mechanistic–Empirical Pavement Design Guide and Software

NCHRP Synthesis 457

Documented is the implementation of the 2008 AASHTO Mechanistic–Empirical (ME) Pavement Design Guide: A Manual of Practice and the 2011

software program AASHTOWare Pavement ME Design, formerly DARWin-ME.

2014; 80 pp.; TRB affiliates, \$55; nonaffiliates, \$41.25. Subscriber categories: design; highways.

Roadway Safety Data Interoperability Between Local and State Agencies

NCHRP Synthesis 458

This synthesis surveys state and local safety data and highlights transportation agency practices that support data-driven safety programs on public roads.

2014; 88 pp.; TRB affiliates, \$43.50; TRB nonaffiliates, \$58. Subscriber categories: highways; safety and human factors.

A Guidebook for Integrating National Incident Management System (NIMS) for Personnel and Resources at Airports

ACRP Report 103

This guidebook addresses common NIMS and incident command terminology, outlines incident command structures for various situations, and includes training outlines and sample plans from airports.

2014; 128 pp.; TRB affiliates, \$45.75; nonaffiliates, \$61. Subscriber categories: aviation; security and emergencies.

Defining and Measuring Aircraft Delay and Airport Capacity Thresholds

ACRP Report 104

This volume offers guidance to help airport managers understand, select, calculate, and report measures of delay and capacity.

2014; 74 pp.; TRB affiliates, \$36.75; nonaffiliates, \$49. Subscriber categories: aviation; planning and forecasting.

Guidelines for Ensuring Longevity in Airport Sound Insulation Programs

ACRP Report 105

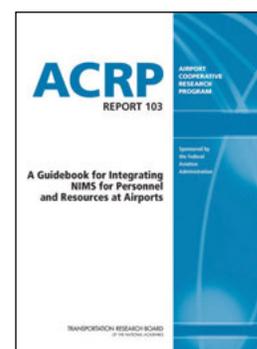
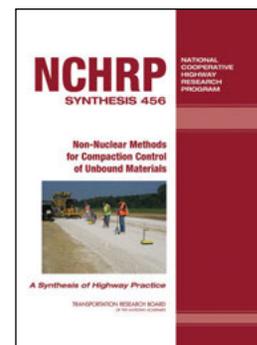
A companion to ACRP Report 89, *Guidelines for Airport Sound Insulation Programs*, this report provides best practices in all phases of a sound insulation program to reduce or eliminate deterioration.

2014; 48 pp.; TRB affiliates, \$35.25; nonaffiliates, \$47. Subscriber categories: aviation; construction.

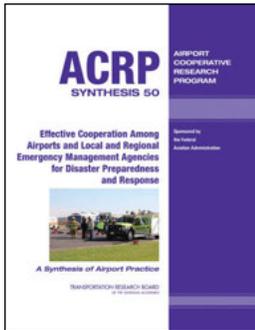
Being Prepared for Irregular Operations (IROPS): A Business-Planning and Decision-Making Approach

ACRP Report 106

Presented in this report is guidance for airport planning and funding decisions related to IROPS



TRB PUBLICATIONS (continued)



contingency planning, with a spreadsheet-based business planning and decision support tool to quantify the value of proposed IROPS mitigation.

2014; 88 pp.; TRB affiliates, \$48.75; nonaffiliates, \$65. Subscriber categories: aviation; finance; operations and traffic management.

Effective Cooperation Among Airports and Local and Regional Emergency Management Agencies for Disaster Preparedness and Response

ACRP Synthesis 50

This volume provides access to a range of policies, programs, practices, and relationships for establishing and sustaining good working relationships between airports and their emergency response allies.

2014; 52 pp.; TRB affiliates, \$33; nonaffiliates, \$44. Subscriber categories: aviation; security and emergencies.



Impacts of Aging Travelers on Airports

ACRP Synthesis 51

This synthesis explores the challenges of wayfinding, fatigue, technology and equipment, and needed amenities for aging travelers, along with accommodative practices.

2014; 36 pp.; TRB affiliates, \$33; nonaffiliates, \$44. Subscriber category: aviation.



Habitat Management to Deter Wildlife at Airports

ACRP Synthesis 52

Part of a series on wildlife risk management at airports, this synthesis presents information on habitat management to deter wildlife and manage risk.

2014; 84 pp.; TRB affiliates, \$39; nonaffiliates, \$52. Subscriber categories: aviation; environment.

Characteristics of Premium Transit Services That Affect Choice of Mode

TCRP Report 166

Explored in this volume are transit travel behavior determinants and ways to represent and distinguish transit characteristics in travel forecasting models. Appendixes comprising a literature review, survey instruments, and models are included with the report.

2014; 398 pp.; TRB affiliates, \$66.75; nonaffiliates, \$89. Available at http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_166.pdf.

Optimizing Bus Warranty

TCRP Synthesis 111

This synthesis examines steps to monitor war-

ranty coverage periods more accurately, to optimize the warranty process, and to maximize warranty reimbursement.

2014; 72 pp.; TRB affiliates, \$41.25; nonaffiliates, \$55. Subscriber categories: finance; public transportation; vehicles and equipment. Available at http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_syn_111.pdf.

Suballocating Federal Transit Administration Section 5307 Funding Among Multiple Recipients in Metropolitan Areas

TCRP Synthesis 113

This synthesis documents the approaches, methodologies, and practices for the suballocation of Federal Transit Administration Section 5307 formula funds—the primary source of financial support for public transportation capital projects. Also explored are practices for fund distribution.

2014; 73 pp.; TRB affiliates, \$15; nonaffiliates, \$20. Subscriber categories: finance; planning and forecasting; public transportation; society.

Assessment of Continuous Pavement Deflection Measuring Technologies

SHRP 2 Report S2-R06F-RW-1

This volume compiles and assesses continuous deflection measuring technologies and assesses the capabilities of select devices. Case studies on technology applications are included; report results were incorporated into the online NDTtoolbox.

2013; 99 pp. Subscriber categories: construction; highways; maintenance and preservation; pavements. Available at <http://onlinepubs.trb.org/onlinepubs/shrp2/SHRP2prepUBR06F.pdf>.

Evaluating Alternative Operations Strategies to Improve Travel Time Reliability

SHRP 2 Report S2-L11-RR-1

In this volume, ways to improve travel-time reliability are identified and evaluated, along with technological changes, operational solutions, and organizational actions.

2014; 194 pp.; TRB affiliates, \$54.75; nonaffiliates, \$73. Subscriber categories: finance; highways; operations and traffic management; planning and forecasting. An e-book version of this report is available for purchase at Amazon, Google, and iTunes.

To order TRB titles described in Bookshelf, visit the TRB online Bookstore, at www.TRB.org/bookstore/, or contact the Business Office at 202-334-3213.

INFORMATION FOR CONTRIBUTORS TO

TR NEWS

TR News welcomes the submission of manuscripts for possible publication in the categories listed below. All manuscripts 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 manuscripts accepted for publication are subject to editing for conciseness and appropriate language and style. Authors receive a copy of the edited manuscript for review. Original artwork is returned only on request.

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, etc.). Manuscripts should be no longer than 3,000 words (12 double-spaced, typed pages). Authors also should provide charts or tables and high-quality photographic images with corresponding captions (see Submission Requirements). Prospective authors are encouraged to submit a summary or outline of a proposed article for preliminary review.

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, whether they pertain to improved transport of people and goods or provision of better facilities and equipment that permits such transport. 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 one or two illustrations that may improve a reader's understanding of the article.

NEWS BRIEFS are short (100- to 750-word) items of interest and usually are not attributed to an author. They may be either text or photographs or a combination of both. Line drawings, charts, or tables may be used where appropriate. Articles may be related to construction, administration, planning, design, operations, maintenance, research, legal matters, or applications of special interest. Articles involving brand names or names of manufacturers may be determined to be inappropriate; however, no endorsement by TRB is implied

when such information appears. Foreign news articles should describe projects or methods that have universal instead of local application.

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 illustrations, and are subject to review and editing.

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, and ISBN. Publishers are invited to submit copies of new publications for announcement.

LETTERS provide readers with the opportunity to comment on the information and views expressed in published articles, TRB activities, or transportation matters in general. All letters must be signed and contain constructive comments. Letters may be edited for style and space considerations.

SUBMISSION REQUIREMENTS: Manuscripts submitted for possible publication in *TR News* and any correspondence on editorial matters should be sent to the Director, Publications Office, Transportation Research Board, 500 Fifth Street, NW, Washington, DC 20001, telephone 202-334-2972, or e-mail jawan@nas.edu.

- ◆ All manuscripts should be supplied in 12-point type, double-spaced, in Microsoft Word, on a CD or as an e-mail attachment.

- ◆ Submit original artwork if possible. Glossy, high-quality black-and-white photographs, color photographs, and slides are acceptable. Digital continuous-tone images must be submitted as TIFF or JPEG files and must be at least 3 in. by 5 in. with a resolution of 300 dpi. A caption should be supplied for each graphic element.

- ◆ Use the units of measurement from the research described and provide conversions in parentheses, as appropriate. The International System of Units (SI), the updated version of the metric system, is preferred. In the text, the SI units should be followed, when appropriate, by the U.S. customary equivalent units in parentheses. In figures and tables, the base unit conversions should be provided in a footnote.

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Transportation Research Board 94th Annual Meeting

January 11–15, 2015 • Washington, D.C.

CORRIDORS TO THE FUTURE: TRANSPORTATION AND TECHNOLOGY

As the 94th TRB Annual Meeting relocates to a new space at the Walter E. Washington Convention Center in Washington, D.C., the theme for the meeting explores the future of transportation. It is a future that can be expected to include many changes, including increasingly autonomous vehicles, a changing energy landscape, climate change, changing demographics and travel patterns, big data, and much more. Spotlight sessions, workshops, and in-depth discussions will address the critical role that transportation innovation and research have in the development and application of new technology to create a more seamless, personalized, and multimodal user experience.

Plan now to

- Learn about recent developments and changing contexts that may affect transportation policy making, planning, design, construction, operations, safety, and maintenance;
- Explore with stakeholders and subject-matter experts the role of innovation and research in addressing critical transportation issues;
- Discover how international, federal, state, regional, and local transportation agencies and private-sector organizations are deploying the latest techniques and strategies;

- Network with nearly 12,000 transportation professionals attending the meeting and the thousands who will be participating in TRB committee meetings;
- Take advantage of 4,500 presentations in nearly 800 sessions and specialty workshops; and
- Learn from more than 200 exhibits showcasing a variety of transportation-related products and services.

Exhibit and Marketing Opportunities

Show your organization's support for transportation research and innovation by becoming an Annual Meeting Patron, Advertiser, or Exhibitor.

Information

Registration is now open.

Register before November 30, 2014, to take advantage of lower fees.



For more information, visit
www.TRB.org/AnnualMeeting.

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