

An aerial photograph of a scenic landscape. A paved road with yellow and white markings curves through a lush green area with scattered evergreen trees. In the background, a large, calm blue lake is visible, surrounded by more forested hills under a bright blue sky with scattered white clouds. The overall scene is peaceful and natural.

Federal Highway Administration  
Federal Lands Highway Program

2017  
*The Year in Review*



***From the desk of the Associate Administrator***

This report celebrates another year of accomplishments by the Federal Highway Administration, Office of Federal Lands. During 2017, the Office of Federal Lands delivered a \$1.4B program for our Federal Land Management Agency partners, Native American Tribal partners, State Departments of Transportation, and other partner agencies such as the Department of Defense and Department of Homeland Security. We were only able to accomplish this through fostering relationships and partnering with each of our stakeholders to deliver context sensitive solutions for highway projects. These projects ranged from expressways in urban areas to highways and bridges in remote areas with challenging terrain, unique habitats, and historical environments.

During the past year, our nation was impacted by several major natural disasters. The Office of Federal Lands supported our federal and state partners in responding to events ranging from hurricanes in the Caribbean to wildfires on the Pacific Coast. We worked closely with the Federal Emergency Management Agency to assist in emergency relief efforts that allowed local and state Departments of Transportation to quickly repair roads and bridges and restore service to the public. These efforts were instrumental in getting local communities back on their feet and on the road to recovery.

2017 was also a year where our nation turned its attention toward rebuilding our national infrastructure. Our elected officials are focused on addressing infrastructure needs on not only our nation's highways operated by the State Departments of Transportation, but also on highways leading to and located on federal land. Almost a third of the United States is federally owned land and the transportation requirements are enormous. As the American public continues to enjoy and visit our national parks, forests, wildlife refuges, and other lands in record numbers, the Office of Federal Lands Highway and our Federal Land Management Agency partners are working in close partnership to meet these transportation requirements. We're excited about the future and stand ready to do our part in rebuilding our nation's infrastructure!

The projects we delivered in 2017 tell our story best. The next several pages showcase some of these projects. Please take a few minutes to see what we have accomplished!



***Timothy G. Hess, P.E.***  
***Associate Administrator for Federal Lands***  
***Federal Highway Administration***



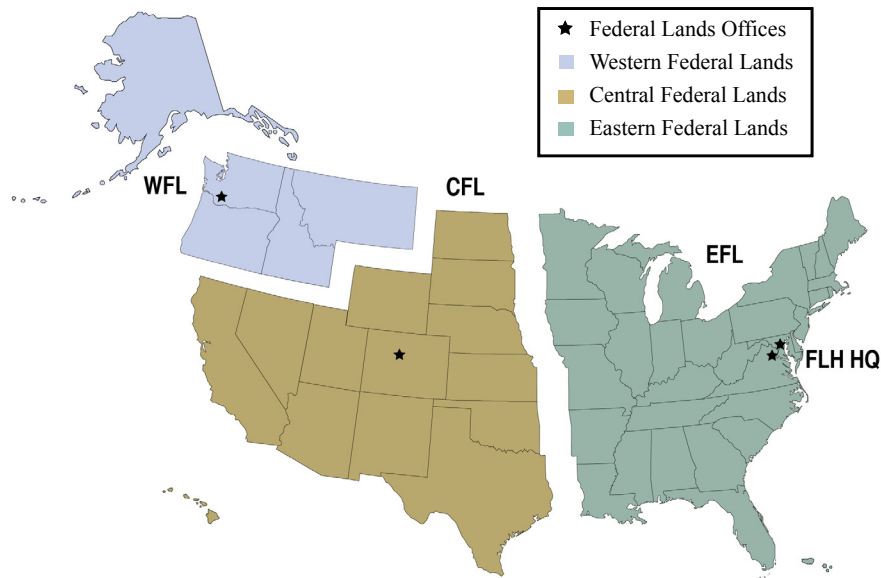
*Tim (right) onsite at the Manning Crevice Bridge Replacement project presents Western Federal Lands Project Engineer, with a Federal Lands commemorative coin, for a job well done!  
— Salmon River Road, Idaho*

# The Federal Lands Highway Program

## 2017

### The Year in Review

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U.S. Department of Transportation  
**Federal Highway Administration**

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*Special thanks to the Federal Lands employees responsible for taking the majority of the beautiful photographs contained in this report.*

*Front Cover: Navajo Lake Road, Dixie National Forest, Utah  
Back Cover: Defense Access Road, Wheatland County, Montana*



## Vision

To be the partner of choice to Federal Land Management Agencies and Tribes. We will implement innovative transportation solutions that provide access to and through public lands.

## Mission

Improving transportation to and within Federal and Tribal Lands by providing technical services to the highway/transportation community, as well as building accessible and scenic roads that ensure the many national treasures, within our Federal Lands, can be enjoyed by all.

*Navajo Lake Road, Dixie National Forest, Utah*

## **Our Role**

The Federal Highway Administration (FHWA) Federal Lands Highway Program (FLHP) was established in 1982 to promote effective, efficient, and reliable administration for a coordinated program of public roads and bridges; to protect and enhance our Nation's natural and cultural resources; and to provide needed transportation access for Native Americans. The Federal Government, through various Federal Land Management Agencies (FLMAs): the National Park Service (NPS); USDA Forest Service (FS); U.S. Fish and Wildlife Service (FWS); Bureau of Indian Affairs (BIA) and Tribal Governments; Bureau of Land Management (BLM); Department of Defense (DOD); U.S. Army Corps of Engineers (USACE); and Bureau of Reclamation (BOR), have ownership responsibilities for more than 30% of the Nation's land. This responsibility covers more than 500,000 miles of public and administrative roads on federal land across the U.S. and its island territories.

The Office of Federal Lands Highway (FLH) is relied upon by these partners to solve and manage unique challenges that are wide-ranging in environment, geography and complexity, through engineering solutions that are sensitive to the context of the land. We are often confronted by unique terrain, work restrictions, and challenging deadlines. Whether it is building highly visible and political projects, constructing roads that are national landmarks, or providing critical access on low-volume transportation facilities, FLH is at the forefront of consistently delivering distinct and sound engineering projects.

FLH consists of a Headquarters Office (HFL) in Washington, District of Columbia and three Federal Lands Highway Division Offices (FLHD): Eastern Federal Lands (EFL) in Sterling, Virginia; Central Federal Lands (CFL) in Lakewood, Colorado; and Western Federal Lands (WFL) in Vancouver, Washington.

Federal Lands' role is categorized into two areas: Program Administration and Project Delivery. Program Administration addresses stewardship and oversight for funds provided through the multi-year transportation authorization, currently the Fixing America's Surface Transportation Act (FAST Act) which provides funds for FY 2016-2020. Under the FAST Act, program funds (i.e Tribal Transportation Program (TTP), Federal Lands Transportation Program (FLTP), Federal Lands Access Funds (FLAP)) are administered by the Office of Federal Lands. TTP funds are allocated to Federally Recognized Tribal Nations for capacity development and delivery of projects on tribal lands. The FLTP and FLAP funds are allocated to FHWA and the FLMAs for the planning, design, and construction of highway, road, bridge, and other transportation projects determined necessary by our FLMA partners.

Project Delivery is the development of projects from preliminary design through final design and construction of a project. The Office of Federal Lands uses funds provided the FLTP and FLAP to develop and deliver projects for FLMAs. In addition, the Office of Federal Lands delivers projects for state and local Departments of Transportation, as well as other federal

agencies that need FHWA assistance in designing and constructing highways for their agency's needs.

Now in its 36th year, the program and our role continue to expand to include more Federal partners and road networks. FLH expertise and credibility has grown to deliver a wider variety of transportation projects and improvements nationwide.

### ***We are responsible for:***

- ***Transportation Planning***
- ***Program Administration***
- ***Project Management***
- ***Environmental Compliance***
- ***Preparation of Plans, Specifications and Estimates (PS&E)***
- ***Contract Administration***
- ***Construction Supervision and Inspection***
- ***Technical Assistance to the Highway Community***

### ***Our engineering and technical expertise includes:***

- ***Highway and Bridge Design***
- ***Survey, Mapping and Right of Way***
- ***Hydraulics***
- ***Geotechnical***
- ***Traffic***
- ***Safety***
- ***Intelligent Transportation Systems***
- ***Design Visualization***
- ***Materials and Pavements***
- ***Consultant and Construction Contract Acquisition***
- ***Road and Bridge Inventory and Inspection***
- ***Asset Management***

***We employ practices and techniques of the FHWA Every Day Counts Innovations (EDC), designed to shorten project delivery, enhance durability and safety, improve environmental sustainability and increase efficiency through technology and collaboration in our daily business.***

## ***The Federal Lands Programs***

### **Federal Lands and Tribal Transportation Program (FLTTP)**

The FLTTP established under the Moving Ahead for Progress in the 21st Century Act (MAP-21) and continued under the Fixing America's Surface Transportation Act (FAST Act) authorizes annual funding through three primary programs: the Federal Lands Access Program (FLAP), the Federal Lands Transportation Program (FLTP), and the Tribal Transportation Program (TTP). Through these programs, FLH works with numerous Federal agencies and Indian Tribes as well as State and Territorial partners to deliver projects.

### **Federal Lands Access Program (FLAP)**

The FLAP, authorized at \$255 million in FY 2017, provides flexibility for a wide range of transportation projects in the 50 States, the District of Columbia, and Puerto Rico. FLAP was established to improve state and county transportation facilities that provide access to high-use recreation sites and economic generators within Federal lands.

### **Federal Lands Transportation Program (FLTP)**

The FLTP, authorized at \$345 million in FY 2017, provides funding for the management and upkeep of approximately 50,000 miles of federal public roads and other assets comprising partners' Federal lands transportation facility inventory. The program provides funding to the NPS, FS, FWS, BLM, BOR, USACE, and eligible independent federal agencies (IFA). To date, the Presidio Trust Corporation is the sole IFA to be included in the FLTP. The Presidio will begin receiving funds in 2017. Of the three programs that comprise the FLTTP, the FLTP incorporates performance based management principles outlined in MAP-21 and reinforced under the FAST Act. The FLTP places emphases on performance goals defined by the Secretary of Transportation and FLMA(s) and is intended to target funds toward multi-modal transportation facilities that access high use recreation destinations and federal economic generators within the federal estate.

### **Tribal Transportation Program (TTP)**

The TTP, authorized at \$475 million in FY 2017, provides funding for safe and adequate transportation and public road access to and within Indian reservations, Indian lands, and Alaska Native Village communities.

### **Nationally Significant Federal Lands and Tribal Transportation Projects (NSFLTTP)**

The NSFLTTP was created under the FAST and is intended to provide a reliable source of funding for major, high cost projects that typically cannot be funded with FLTTP resources. This program is funded through the General Fund at a maximum of \$100 million per year, but did not received an appropriation in FY 2017.

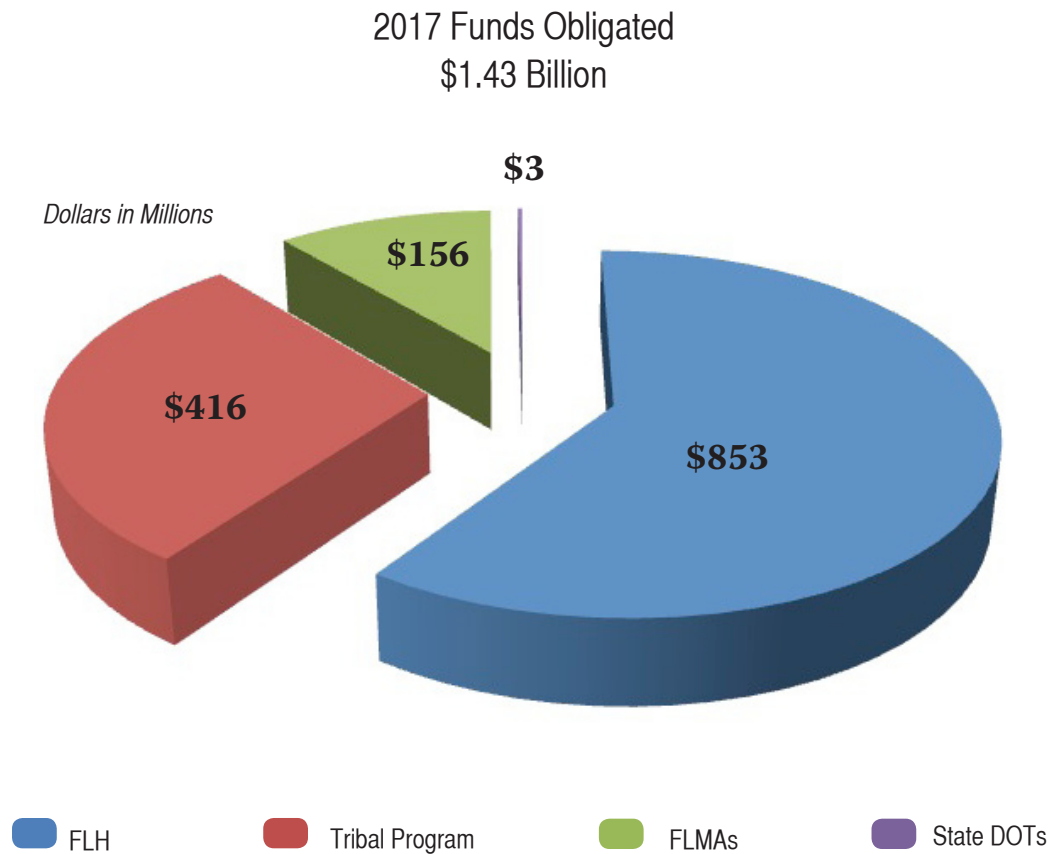


*The Office of Federal Lands Highway and the US Forest Service signed an updated interagency agreement celebrating a partnership that dates back to the 1920s.*

## The Federal Lands Programs

### Program Funds Obligated by Executing Agent

In 2017, \$1.43 billion in Federal funds were obligated by Federal Lands and its partners. Of this amount, \$853 million was obligated by the Office of Federal Lands (FLH) through the Federal Lands Highway Divisions. \$416 million in Tribal Transportation Funds were jointly administered by FHWA and BIA and distributed to Federally Recognized Indian Tribes. The remaining \$159 million was transferred to our partners at various FLMAs and State Departments of Transportation (DOTs) for use on their projects and in administration of the Federal Lands Programs.



### FAST ACT FY 2017 PROGRAM FUNDING

**\$345 million** FLTP

**\$255 million** FLAP

**\$475 million** TTP

### PROGRAM DELIVERY SUCCESS

**82%**

Funds On The Ground

**93.4%**

of the FAST Act FY 2017 Programs were expended

**2025**

Lane Miles (Completed Construction)

**1282**

Lane Miles (Awarded)

**72**

Bridges (Completed Construction)

**100**

Bridges (Awarded)

## **Tribal Transportation Program (TTP)**

### **Success in the Program**

#### **The TTP in 2017**

The TTP, authorized at \$475 million in FY 2017, provides funds to 567 federally recognized Tribes to improve the transportation systems located within, or that provide access to, Tribal lands. These roads, bridges, trails and transit systems most often provide basic access to community services and help to enhance the quality of life of Tribal members.

Federal Lands co-administers the TTP with the BIA and is responsible for the primary stewardship and oversight of program funds. Approximately 131 of the Tribal governments operate their TTP directly through Program Funding Agreements with FHWA.

#### **Transportation Safety in Tribal Areas**

Each year under the FAST Act, 2% of the available TTP funds (\$9 million) are set aside to address transportation safety issues on Tribal land. Awarded annually, projects are chosen whose outcomes will address the prevention and reduction of death or serious injuries in transportation related incidents, such as motor vehicle crashes. Transportation fatalities and injuries severely impact the quality of life in Indian country. FHWA advocates the development of strategic Transportation Safety Plans as a means for Tribes to determine how transportation safety needs will be addressed in and around tribal communities. Infrastructure improvements, crash data collection, sharing, and use improvements have been funded by Tribal Transportation Program Safety Funds (TTPSF). Transportation Safety Plans have been developed by over 60% of Tribes as a result of this funding.

On April 10, 2017, FHWA awarded 74 Tribes a total of \$9 million for 77 projects. On September 21, 2017, the FHWA published the fifth annual notice to announce the availability of approximately \$18 million and request grant applications for FY2017 and FY 2018. Additional information about the funding can be found at <http://flh.fhwa.dot.gov/programs/ttp/safety>.

Some examples of successful safety infrastructure improvements funded by TTPSF:

- Separated Pathways for Pedestrian and Vehicular Safety
- Intersection Traffic Control
- Ice Road Safety Monitoring



*A separated pathway connects Citizen Potawatomi Nation to the city of Pawnee, Indiana.  
Image courtesy of Tom Edwards, Cross Timbers Consulting*



*Cherokee Nation's first traffic light project with the Oklahoma Department of Transportation at the intersection accessing the entrance to Sequoyah High School, Head Start, Cherokee Immersion Charter School and the Early Childhood Development Center.  
Image courtesy of Michael Lynn, Cherokee Nation*



## Tribal Transportation Program (TTP)



*Ice roads require constant monitoring to ensure safe travel during the winter months. All along the Kuskokwim River there are key individuals who monitor the river closely, throughout the year. They communicate back and forth on conditions in preparation for the necessary planning and marking of safe winter transportation routes.  
All images courtesy of Mark Leary, Native Village of Napaimute*



*The social and economic benefits of having safe, maintained winter transportation routes in this region are immeasurable. Families from all over the Kuskokwim were able to attend a recent Regional Basketball Tournament at Kalskag High School.*



*Without the financial support of the TTPSF for their winter transportation systems locals are forced to rely on trails like this one between Aniak & Chuathbaluk. Chuathbaluk is located on the north bank of the Kuskokwim River, 11 miles upriver from Aniak in the Kilbuk-Kuskokwim Mountains. It is 87 air miles northeast of Bethel and 310 miles west of Anchorage.*



*A large volume of U.S. Mail is transported on the River by truck, in fact many government agencies and businesses benefit from the use and maintenance of the ice roads.*

## Tribal Transportation Program (TTP)

### Tribal Transportation Safety Reports to Congress

Motor vehicle crashes cause an average of 655 fatalities each year in Tribal areas. Transportation crashes in Tribal areas often go unreported and may not be shared via state and national databases. This puts Tribal areas at a disadvantage for accessing resources and programs designed to improve transportation safety. FHWA published a report to Congress this year identifying opportunities to improve transportation crash reporting in Tribal areas.

Despite being under reported, motor vehicle crashes are a leading cause of unintentional injury for American Indians and Alaska Natives between the ages of 1 and 44. The Tribal Transportation Safety Management System Steering Committee researched five years of available fatality data, transportation safety plans developed by Tribes, and other data sources to identify topics to emphasize in a Tribal Transportation Strategic Safety Plan published in August 2017. The safety plan identifies some overall trends which may help to guide national technical assistance and be useful toward the planning efforts of Tribes and States. Topics of greatest concern in tribal areas are:

*Decision Making Process* – A successful safety program must have clear direction. This topic encourages Tribes to develop strategic safety plans and use those plans to manage a coordinated safety program.

*Crash Data* – As identified in a prior report to Congress, crash data improvements are needed in many Tribal areas.

*Occupant Protection/Child Passenger Seats* – Over half of all fatalities were not using safety restraints in the studied Tribal areas.

*Roadway Departure* – Errant drivers leaving the proper lane or roadway represent a large portion of fatal crashes in Tribal areas.

*Impaired Driving* – Statistics for impaired driving are estimated to be slightly higher in Tribal areas than elsewhere in the United States.

*Pedestrian Safety* – Many Native American communities have citizens walking greater distances on a regular basis. Pedestrian safety is identified as a top priority in many Tribal safety plans. Most pedestrian accidents in Tribal areas occur at a location other than an intersection or marked crosswalk.

*Availability of Public Safety Services* – The severity of an injury is often directly related to the speed with which proper medical attention can be provided. The time elapsed from EMS notification to arrival at a treatment facility is more than an hour in 44% of Tribal area fatalities compared to 23% of all fatal crashes nationwide.

Additional resources and information, including a copy of the safety plan, can be obtained on the committee's website, [www.TribalSafety.org](http://www.TribalSafety.org).

### FHWA hosted the TTP Oklahoma/Eastern Region Tribal Workshop

FHWA delivered its annual three-day Tribal Workshop in Salamanca, NY for Tribes in the BIA Eastern and Eastern Oklahoma Regions. The Workshop provided technical assistance to Tribes, showcased successful transportation projects, and provided an opportunity for Tribes to share information.

Topics were presented by the FHWA, BIA, Department of Interior, Seneca Nation, Chickasaw Nation, Citizen Potawatomi Nation, the New York LTAP, Eastern Band of Cherokee Nation, and the Osage Nation. Many from the FHWA and non-FHWA Agreement Tribes in the Oklahoma and Eastern BIA Regions also attended.

Technical training included a variety of topics on planning, development, and construction of transportation projects, and transportation maintenance. The goal was not only to strengthen technical knowledge, but to build relationships with the Tribal communities served by the TTP Program.



*Erin Kenley, FHWA Director of the Tribal Transportation Program presents during the workshop.*

### FHWA Southwest and Western Region Tribal Transportation Program Workshop

The objectives of these workshops were to provide an update on the TTP, facilitate networking, provide training, promote available programs and technologies, and share best practices in program delivery with Tribes in the Southwestern, Navajo, and Western Regions. This year, topics included FEMA, CDL Certification, Paving Best Practices, Safety Plans, ERFO, Construction Safety, and more. The workshop was held at the Navajo Division of Transportation Complex in Tse Bonito, New Mexico and drew an average of 75 participants each day. Participants represented various Tribal DOT's, State DOT's, Federal (FHWA, BIA, FEMA) agencies, Local Community Colleges, Asphalt Paving Industry partners, and several Public and Private agencies.

### Tribal Transportation Program (TTP)



#### Historic Rainbow Arch Bridge, Pottawatomie County, Oklahoma

The Citizen Potawatomi Nation repaired/restored and preserved a historic concrete bridge structure. Locally, the bridge is known as the Rainbow Arch Bridge, located in Pottawatomie County, Oklahoma. The structure was originally built in 1917. According to the Citizen Potawatomi Nation Public Information Office it is believed to be the oldest standing bridge in Pottawatomie County. The single span concrete arch bridge carries Rangeline Road across Squirrel Creek, the only one of its kind remaining in the state, it is on the National Register of Historic Places. Originally running along what was then-known as the Williams Highway linking the towns of Shawnee and Tecumseh, the road and bridge were constructed using labor from prisoners housed at the Oklahoma State Penitentiary located in McAlester.

As road and travel infrastructure developed in the county, the main artery between the two largest towns in Pottawatomie County became what was known as Beard Street, later named S. Gordon Cooper Drive. Despite this, the solid engineering and construction stood the test of time as the bridge remained drivable almost a century later. Finally, time and erosion took its toll and in 2013, the structure was closed to traffic. Two years later, through an agreement with the Pottawatomie County government, the Citizen Potawatomi Nation assumed ownership and maintenance responsibilities. The Federal Highway Administration provided more than \$300,000 through the Tribal Transportation Program to the project to assist in repairing a piece of American history.



*The newly restored bridge and marker, Images courtesy of Citizen Potawatomi Nation Public Information Office and Department of Transportation*

*The original bridge*

## Tribal Transportation Program (TTP)

### Dwight Mission/Sequoyah Landing Road and Sequoyah Bay Road, Sequoyah County, Oklahoma

Dwight Mission Road south from I-40 leads to the National Cherokee Nation Park in Sequoyah County, Oklahoma. The park is an “800-acre tribal property, open to the public, adjacent to Robert S. Kerr Reservoir, and part of the Arkansas River system. The Nation received the land from the Army Corps of Engineers in 1998 and designated it as a Cherokee Nation National Park in April 2016. The two-lane surface rehabilitation project starts at the park gateway and terminates north at I-40. Part of the project is Sequoyah Bay Road, which turns slightly northeast from the intersection of Dwight Mission Road toward Sallisaw Creek Public Use Area, which is also owned by the Nation. The project scope included full-depth patching, constructing an asphalt pavement including drives inside the camping area, and signing. The improved roadway provides access to residential and recreational areas.



Robert S. Kerr Reservoir



Ribbon cutting held October 16, 2017  
courtesy Cherokee Nation



Dwight Mission  
Road looking South



Start of Dwight Mission  
Road project, looking North



Sequoyah Bay Road looking east from Dwight Mission  
Road intersection

## Tribal Transportation Program (TTP)

### Ivar's Bridge Replacement, Fort Yukon, Alaska

Ivar's bridge was built by a Fort Yukon resident in 1959 and refurbished in 1981. The bridge provides access to subsistence hunting, fishing, berry picking and firewood gathering for the local population.

Ivar's bridge consisted of multiple corrugated metal-pipe culverts, laid side-by-side across the Sucker River, with concrete slabs placed on top of the culverts to create a narrow single lane bridge. The bridge was determined to be structurally deficient and obsolete and had been posted as "closed for all traffic" since 2013.

The Tribe contracted with FLH to design and construct the project on behalf of the Tribe. Funding for this bridge replacement contract included \$430,250.00 in an Accelerated Innovation Deployment Demonstration grant, with a total award of \$2,790,680.00. Ivar's Bridge is the first Geosynthetic Reinforced Soil bridge in Alaska. The project was completed and celebrated with a ribbon cutting ceremony on October 17th, 2017.



*Aerial views of the bridge under construction*



*Ribbon Cutting ceremony: [Right to Left] Nancy James, 1st Chief; Frannie Hughs, Tribal Council Member; Michele Vandyke, Tribal Council Member; Michael Peter, 2nd Chief; and Paul Rettinger, FHWA TTP Sr. Tribal Coordinator.*



*Aerial view of the completed bridge*

## ***Project Delivery***

### ***Project Showcase***

#### **Navajo Lake Road, Dixie National Forest, Utah**

The road provides access to Navajo Lake, multiple campgrounds, and numerous recreational opportunities. It is a popular spot because of its proximity to Cedar City, Utah. The Forest Service also operates logging operations along the south side of the alignment. This project reduced dust hazards, improved visibility and enhanced overall safety. The completion of this project was highly anticipated by locals and visitors alike.



## Project Delivery

### White Pond Road, Assabet River, National Wildlife Refuge, Massachusetts

Assabet River National Wildlife Refuge, a large wetland and forested area serves as an important feeding and breeding ground for migratory birds and other wildlife. White Pond Road, provides primary access to 15 miles of walking and biking trails as well as access to the Towns of Maynard and Stow, Massachusetts. This project allowed for careful reconstruction and preservation of historic hand-laid stone walls and historic stone boundary markers while improving pavement and drainage.



*White Pond Road, Assabet River National Wildlife Refuge, Massachusetts*



### Grand Loop Road, Norris to Golden Gate, Phase 2, Yellowstone National Park, Wyoming

The project scope includes updating the existing surface of the roadway and implementing several large realignments of the roadway to reclaim wetland and historical areas along the project limits. There will also be rehabilitation of stone masonry and historical timber structures throughout the project. Additionally, several rehabilitation projects including lookouts and trails will occur in the Grand Canyon of Yellowstone area at Inspiration Point, Brink of Upper Falls, and Uncle Toms Trail.



*Boardwalk Installation at Inspiration Point, a viewpoint on the north rim of the Grand Canyon of the Yellowstone River, Yellowstone National Park, Wyoming*

## Project Delivery

### Lake Park Improvements, Lewisville, Texas

The City of Lewisville, Texas maintains Lake Park through a lease agreement with the U.S. Army Corps of Engineers. The project included reconstruction of 1.6 miles of roadway inside the park, reconstruction of nine parking lots, and addition of 2.25 miles of new recreational trails within park boundaries. The construction notice-to-proceed was issued on November 2, 2015 with a completion date of May 19, 2016. Three weeks later the project was flooded by an historic rain event and was completely underwater for almost four months. The contractor was able to start work on some of the higher project areas but was unable to work on the rest of the project until May 2016 due to saturated soil conditions. As a result of the flood, additional subexcavation and pipe work was required that was not in the original contract. Although this project experienced many setbacks, the City of Lewisville was a very supportive, understanding partner, and were very happy with the finished project.



Lake Park Access Road, Lewisville, Texas

### Bridge Rehabilitation, New River Gorge National River, West Virginia

The New River in the Appalachian Mountains of southern West Virginia is a rugged, whitewater river that flows northward through deep and spectacular canyons. The Park is renowned for its premier recreational opportunities. FLH completed rehabilitation of five historic timber bridges within the park, including Mill Creek Bridge, Upper Glade Creek Bridge, Fayette Station Bridge, and Camp Brookside Access Bridge. The work included repair and replacement of timber rails, posts, curbs, decking, and running boards; cleaning and painting of steel bridge members; repair and repointing of stone masonry; and construction of a concrete retaining wall.



Fayette Station Bridge before and after.





## Project Delivery

### Big and Little Swan Creek Bridges, Natchez Trace Parkway, Tennessee

Over the last 30 years Federal Lands has replaced numerous bridges along the Natchez Trace Parkway in Tennessee, Alabama and Mississippi because of alkali-silica reactivity (ASR). The rehabilitation of the Big Swan Bridge and replacement of the Little Swan Bridge are the most recent examples of this concrete condition. ASR is caused by a reaction between the hydroxyl ions in the cement with the silica in aggregates which forms a gel that expands and cracks the concrete. 50 to 75 years ago, most bridges along the Trace were built from locally available bank-run gravels that contained chert, an aggregate now well known for its reactivity. Construction of the bridges also included a spray-applied waterproofing membrane over the bridge deck prior to the final asphalt concrete to protect against water infiltration, reduce potential for corrosion, and prolong the service life of the bridge deck. The bridges were completed in May 2017.



Top Left: Application of prime coat; Right: Application of polymer membrane  
Bottom: Application of top coat



Looking north along the Parkway at Little Swan Creek Bridge.



North and South Abutment views show existing rock face and conserved stone used as erosion control.



## Project Delivery

### Middle Fork Snoqualmie Valley Road, Mt. Baker-Snoqualmie National Forest, Washington

Only an hour away from Seattle, the Middle Fork Snoqualmie Valley provides a popular wild and natural escape from urban life. Visitors can enjoy hiking, biking, kayaking, horseback riding, and swimming. As the population continues to boom in and around Seattle, so does the wear and tear on this beautiful area.

Prior to the Middle Fork Snoqualmie Valley Road project, visitors drove over numerous potholes, bikers choked on summer dust clouds, and the road suffered many emergency events because of poor drainage, among other problems. King County, the Forest Service, the Washington Department of Natural Resources and FLH came together with a solution — pave 9.7 miles of Forest Service Road 56.

This new road added many benefits. It protects and enhances water quality in the valley, reduces sediment runoff into streams and wetlands, diminishes summer dust clouds and opens coastal cutthroat trout migration routes that have been blocked for decades.

In addition to paving, new culverts, bridges and ditches were constructed as well as slope stability repairs. Of particular note was the construction of two Low-Water Crossings (LWC). The concrete plank armored fords are located at stream crossings frequently experiencing debris flows and heavy sediment loads that would cover and erode the old road. The fords are configured and positioned to funnel normal stream flow and lighter debris loads across the debris fan. Heavier debris loads are trapped on and upstream of the LWC, focusing the maintenance effort. Riprap aprons protect the downstream road embankment from eroding. Concrete plank design reduced construction time and costs. The culvert vents convey normal daily stream flow and allow traffic access across a non-flooded LWC.



*Middle Fork Snoqualmie Valley Road, Mt. Baker-Snoqualmie National Forest, Washington*

## ***Project Delivery***

### **Foothills Parkway, Missing Link, Great Smoky Mountains National Park, Tennessee**

As part of the Great Smoky Mountains National Park, the Foothills Parkway has been under construction since 1983. Sections 8E and F, 16.1 miles from Wear Valley to Walland, are some of the most difficult construction in terrain and environmental sensitivity that includes the 1.6-mile section at Caylor Gap called the “Missing Link.” Construction of the Missing Link alone has been under construction since 1999. Because of the NPS’ original desire to open the Parkway for the NPS Centennial Celebration in 2016, the final paving project was accelerated to ensure an essentially complete design despite an unidentified source of construction funding. With the grading and bridges under contract, the project team was asked to regenerate and design the final alignment, pavement structure, drainage and safety appurtenances over the full 16 miles and work long hours to ensure a PS&E ready to advertise once funding came. The project was awarded in April 2017, and this segment of Parkway will be opened finally after 35 years!



*Foothills Parkway, Missing Link, Great Smoky Mountains National Park, Tennessee*

## Project Delivery

### Baker-Barry Tunnel Preservation, Marin Headlands, Golden Gate National Recreation Area, California

Baker-Barry Tunnel is a one-way, 2,362-foot long tunnel. The tunnel was originally constructed by the Army in 1917-1919 to provide access between Fort Baker and Fort Barry. Primary project goals included preservation of the existing tunnel liner to extend the service life, replacement of the existing high-pressure sodium lighting system to reduce maintenance and energy use and increase safety for vehicles and bicyclists, and replacement of the undersized waterline and deteriorated sewer line.

The preventative maintenance work within the tunnel included polyurethane resin injection, coring/pressure grouting, removal and replacement of the deteriorated lighting system, and removal and replacement of the existing wall mounted waterline and sewer line. Overall the project greatly reduces future maintenance and monthly utility costs.



### Portsmouth Ditch Road, Great Dismal Swamp National Wildlife Refuge, Virginia

The Great Dismal Swamp National Wildlife Refuge is the largest intact remnant of a vast habitat that once covered a million acres of southeastern Virginia and northeastern North Carolina, critical to the protection, preservation and perpetuation of a unique and outstanding ecosystem supporting a diversity of animal and plant life. The Portsmouth Ditch Road is an aggregate-surfaced road providing access to the northern part of the Refuge, as well as several adjacent private properties. In various areas the road was realigned to avoid encroachment on the private properties. As part of the work, two wooden pedestrian bridges in extremely poor condition were replaced over the Portsmouth Ditch, a canal running parallel to the road. To minimize preliminary engineering costs on the project, a risk-based practical design approach for the design of the two bridges was recommended. Consequently, no geotechnical investigation for the foundation design was conducted and the bearing capacity of the soil was estimated using available soil data to develop the abutment design. The design was further streamlined to use pre-fabricated fiber-reinforced polymer trusses. This practical design approach substantially reduced preliminary engineering costs.



## *Project Delivery*

### **George E. Tryon Bridge, South Fork Smith River Road, Six Rivers National Forest, California**

The project replaced a structurally deficient, fracture-critical steel deck arch bridge in a high seismic zone. The project team utilized the CM/GC contracting method to engage industry expertise and encourage innovation. The project team developed an innovative construction approach to replace the bridge on the current alignment and maintain traffic throughout construction. The new concrete deck arch bridge was built in and around the existing structure with staged construction. The project was successfully completed 2 ½ months ahead of schedule.



## *Project Delivery*

### **Lahaina Bypass, Maui, Hawaii**

The Lahaina Bypass Project was developed to mitigate traffic congestion along Honoapiilani Highway (State Route 30) through Lahaina Town in West Maui. The project will not only improve vehicular throughput, but will also provide an alternate route through the area. The new bypass will increase dependability and durability especially considering shoreline erosion and future sea level rise.



## Project Delivery

### Hatchery Entrance Road and Parking, Jordan River National Fish Hatchery, Michigan

Established in 1963, the Jordan River National Fish Hatchery is the primary hatchery stocking lake trout into Lakes Michigan and Huron. Located in Antrim County, the hatchery annually propagates nearly 2 million yearling lake trout. Numerous visitors come every year to enjoy fishery education and hatchery tours. Throughout the hatchery, the pavement and safety condition had become dangerous and rehabilitation of the Hatchery Entrance and other roadways, driveways, and parking areas became a necessity. The work included asphalt pavement removal, select full-depth pavement patching and widening, asphalt pavement reconstruction as well as new asphalt pavement construction, asphalt concrete pavement overlay, concrete curb and gutter replacement, drainage replacements and improvements, guardrail replacement, and other miscellaneous work.



*Entrance Road and Parking, Jordan River National Fish Hatchery, Michigan*



### Rim Rock Drive, Colorado National Monument, Colorado

Rim Rock Drive is a 23 mile stretch of road that runs along the top of the canyon rims in Colorado National Monument near Grand Junction, Colorado. Construction of Rim Rock Drive was completed in 1950 and the road was added to the National Registry of Historic Places in 1994. Rapid population growth in the area has led to numerous challenges with commuter, recreational, cycling and commercial traffic. The main thoroughfare for access to Glade Park, a small town southwest of the Monument, is the eastern-most four-mile section of Rim Rock Drive ending at the East Gate of the Monument. The project repaired the historic Guard Wall at Half Tunnel and consisted of a culvert repair including rock removal, placement of minor concrete, culvert pipes, reinforced concrete wall, and stone masonry at the culvert at mile marker 6.1 in the Colorado National Monument. The work was completed on a small cliff ledge with a 2,000-foot drop along the roadway. All work had to be completed from above, along the roadway and along the small ledge.



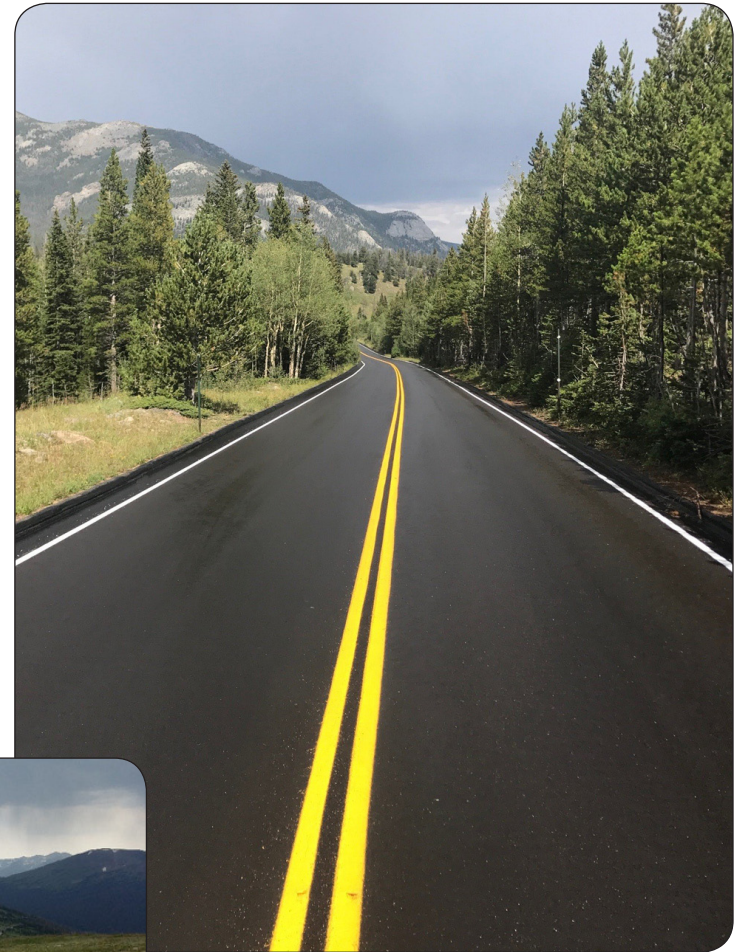
*Culvert Installation, Rim Rock Drive, Colorado National Monument, Colorado*

## Project Delivery

### Rocky Mountain National Park Pavement Preservation, Colorado

After 4 months and \$2.6 million, pavement preservation has been completed on 23.4 miles of roadway throughout the Rocky Mountain National Park. The project applied a Type 3 Micro Seal to the mainline roadway and a type 2 Micro Seal in the parking areas. The Alpine Visitor Center parking lot at an elevation of 11,796 feet also received a type 2 Micro Seal.

This treatment will prolong the life of this popular roadway providing access to numerous recreational areas throughout the Park and also serving the Colorado foothill communities and the Denver area.





## Project Delivery

### Daniel K. Inouye Highway, Hawaii

Daniel K. Inouye Highway (DKI, formerly Saddle Road) was opened with a dedication ceremony on Tuesday October 10, 2017. The completion of the East Side project is a significant milestone as it signals an end to the original vision of the late Senator Daniel K. Inouye by safely connecting the communities of East and West Hawaii.

Originally constructed as a one-lane road by the U.S. Army in 1942 to connect military training facilities, the DKI Highway is the most direct cross-island route between east and west Hawaii for business travel, transport of goods and services, tourism, recreation, shopping, and daily commuting. Public use, prior to improvements, had been historically very low because of substandard and hazardous conditions. In addition to being a cross-island route, the DKI Highway provides the only paved access to the Army's Pohakuloa Training Area, Mauna Kea State Park, and the Mauna Kea and Mauna Loa observatories.

The East Side project encompassed nearly six miles of highway, reconstructing approximately three miles of the existing Daniel K. Inouye Highway, upgrading the roadway to modern design standards and including safety features such as eight-foot shoulders, straighter alignment, a climbing lane, and adding three miles of new road. The project increased the overall highway capacity and removed potential conflicts between military operations and public traffic.

This project presented unique challenges such as varying subsurface conditions from a'a and pahoehoe lava, dense basalt, and volcanic ash and the need to address precautionary measures necessary for containment, treatment and placement of cleared timber to help prevent the spread of the Rapid Ohia Death fungus.

Phased construction of the route began in 2004, with funding leveraged through programs including Fed-Aid (STIP), Discretionary (TIGER, High Priority Projects), State of Hawaii, Ecosystem Management, and Defense Access Road funding for a total cost of \$316.5M. The completion of the route (48 miles) exemplifies the virtues of a successful partnership between the FHWA, the Army, Hawaii DOT, and several local, state, and federal agencies, to successfully advance joint use (public/military) transportation improvement projects.



## Project Delivery

### Scenic Loop Drive, Red Rock Canyon National Conservation Area (RRCNCA), Nevada

Designated in 1982, the Red Rock Canyon National Conservation Area (RRCNCA) is a Bureau of Land Management (BLM) managed area comprised of 198,000 acres of nationally significant geological, archaeological, ecological, cultural, scenic, scientific, wildlife, riparian, wilderness, endangered species, and recreation resources. Scenic Loop Drive, a 13 mile one-way scenic byway, provides the sole access to the recreational amenities in this portion of RRCNCA. Transportation safety improvements delivered by the project included two new bridges, a flood warning system, four parking area expansions, a comprehensive signage overhaul, and over 15 miles of road rehabilitation. The delivery of transportation safety improvements to this area was balanced against the sensitive environmental conditions — in this area of the Mojave Desert, where the annual precipitation can be less than five inches, a roadside yucca represents several decades of growth, and several centuries for a mature Joshua tree.

The RRCNCA project utilized the streamlining of the EDC initiative by pairing BLM, FLH, and consultant environmental staff. The collaborative effort resulted in a streamlined review process in the design, NEPA, and permitting portions of the project. The core values of the area, including protecting the natural resources while providing an excellent visitor experience, were preserved while maintaining an accelerated project delivery schedule. Safety Edge was also implemented along the scenic byway. The byway was awarded 3rd place in Roads & Bridges Magazine, Top 10 Roads Projects for 2017.



## Project Delivery

### Halona Street Bridge, Honolulu, Hawaii

Hawaii Governor David Ige was joined by FHWA and State officials in a traditional Hawaiian blessing ceremony on September 29, 2017 to celebrate the opening of the Halona Street Bridge in Honolulu. Delivered on behalf of Hawaii DOT, construction on the new bridge began January 2017 and was completed in nine months. Project highlights included replacing the bridge foundation, pavement and railings, as well as replacing the water and gaslines beneath the bridge, all of which improve the safety and reliability of the structure. The original bridge was built in 1938. Prefabricated bridge elements, Geosynthetic Reinforced Soil and contracting innovations where industry can compete on both price and contract time, were contributing elements to early project completion. The project cost to replace the structurally deficient bridge was \$7.2 million, 80 percent of which was provided by Federal funding.

Referring to the ongoing Memorandum of Agreement (MOA) among Hawaii DOT, FLH, and the Hawaii Division, Gov. David Ige said, “We are proud to be working with the FHWA on a dozen additional projects that will benefit Hawaii’s residents and visitors across the State”. The completion of the Halona Street bridge project was a significant milestone to the MOA partnership as it is the first of eleven bridges to be completed.



### Beach Drive, Rock Creek Park, Washington, DC

Beach Drive provides a pleasant trip through the Rock Creek Park in Washington, DC for commuters, drivers, bicyclists and pedestrians. The condition of the pavement and safety had deteriorated to a point of extreme, requiring full reconstruction. The project also includes improvements to pedestrian and bicycle trails in collaboration with the District DOT, storm drain rehabilitation; raised pavement markers, centerline rumble strips, guardrails and road signs; parking area reconstruction; traffic signal and streetlight replacement; and the rehabilitation of six bridges. Work has also included construction of new sidewalk and guardrail within the adjacent Washington National Zoo Tunnel. The project will require 5 phases of construction to accommodate the very complicated and high-volume peak hour traffic.



## Project Delivery

### Big Fork-Athens Road, Ouachita National Forest, Arkansas

The Big Fork-Athens Road (County Road 64) provides access to the Shady Lake Recreation Area, a popular tourist destination in the Ouachita National Forest, Polk County, Arkansas. This project for the final grading and paving was the culmination of a 9-year effort to relocate and pave the road. Design began in 2008, and the work was constructed in a series of 4 projects between 2013 and 2017. The relocation improved visitor access by reducing the distance from State Highway 246 to the recreation area, and by replacing the existing narrow, winding, unpaved road with a 2-lane all-weather facility.



### United States Marine Corps War Memorial (Iwo Jima Memorial) Access Improvements, Virginia

Over 1.5 million people visit this national monument each year. Funded by private donations specifically to restore the monument and surrounding parklands, the project includes reconstruction of the Iwo Jima Memorial Access Road and parking area, new curb and gutter, as well as sidewalk and trail resurfacing at the US Marine Corps War Memorial. Asphalt pavement is being replaced with concrete pavement which will require less maintenance and provide better support for the traffic volumes and heavy weight of the many tour buses which frequent the monument. The project team was able to expedite design and acquisition activities to advertise one month ahead of schedule to accommodate the project's very narrow construction window. The collaboration continued through the procurement stage in developing pre-negotiation objectives and conducting successful negotiations with the 8(a) contracting firm that led to contract award.



## Project Delivery

### Whitney Portal Road, Inyo National Forest, California

Whitney Portal Road is a two-lane paved major collector accessing Whitney Portal Trailhead in the Inyo National Forest and the Alabama Hills Recreation Area of the BLM. The project was a 3R-plus asphalt rehabilitation project, with 4R segments, that extends 11.2 miles westward from the town of Lone Pine, California to the Whitney Portal Recreational Area. The road is primarily on federal lands including BLM and Inyo National Forest and is maintained by Inyo County. The project crossed through a variety of terrains beginning at an elevation of 8,500 ft in steep and narrow mountainous terrain, stretching all the way to the comparatively barren Owens Valley at 3,500 ft.

The challenge of the extreme terrain helped earn this dynamic project the *2017 Roads & Bridges/Asphalt Recycling and Reclaiming Association (ARRA) Recycling Award in the Full-Depth Reclamation category.*



### Catwalk National Recreation Area Trail Reconstruction Gila National Forest, New Mexico

The Catwalk National Recreation Area Trail was reopened to visitors during a ribbon cutting ceremony on May 28, 2016. The Catwalk National Recreation Area is a vitally important economic generator for the Forest Service and the surrounding communities as an internationally renowned destination for recreation by tens of thousands of visitors annually. The reopening of the reconstructed Catwalk Trail signals to many locals and longtime visitors the beginning of revitalization for the region following several forest fires and floods.

The project leveraged the innovation and ingenuity of a design-build contract to quickly restore the distinctive suspended walkways and pedestrian trail bridges. The final design allowed for replacement of the destroyed facilities in a context sensitive manner that respected the historic, aesthetic, and environmental aspects of the area while providing ADA access for future generations of visitors.

This dynamic project was the recipient of the *2017 ACG Alliant Build America Award in the Design Build Category.*



## Project Delivery

### I-564 Intermodal Connector, Norfolk, Virginia

The I-564 Intermodal Connector project in Norfolk, VA is a collaborative transportation partnership between EFLHD, VDOT, and the U.S. Navy. The new high-speed roadway will connect the existing I-564 through two of the region's economic powerhouses – Naval Station Norfolk (NSN), the largest naval base in the world and the area's largest employer, and to Norfolk International Terminals (NIT), the Virginia Port Authority's largest terminal in Hampton Roads. The project's construction was accelerated to provide access to the NIT north gate by late December 2017. The acceleration included extensive ground improvement techniques to achieve rapid consolidation of the poor quality underlying soils and prevent future settlement of the nearly 300,000 cubic yards of embankment fill needed to construct the roadways. Four bridges are also being constructed, including a 3-span flyover bridge over I-564. The roadway is expected to be open to all traffic by Fall 2018.



### Veteran's Drive, St. Thomas, U.S Virgin Islands

The project consists of the reconstruction and widening of approximately 0.5 miles of Veterans Drive (Route 30) from west of Hospital Gade to Long Bay Road in the Charlotte Amalie Harbor area on the island of St. Thomas, U.S. Virgin Islands (USVI). To improve mobility and access, the USVI Department of Public Works (DPW) proposed to widen Veterans Drive towards the bay to add two additional traffic lanes, medians, and a promenade, among other features. The work includes roadway excavation, embankment, aggregate base, asphalt pavement milling, hot asphalt concrete pavement, reinforced concrete pavement, concrete curb and gutter, concrete, brick, and cobblestone sidewalk, precast modular block retaining walls (seawalls), drainage, utility (water, telephone, sewer, power, and irrigation) adjustments and replacements, traffic signal and street lighting replacements, and other miscellaneous work. Benefits of the project include alleviating the existing traffic congestion, providing additional roadway capacity, improving safety for motorists and pedestrians, and enhancing the aesthetics of the waterfront and cultural and historical features.

The USVI government requested FLH to deliver the complex project, which included resolving questions during review of the contract developed by the DPW design consultant; coordinating approval of NEPA compliance, required permits, and all unique proprietary items to meet the unique cultural and historical streetscape elements that relieves congestion and creates a signature pedestrian-friendly environment. This project highlights Federal Lands ability to deliver complex projects and collaborating with multiple stakeholders and other Federal Agencies.

Project construction contract was awarded in September 2017, with construction anticipated to begin Spring 2018.



## Project Delivery

### Spruce Railroad Trail, Olympic National Park, Washington

The Spruce Railroad Trail is a rail trail located on the shores of Lake Crescent about 20 miles west of Port Angeles, Washington. The trail follows the former Port Angeles Western Railroad. In 1918, the U.S. Army Signal Corp built the Spruce Railroad to haul Sitka Spruce to mills for the manufacture of airplanes. Railroad companies used the tracks as a common carrier line and to haul logs until 1951. Sometime in the early 1960's, with the railroad defunct, workers blasted the McFee Tunnel closed. At the time they kept no documentation of the blasting. This lack of documentation challenged workers in late 2016 when work began to restore the tunnel as a hiking, biking, wheelchair accessible pathway.

After the rubble and debris were cleared shotcrete was applied to reinforce the tunnel structure. Project completion was celebrated with a ribbon cutting on July 15, 2017, at the entrance of the McFee Tunnel to celebrate its grand reopening after over 50 years.



*Scoping Trip inspecting another railroad tunnel slated for an upcoming project, further along the Spruce Railroad Trail.*

## *Project Delivery*

### **Skagit River Bridge Rehabilitation, North Cascades National Park, Washington**

The Skagit River Bridge provides access to the North Cascades National Park Visitor Center and Newhalem Campground. This project provided for much needed repairs on the bridge, including epoxy embedded aggregate deck resurfacing, as well as rock stabilization on the bridge approach.





*Project Delivery*

**Pavement Preservation, Utah**



*Roadway and Parking Area, Island In The Sky, Canyonlands National Park, Utah*



*Visitor Center Parking, Arches National Park, Utah*



*Bryce Point Access Road, Bryce Canyon National Park, Utah*

## Project Delivery

### Historic Columbia River Highway State Trail, Oregon

The Historic Columbia River Highway State Trail Project shifted from a routine construction project to an emergency situation in September 2017, when the area was overcome by fire. The Eagle Creek Fire ravaged the Columbia River Gorge and shut down Interstate 84, a main east-west artery. Of particular concern was the area around Shellrock Mountain, the location of the state trail project. FLH staff worked with the Oregon DOT and Fire Control to clear timber within the project limits, install debris ditches and barriers, and facilitate a 4,000-foot long lane shift detour to re-open I-84. The fire was a significant event that closed I-84 for several weeks. The state trail project was in the middle of the closure and also in danger of being burned, and, the construction contract was at risk of significant delay or possible termination. Project staff worked very hard with the “Fire Control” team to assist and keep the project going. The project became part of the fire control and suppression plan, by clearing timber and thus removing fire fuel. The cleared timber was removed in record time. After the fire was over, burnt debris was falling down the slopes above the project and actually entering I-84 (which was still closed) and crossing the travel lanes. Crews installed debris catch ditches, protection barriers, and a lane shift (away from the slope). This allowed I-84 to open for the first time in weeks. FLH staff performed site reconnaissance to evaluate the hazards and worked with Oregon DOT, USFS, BPA, Fire Control, and other agencies to develop a prioritization and mitigation plan. That plan included removing burnt and dead trees high up on the slopes above the project and the interstate using a helicopter with a saw attachment.



Sand filled “Super Sacks” were used as debris barriers.



Fire Control Team Helicopter lifts off with saw attachment.



A total of 8,000 feet (4,000 feet for each lane) was moved to create a lane shift away from burnt hill sides.

## *Project Delivery*

### **Cold In-Place Recycling, Palmer Junction, Umatilla National Forest, Oregon**

The Palmer Junction Roadway was rehabilitated using the Cold In-Place recycling (CIR) process. The top three inches of the existing surface are ground down and mixed with an emulsified asphalt recycling agent. Then the material is placed back down on the road using pavers. This process not only saves on material costs but also on fuel costs and traffic delays since new road material does not need to be hauled to the project site.



*Project Delivery*

**Horse Ranch Creek, Road and Bridge Rehabilitation, Minuteman Missile Base Roads, Montana**



**Old Highway 2 Rehabilitation and Bridge Replacement, Phillips County, Montana**



## Project Delivery

### Manning Crevice Bridge, Salmon River Road, Nez Perce National Forest, Idaho

Manning Crevice Bridge, built in 1934 by members of the Civilian Conservation Corps was part of Franklin D. Roosevelt's efforts to create jobs during the Great Depression. The existing timber-towered suspension bridge over the Salmon River had width, height, and turning limitations, as well as load restrictions. Extremely sharp curves onto the bridge from both ends, required wheel rub rails to both direct wheels away from the support posts and to keep vehicles on the structure. The concrete anchor blocks showed extreme deterioration and cracking, and the timber support towers showed signs of serious decay.

The current project will correct all deficiencies by constructing a new bridge slightly upstream from the existing bridge. The decision to replace the bridge came after an inspection in 2016, when it was found out of compliance with current bridge standards. The new bridge will span over 300 feet, as a one-lane asymmetrical suspension bridge with a 75-foot tall steel tower on the north end. The CM/GC method was utilized and the project is expected to be complete in spring of 2018.



## Emergency Relief for Federally Owned Roads (ERFO)

### Big Oak Flat Road, Yosemite National Park, California



*Damage caused by a landslide. NPS consulted with FLH and closed the roadway before a larger failure could occur. An emergency letter contract was awarded March 3, 2017. The road reopened on May 1, 2017.*

### Hurricanes Irma and Maria, Puerto Rico, US Virgin Islands

In response to a Mission Assignment from the Federal Emergency Management Agency (FEMA) issued in mid October, FLH provided direct support to Puerto Rico and the Virgin Islands in the aftermath of Hurricanes Irma and Maria. FLH staff made a field visit during the week of October 25 through November 3 to establish initial contact with Puerto Rico Highways and Transportation Authority (PRHTA) staff in the different regions to assist in the location and prioritization of damage sites. During this visit the team was able to do market research among local contractors. The determination was made that Letter Contracts were the only feasible way to execute the work to reestablish critical access within the timeframe given.



## Emergency Relief for Federally Owned Roads (ERFO)

### Emergency Slide Repair and Pavement Reconstruction, Monongahela National Forest, West Virginia

In June 2016, the Monongahela National Forest experienced a 1000-year storm with 10 inches of rain falling in less than 24 hours. The event devastated this West Virginia National Forest Unit and surrounding communities. The Forest Service requested immediate assistance and 12 FLH engineers of varying disciplines were dispatched to assess damage and document in Damage Survey Reports (DSRs) for the Forest. The inspection team was joined with Forest Service staff to guide them through the devastation.

The damage will result in multiple future projects. One project at Milepost 16 on FS Route 86, Williams River Road was identified as an immediate priority to reestablish access to local residents and visitors. The project consisted of slide repair and pavement reconstruction. With an accelerated schedule, project inception to contract award took less than 4 months. FLH has identified and will deliver 8 projects totaling \$20 Million in damage resulting from the storms.



*A Forest Service Timber Technician accompanying the FLH inspection team prepares to clear a path of fallen trees with protective gear and chain saw.*

### Pilgrim Creek Road, Shasta-Trinity National Forest, California

Two steel plate culverts along Mud Creek in the Shasta-Trinity National Forest were damaged and plugged with mud flow debris in September 2014, after a portion of Konwakiton Glacier broke off Mount Shasta. The project goal was to replace the damaged culverts with structures that would pass future debris flow events, while providing safe access within the Forest. A bridge structure was proposed as part of a no-cost contract modification to the original plan for arched culvert structures. This solution will better handle future mud flow and runoff events without negative impact to the stream, replacement structures, or the roadway.



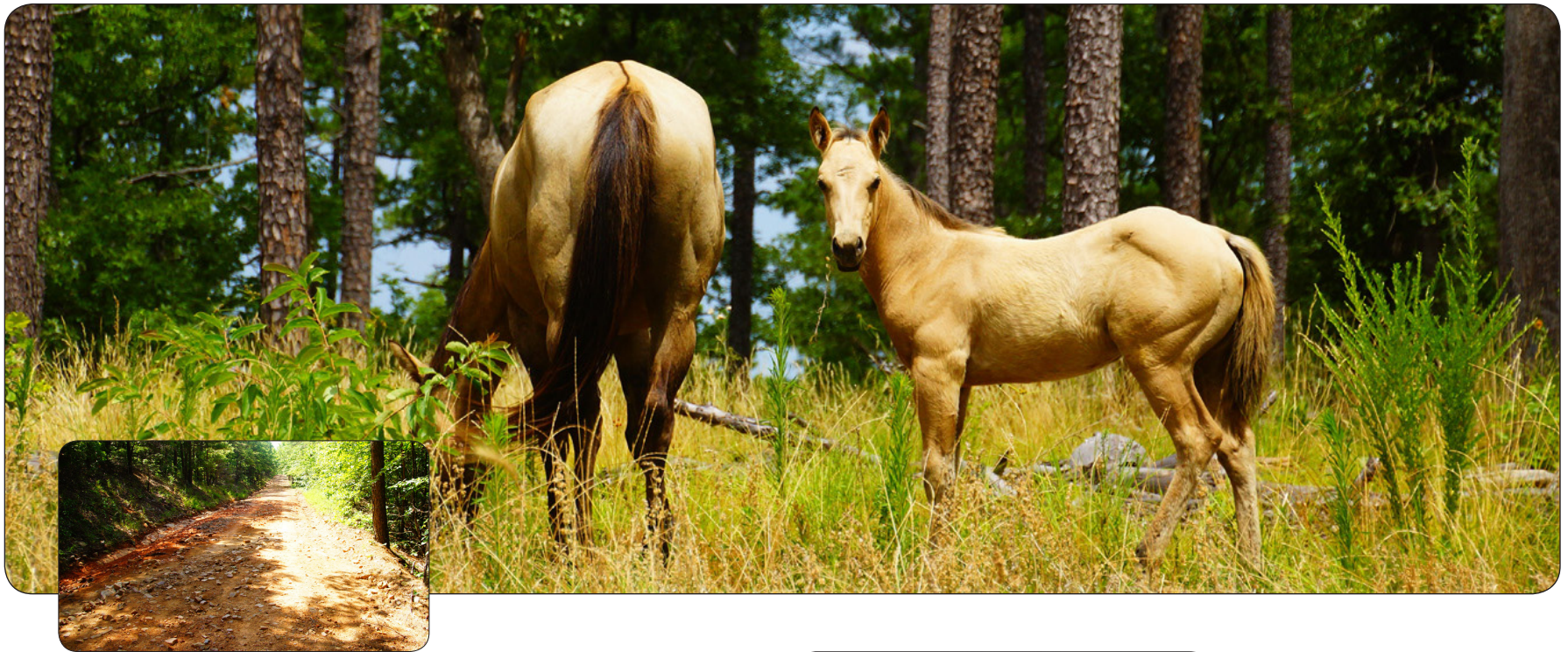
*After*

*Before*

## Emergency Relief for Federally Owned Roads (ERFO)

### Ouachita and Ozarks/St. Francis National Forests, Arkansas

The May 2017 flood in Arkansas affected both the Ouachita and Ozarks/St. Francis Units of the Forest Service. The extensive damage that had to be assessed on these forests took an entire week of less than smooth surfaced, unpaved roads in the middle of one of the largest forests in the east. On the final day, in the final Ranger District, Federal Lands and Forest Service personnel were treated to the rare sight of wild mustangs grazing in one of the Forest clearings. The Assessment Team agreed, the scene made all the bumps and dips worth it!



### Emergency Road and Trail Repairs, Lake Shelbyville, Kaskaskia River, and Lake Carlyle, Illinois

FLH demonstrated commitment to accelerate the preliminary schedule for this emergency project from scoping to PS&E approval within 6 months from the time project funds were made available after scoping. The project consisted of emergency repair of gravel roads, parking areas, and sidewalks/trails damaged by flooding from a storm in 2016.





## Emergency Relief for Federally Owned Roads (ERFO)

### Tamarac Wildlife Refuge, Minnesota

In July 2016 the Northern plains of Minnesota were flooded. One of the casualties of the flood was Tamarac Wildlife Refuge just south of the White Earth Indian Reservation that specializes as a breeding ground for migratory birds. Thankfully the damage was minor considering the widespread nature of the storm. During the assessment visit, the ERFO Coordinator took a rare opportunity to capture one of the many dozens of hummingbirds in midflight! Seeing these amazing animals in a protected habitat was a great way to cap a two-week tour of damage that eventually exceeded \$20,000,000 affecting 3 states and 7 partner units.



### Black Bayou Lake National Wildlife Refuge, Louisiana

The holiday storms of 2015 caused damage in 8 Southeastern states from Missouri through Louisiana all the way to the South Carolina coast. It has been the most extensive and widespread event in the history of the ERFO program. Even though the total cost of the combined damage was not a program record there were some very unique projects involved and many units that got their first taste of the devastation associated with these disasters. The Black Bayou Lake National Wildlife Refuge in Louisiana lost a vital piece of their infrastructure in their boardwalks that take visitors into the heart of these storied wetlands. FLH took the lead in the repair of these structures and has made a positive impression on this unit as they struggle with their first huge infrastructure loss.



*Chequamegon-Nicolet National Forest*

### Chequamegon-Nicolet National Forest, Wisconsin

A deluge of rainfall on July 11, 2016 led to extensive flooding and damage to roadway and bridge infrastructure of the Chequamegon-Nicolet National Forest, located in northern Wisconsin. This project aims to identify and repair all the damage from that storm, which stretches across hundreds of miles of roadway and trails and included over 55 original Disaster Survey Reports (DSR). The project team developed a comprehensive scoping report which described the damage in detail and estimated the repair cost for all sites. A feasible grouping of projects was developed that optimized the delivery schedule for all work and encompassed all 55 DSR sites including roadway and trail bridges, culvert repair and replacement and AOP determination, grading, and slide repair. The design team expended significant effort to develop detailed and quality preliminary estimates for each DSR site, which ultimately helped in deciding the appropriate delivery method for design, which includes both A&E and in-house work.

## Technical Assistance

### Bridge Inspection Program

With inspection teams now located in all three Federal Lands Divisions, the efficiency of the Bridge Inspection Program (BIP) continues to improve. Advantages include cost savings through reduction of travel time, performing a higher percentage of inspections with in-house resources, and furthering closer working relationships with our partner agencies in the various regions. This has allowed the divisions to become more familiar with bridges in their inventory, share more work, and function as one organization with the goal of delivering quality projects in a cost-effective and timely manner.

Because of the allocation of inspection work among the three Divisions, the Bridge Inspection Program has been able to reduce the average cost of an inspection by up to \$500 per bridge.



*FLH Bridge Management Team reviewing process for bridge inspections with NPS staff during the annual Roads Working Group meeting, Gettysburg, PA*



*Under Bridge Inspection, Lake Shasta Spillway Bridge, California*



*FLH Geotechnical Engineer consults with on-site staff on the construction of the new George E. Tryon Bridge, South Fork Smith River Road, California*

## Technical Assistance

### Buford Dam Road Feasibility Study

In cooperation with the US Army Corps of Engineers, FLH completed a feasibility study to relocate the Buford Dam Road for traffic and pedestrian safety and security at Lake Sydney Lanier in Forsythe and Gwinnet Counties, Georgia. Constructed by the Corps in the 1950's, the multi-purpose lake provides for flood protection, power production, water supply, navigation, recreation, and fish and wildlife management. Initially designed to provide access for recreation and engineered structures associated with the dam, the route has turned into a major commuter thoroughfare carrying 350,000 cars per month. The narrow typical section creates a safety hazard for visitors and challenges associated with emergency response. The dam is rated in the top five security interests in the State. The study considered five alignment alternatives with roundabouts and various phases of construction, including an ultimate alternative to bypass the dam with a 1200 foot bridge structure over the Chattahoochee River. The Corps has requested FLH to begin design for at least the first phase of the project.



*Buford Dam Road, Lake Sydney Lanier, Georgia*

### FLH conducts George Mason University Civil and Infrastructure Engineering (CEIE) 499-Highway Design Construction Course

For the eighth time, the FLH conducted its George Mason University course for Fall 2017 to ten civil engineering students. This year the class was upgraded to a full 3-credit course. This laboratory course introduces senior-level students to the tools, techniques, and methods used by various civil engineering disciplines to design and construct roads and bridges. The laboratory uses short lectures, individual readings, equipment demonstrations, and hands-on exposure to the equipment and processes used by civil engineering staff. Sessions are held either in a classroom setting or on a local project. For most students, it is their first experience within a professional engineering office environment. The course runs 14 sessions for the full fall semester on Thursday mornings.



*Project Site Visit, Rock Creek Park, Washington, DC*

## Technical Assistance

### Road Safety Audits and Safety Reviews

The FLH Safety Team provides technical services to our FLMA partners and to our own project development and construction staff. The Team seeks opportunities to incorporate safety measures in projects, balanced with resource preservation to reduce the number of fatal and injury crashes. The Safety Team conducts Road Safety Audits and other safety reviews, encourages the use of new technologies such as the latest crash-tested hardware, provides training, and continues to pursue the use of proven safety countermeasures such as high-friction surface treatments and wider edge lines.



*FLH Highway Safety Engineers collecting measurements of pavement edge slope and vehicle speed for project safety reviews.*

### U.S. DOT's Small Business Innovation Research (SBIR) Program Real-Time Solar-Powered Traffic Data Network

With the support of the SBIR program, the FLH and NPS contracted to develop, test and deploy a low-profile Traffic Monitoring System developed by small business, Intelligent Automation.

The Unobtrusive Traffic Monitoring System (UTMS) consists of a Doppler microwave radar and Wi-Fi/Bluetooth sensors that can be installed either on the back of NPS traffic signs along roadways, or mounted on bridge piers or lighting poles. The sensors collect vehicle volume, speed, travel time, and vehicle type classification data.

Advanced prototype UTMS systems are currently being tested at six locations on the George Washington Memorial Parkway (GWMP) in Northern Virginia under Phase II of SBIR funding. The next steps for moving the technology toward deployment include long-term testing and validation of the system on the GWMP.

Plans are in place to further improve and ruggedize sensor hardware and software, as well as deploy the system at other NPS parkway locations.

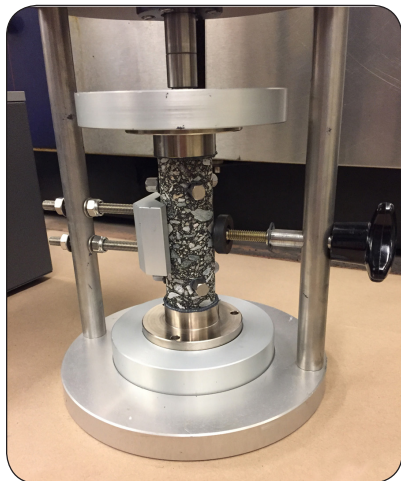


## Technical Assistance

### SHRP 2 R07 Performance Specifications for Rapid Renewal – Furthering the Use of Performance Specifications

FLH has been working with FHWA Turner-Fairbanks Highway Research Center (TFHRC) to refine the development of performance-based specifications for hot mix asphalt materials through the SHRP2 R07 — Performance Specifications for Rapid Renewal effort. FLH is one of the first agencies to actively pursue a performance type specification for hot mix asphalt. The intent is to further advance the quality and application of the agency's asphalt mixtures and extend the service life of its pavements.

Being able to determine quality-adjusted pay factors that realistically reflect pavement performance is a material and construction related challenge faced by all public agencies that design, construct, or manage asphalt concrete pavements. Research has led to the development of relationships that predict pavement performance based on the volumetric properties measured in present-day construction practice. When combined with proven laboratory test methods that measure pavement performance, these performance predictive relationships can be further enhanced to provide a more accurate determination of the expected pavement life. These predictive relationships and advanced testing provide a valuable piece of information that can be used to: optimize and improve pavement performance; determine how volumetric property variations affect pavement life; and provide information needed to determine performance-based pay factors that reflect the as-constructed pavement life. Studies are underway on past projects with the goal of developing a performance specification for hot mix asphalt and determining appropriate pay factors for the as-constructed project.



*Asphalt Mixture Performance Tester — testing machine used in pavement structural design and mixture design specifically designed to measure asphalt mixture engineering properties*

### Internally Cured Concrete (ICC)

FLH is working on Internally Cured Concrete (ICC) technology deployment under the Coordinated Technology Implementation Program (CTIP). ICC provides more durable concrete by reducing the early age cracking potential for critical structural elements. This occurs by providing internal curing of the concrete by substituting highly absorptive lightweight fine aggregate for a portion of the normal fine aggregate utilized in the concrete mix design. The highly absorptive light-weight fine aggregate releases the water during concrete hydration and aids in reducing autogenous shrinkage.

Three separate bridge replacement projects are using this technology. The Fort Pulaski Bridge in Georgia has currently placed the bridge deck concrete. The Shoup and Manning Crevice bridges in Idaho will finish the concrete deck placement in the upcoming months. Laboratory testing of the concrete materials and monitoring of the structures will occur to validate the technology deployment.



*Fort Pulaski Bridge, Georgia*



*Manning Crevice Bridge, Idaho*

## Technical Assistance

### FLMA's Utilize New Unstable Slope Management Program to Inform Planning through Project Delivery in Denali National Park

The 92-mile Denali National Park Road has a long history of landslides causing substantial disruptions to transportation, access restrictions for private inholders, and concerns for public safety. The most dramatic example occurred in July 2016 when a large debris flow triggered by intense rains blocked and closed the road to normal traffic for 10 days, emphasizing the need to reduce risk and make the area more resilient to unstable slope events.

The first step was to implement the new asset management program, Unstable Slope Management Program for Federal Land Management Agencies (USMP for FLMAs). This program was developed for NPS, Forest Service, and BLM to systematically identify the location and condition of the relative unstable slope hazards and risks along the park road. The results of the initial USMP work was used to evaluate 141 unstable slopes. In 2017, Denali National Park completed a Long Range Transportation Plan (LRTP) and Risk Assessment (RA) Workshop where a broad, multidisciplinary group identified unstable slopes as the greatest risk to the park road.

Since completing the LRTP and the RA Workshop utilizing the new USMP for FLMA program and processes, three highly rated unstable slopes along the Park Road have been programmed for risk reduction implementation. In 2018, FHWA is scheduled to assist the Park with a benefit cost analysis for the highly rated unstable slopes in the USMP for the park road to help develop a reprioritized list for programming based on the greatest benefit to the users to provide decision support for prioritizing facility needs in the out-years. Denali National Park, in conjunction with FHWA, hopes the USMP asset management system, teamed with other useful geologic hazard and risk susceptibility work in the Park, will arm decision makers with the data they need to make transparent, prioritized programming decisions to reduce risk from unstable slopes and increase resiliency of the park road well into the future.



*Eagle's Nest Debris Flow in July 2016, looking down to the Denali Park Road*

### U.S. Agency for International Development, Office of Inspector General Millennium Challenge Corporation (OIG-MCC)

FLH Pavement Engineers traveled to Dakar, Senegal to provide engineering assistance to support mission critical audits on roadway projects pertaining to pavement management, maintenance, stewardship and oversight, and sustainability processes. With the lack of in-house engineering expertise within OIG-MCC, FLH was in the unique position to provide this assistance while simultaneously using the opportunity to promote FHWA as the agency-of-choice for transportation engineering services at an international level.

Work included providing project level pavement investigations, analyses, recommendations, and construction support for pavement work ranging from preservation, rehabilitation and maintenance, and reconstruction.



*Technical Assistance*



*Federal Lands project staff on scoping trip in Tazlina, Alaska*

**Working outdoors has its lows...**

***Recorded Temperature -40 degrees below zero!***

**and its HIGHS!**

***Recorded Temperature 129 degrees fahrenheit!!***



*Federal Lands Bridge Inspection Team, Furnace Creek Visitor Center, Death Valley National Park, California*



*Defense Access Road, Wheatland County, Montana*



U.S. Department of Transportation  
**Federal Highway Administration**

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