Federal Highway Administration
Office of Federal Lands Highway

2018
The Year in Review

U.S. Department of Transportation
Federal Highway Administration

This report celebrates another year of accomplishments by the Federal Highway Administration, Office of Federal Lands Highway (FLH). During 2018, FLH delivered a $1.56B program for our Federal Land Management Agency partners, Native American Tribal partners, and other federal, state and local agencies. Projects accomplished last year ranged from intermodal connectors in urban areas to highways and bridges in remote areas. Our projects were over challenging terrain, touched sensitive habitats, and posed unique historical preservation requirements. FLH provided context-sensitive solutions to our partners and provided vital transportation improvements and access for tribal communities and our nation's parks, forests, wildlife refuges, and other federal lands.

During the past year, our nation began rebuilding the infrastructure damaged by Hurricanes Irma and Maria. FLH partnered with Puerto Rico in this effort to design and construct nearly $1B in roads, bridges, and other affected transportation infrastructure. These efforts are part of the larger effort to replace temporary emergency solutions with permanent repairs to the damaged infrastructure. It will take several years to totally rebuild what was damaged and FLH is proud to be part of this national effort.

Our nation continues to focus on our national infrastructure. During the next year, our elected officials are focusing on two key initiatives: our national infrastructure plan and the surface transportation reauthorization. While we have yet to see how these will ultimately turn-out, we know that FLH will be asked to assist in implementing both of these massive initiatives. FLH stands ready to do our part in rebuilding our nation's infrastructure on tribal and federal lands. We will assist tribal communities to build capacity and better meet their transportation challenges. As the American public continues to enjoy and visit our national parks, forests, wildlife refuges, and other lands in record numbers, FLH will work closely with our Federal Land Management Agency partners to meet these transportation needs and ensure that the many national treasures within our Federal Lands, can be enjoyed by all.

The projects we delivered in 2018 tell our story best. The next several pages showcase some of these projects. Please take a few minutes to see what we accomplished!

Site Visit with CFL Project Engineers and NPS staff to discuss upcoming work, Yosemite National Park, California

Federal Lands Leadership Team at the newly completed Foothills Parkway, Tennessee.

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

Office of Federal Lands Highway

The Year in Review

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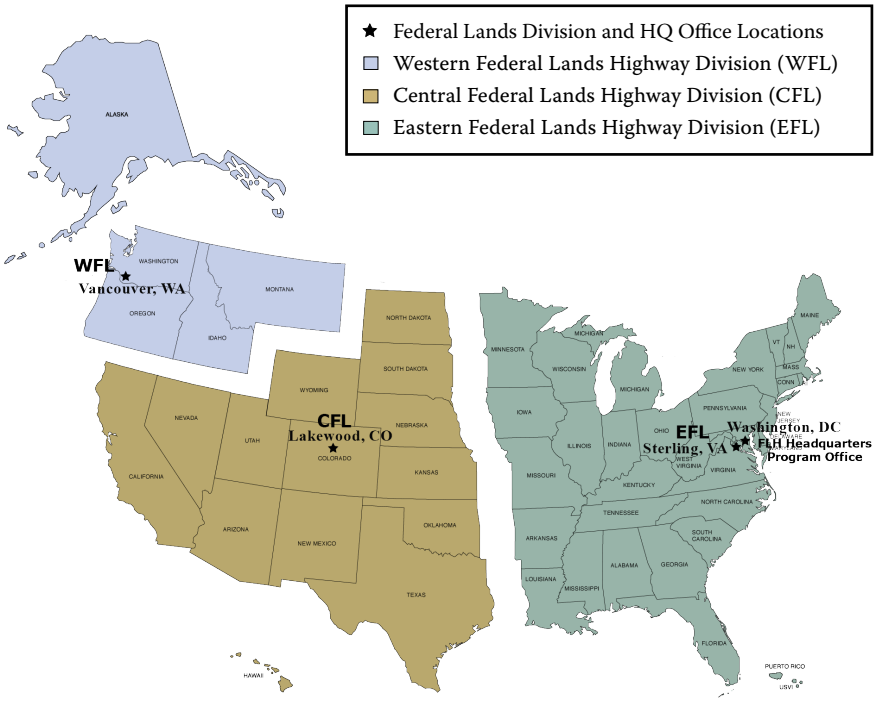

Images throughout this report unless otherwise noted were taken by FHWA employees. Special thanks to all contributors.

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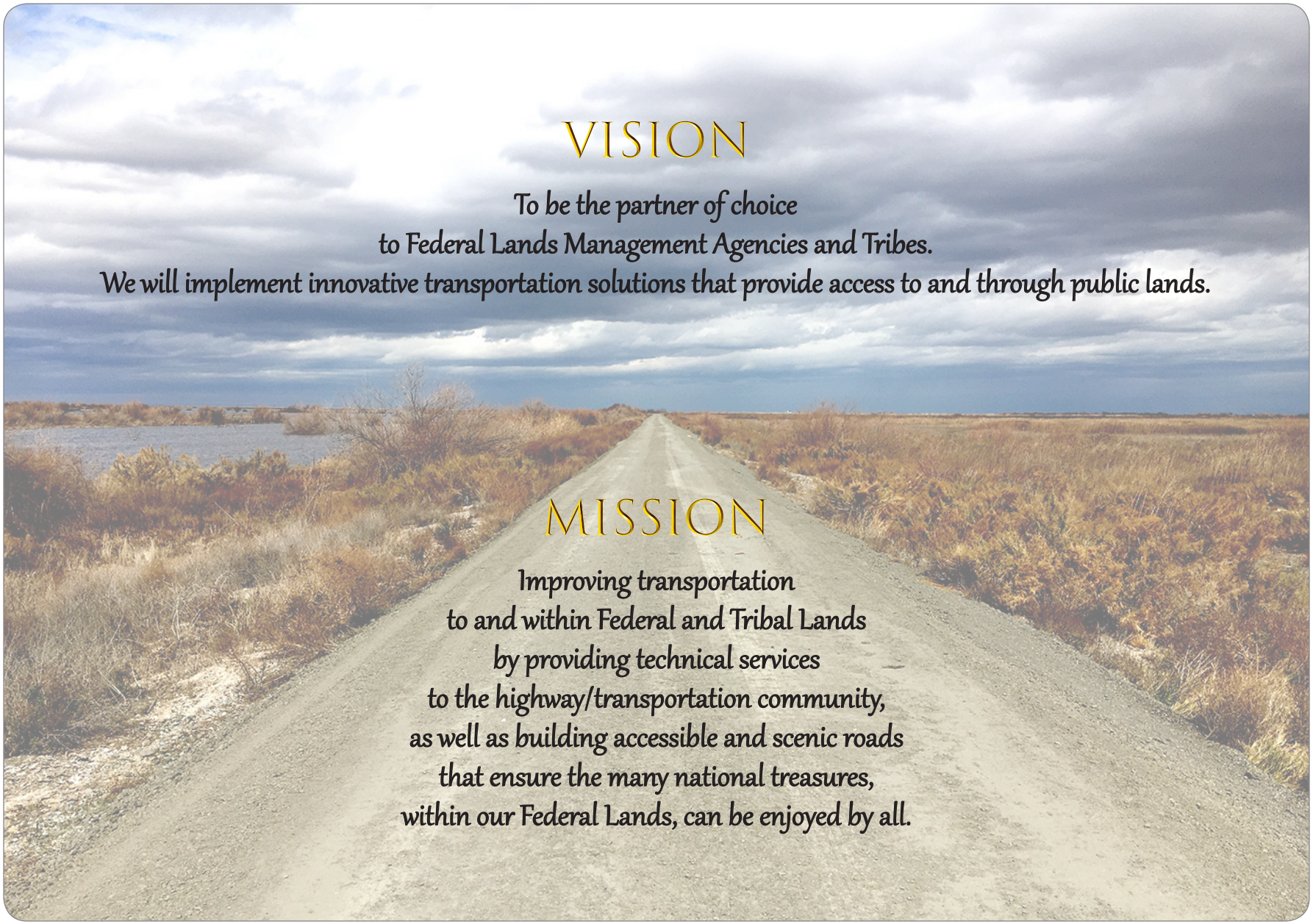
Front Cover: Foothills Parkway, Great Smoky Mountains National Park, Tennessee

Back Cover: Kolob Canyon, Zion National Park, Utah



Kern National Wildlife Refuge Auto Tour Route, California

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 field Division Offices: 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: Business Operations and Engineering. Business Operations addresses stewardship and oversight for our resources, as well as management and oversight of the program, totaling over $1 billion per year. Engineering is the development of projects from scoping and preliminary design through the construction of a project.

FLH is uniquely enabled and entrusted to administer many different types of funds to facilitate transportation improvements for our Partners.

Now in its 37th 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.

Our engineering and technical expertise includes:

- Construction Supervision and Inspection
- Consultant and Construction Contract Acquisition
- Contract Administration
- Design Visualization
- Environmental Compliance
- Funds Management
- Geotechnical Design
- Highway and Bridge Design
- Hydraulics and Hydrology
- Intelligent Transportation Systems
- Materials Sampling & Testing
- Plans, Specifications and Estimates
- Project Management
- Program Administration
- Road and Bridge Inventory and Inspection
- Safety
- Survey and Mapping
- Technical Assistance
- Technology Deployment
- Traffic
- Transportation Asset Management
- Transportation Planning

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.

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 for 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 $260 million in FY 2018, provides flexibility for a wide range of transportation projects in the 50 States, the District of Columbia, Puerto Rico and the US Virgin Islands. 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 $355 million in FY 2018, 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 (IFAs). To date, the Presidio Trust Corporation is the sole IFA to be included in the FLTP. Presidio Trust Corporation began 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 FLMAs, 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 $485 million in FY 2018, provides funds to 567 federally recognized Tribes to improve the transportation systems located within, or that provide access to, Indian country. 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 135 of the Tribal governments operate their TTP directly through Program Funding Agreements with FHWA.

Nationally Significant Federal Lands and Tribal Transportation Projects (NSFLTP)

The NSFLTP, created under the FAST Act, is intended to provide a reliable source of funding for major, high-cost projects that typically cannot be funded with FLTTP resources due to the scope and expense of the project. This program is funded through the General Fund at a maximum of $100 million per year. It did not receive an appropriation until FY 2018, when it received $300 million. The Program will start making awards in FY 2019 based on applications of need.

Defense Access Roads Program (DAR)

The DAR Program is a jointly administered program that provides a means for the military to pay their share of the cost of public highway improvements necessary to mitigate an unusual impact of a defense activity. An unusual impact could be a significant increase in personnel at a military installation, relocation of an access gate, or the deployment of an oversized or overweight military vehicle or transporter unit.

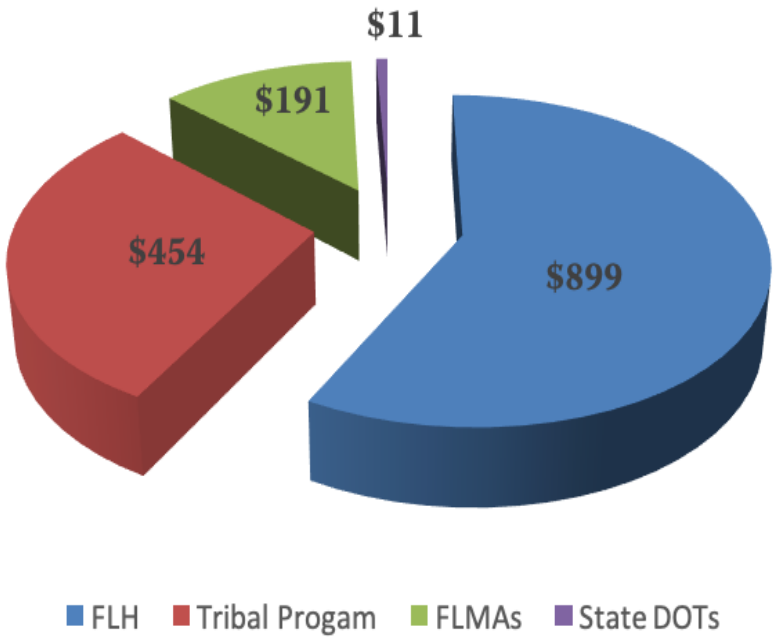
Emergency Relief for Federally Owned Roads (ERFO)

The ERFO Program, assists federal agencies with the repair or reconstruction of tribal transportation facilities, federal lands transportation facilities, and other federally owned roads that are open to public travel, which are found to have suffered serious damage by a natural disaster over a wide area or by a catastrophic failure. The ERFO program is not intended to cover all repair costs but rather supplement Federal Land Management Agency (FLMA) repair programs.

State Route 149, Utah
State Route 149, a rural collector leading from US 40 to the western entrance of Dinosaur National Monument, is the main access to Dinosaur National Monument from Utah. This FLAP project widened the existing facility to 12-foot lanes with 4-foot shoulders and included 17 culvert replacements and a bridge replacement.

FY 2018 Funds Obligated

$1.56 Billion



FAST ACT FY 2018 PROGRAM FUNDING

$355 million FLTP

$260 million FLAP

$485 million TTP

PROJECT DELIVERY SUCCESS

1644
Lane Miles Improved

113
Bridges (Rehabilitated)

39
Bridges (New)

PROGRAM DELIVERY SUCCESS

81%
Funds On The Ground

86%
Obligation Rate

Pavement Preservation Put Into Practice — EDC 4

FLH has adopted Pavement Preservation as standard practice because it provides our partners with overall improved performance and longevity at lower cost.

In March, WFL awarded the Western Region Pavement Preservation Multiple Award Task Order Contracts (MATOC) to 8 contractors located throughout the United States. The award was the culmination of an extensive 18-month process involving Acquisitions, Construction, Materials and Project Management staff, who developed the Acquisition Plan, solicited offers, and evaluated submittals from numerous contractors. The MATOC covers 12 Western states and facilitates efficient delivery of this key asset management program for our partners.

Since award, WFL has advertised 6 contracts valued at over $26 million. We anticipate that this contracting mechanism will save FHWA and our partners significant administrative costs and provide high-quality pavement preservation projects throughout the expected 5-year duration.

Typical Before and After Conditions, Joshua Tree National Park, California (above), Glen Canyon National Recreation Area, Utah (below)

Collaborative Hydraulics: New Modeling Software — EDC 4 & 5

FLH Hydraulic Teams have adopted SRH-2D hydraulic modeling software as general practice in design guidelines for major structure analysis and design. The SRH-2D modeling software provides a more comprehensive understanding of complex flow patterns at river crossings than previous traditional modeling techniques which only utilize 1-directional flow. Our designers have found that it facilitates better communication with partners and other technical disciplines when discussing hydraulic recommendations for projects. With this innovation, the hydraulic analysis is more accurate, resulting in a more cost-effective design process and ultimately, better quality design.

Fiber Reinforced Asphalt Concrete: A More Cost-Effective Solution

With the large network of roadways that our Partners manage under tight budgets, the need for more durable Hot Mix Asphalt (HMA) is clear. Budgets have not kept pace with construction inflation increases. Approximately 70% of project costs are typically in the HMA and aggregate base course work. As a solution, to ensure our Partners are getting the most out of their pavements, FLH proposed adding an aramid fiber combined with a polyolefin fiber to the HMA to produce a Fiber Reinforced Asphalt Concrete (FRAC). This proven, but underutilized innovation, helps to control and reduce thermal cracking, reflective cracking and rutting. FRAC provides an initial cost savings through reduced pavement layer thickness, providing the same durability as conventional mixes or a life-cycle cost reduction when placed at conventional asphalt pavement thickness, extending the pavement life. FRAC has been placed on Beach Drive from Rock Creek Parkway to the Maryland State Line within Rock Creek Park and on a project from Beaver Dam Road to MD 197 on the Baltimore-Washington Parkway. It is currently an active technology deployment under review, and funded by the Coordinated Technology Implementation Program (CTIP).

Before/After FRAC application, closeup of aramid and polyolefin fibers used in the mix, Rock Creek Parkway, Washington, DC

Introducing Mumble Strips

Mumble Strips, not unlike "Rumble Strips", create an audible noise creating a warning for the motorist. Mumble Strips create less external noise that may be a nuisance to a nearby community. Both techniques are milled into the pavement, the difference is in the shape of the milling: rectangular shape for rumble strips, sinusoidal shape for the mumble strips. This technique was applied on the Baltimore-Washington Parkway in Maryland and is currently an active technology deployment under review, and funded by the Coordinated Technology Implementation Program (CTIP).

Close-up of Rumble Strips,Baltimore-Washington Parkway, Maryland

Fiber Reinforced Polymer Used In Historic Bridge Rehabilitation

The condition of the deck and piles on Fishing Bridge, a historic timber bridge in Yellowstone National Park built during the 1930s, both warranted rehabilitation. The bridge consists of 19 — 28-foot spans and is constructed of timber members (piles, log beams, deck). The bridge is 532 feet long with a driving surface of only 25 feet curb to curb.

The timber piles were constructed utilizing Port Orford Cedar, which is very decay resistant, but is susceptible to abrasion due to ice loads. The Bridge is located downstream from the outlet of the Yellowstone Lake and experiences substantial ice flows off the lake during spring breakup. To protect the piles and restore structural capacity the piles were wrapped with a Fiber Reinforced Polymer (FRP) jacket and the annular space filled with marine epoxy grout. The FRP jackets were tinted to match the existing pile color for improved aesthetics.

The existing timber deck needed major repair or replacement as it was exhibiting isolated areas of failure and loss of section. The deck had been paved over and the pavement was exhibiting isolated failures and cracking over much of the surface. Due to the limited width of the bridge and the need to replace or rehabilitate the deck with a structural solution in a two-three week closure period in late October, an innovative approach was required. FRP deck panels were selected. Advantages of the FRP Deck Panels include: the ability to manufacture prior to the construction season at an offsite plant; panels arrive at the site with the wearing surface already attached; and panels can be produced in sizes that would make installation efficient. Panel sizes of roughly 38 feet long by 12 feet wide were produced. The panels are made of lightweight fiber-reinforced polymer with a unit weight of only 15 lbs-per square foot. The panels are designed for full HL-93 truck loading and to span between the existing log stringers. The asphalt overlay was stripped off and the panels were bolted to the top of the timber deck. This solution helped preserve the look of the historic timber bridge and restore its structural capacity.

Views of Fishing Bridge, Yellowstone National Park, Wyoming

Calcium Chloride Stabilization on Defense Access Roads, Montana

The 341st Missile Wing, housed on Malmstrom Air Force Base outside Great Falls, Montana, is responsible for the operation and maintenance of over 100 Intercontinental Ballistic Missile launch facilities. FLH assists under the Defense Access Roads Program by ensuring launch facilities are fully accessible.

Defense Access Roads or missile facility access roads are unpaved roads typically located in rural areas these unpaved roads are routinely in need of maintenance, due to the extremes of Montana winters and the usage of these roads by the Air Force, local ranchers and farmers. Recent innovations in road maintenance techniques have yielded many benefits. One innovation is the way we utilize Calcium Chloride ($CaCl_2$) stabilization. $CaCl_2$ stabilization is an important road construction technique used on unpaved roads that enables our partners to maintain quality and reliability while also keeping maintenance costs down.

The $CaCl_2$ stabilization allows the aggregate road base to maintain integrity longer than it would without it. It does this by trapping moisture into the aggregate layer which holds onto the finer binding aggregate material. This helps prevent dust and gravel from leaving the roadway when cars drive over it, greatly reducing the need for maintenance, and increasing the longevity of the road.

Application of $CaCl_2$, Malmstrom Air Force Base, Montana

After

Before

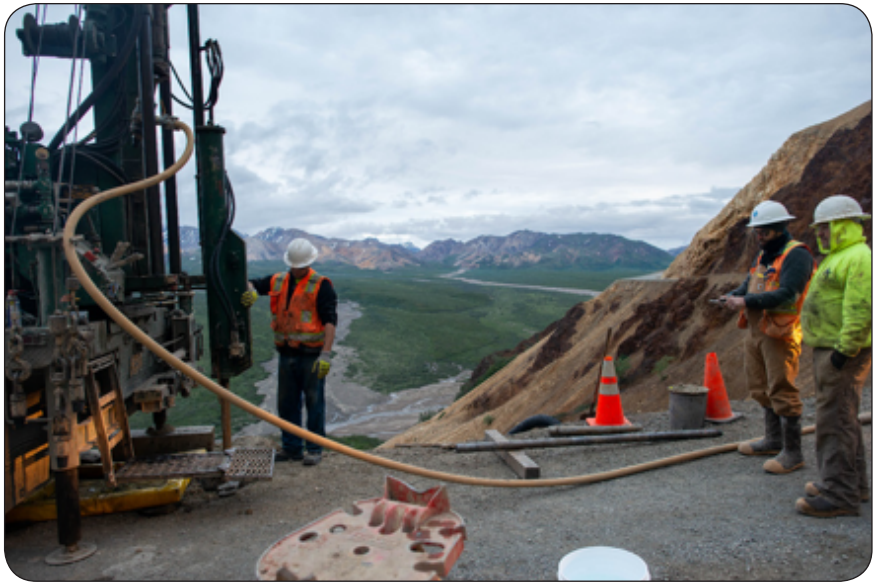
Completed Project

Investigating Landslides, Denali National Park, Alaska

Denali Park Road provides sole road access into Denali National Park and Preserve and to private inholdings in Kantishna, Alaska near the end of the 92-mile road. The Pretty Rocks Landslide is located near the midpoint, along the length of the road, as it twists and turns up and over the scenic Polychrome Pass. At Pretty Rocks, road deformation has progressively worsened since the 1980s, where the road crosses a 400-foot wide part of a large landslide complex. The road is typically closed through the winter from mid-October to early May. Over the last three winters, the full road width across the landslide dropped between 1.5 and 3 feet and experienced additional subsidence during spring, summer and fall. A thorough geotechnical investigation and instrumentation program was performed to better understand and characterize the landslide, allow for modeling and to help develop conceptual design alternatives for the Park's consideration.

Geophysical surveys completed in 2016, utilizing ohm-meter and seismic refraction methods, indicated that the landslide had ice-rich soils, allowing us to strategically plan the 2018 geotechnical investigation and instrumentation monitoring plan. The geotechnical investigation installed five deep-drill holes through the landslide materials into bedrock; two from the road grade and three more below the roadway. Prior to installing instrumentation, each drill hole had optical and acoustic televiewer geophysical surveys conducted to better characterize the subsurface materials. The drill-hole instrumentation that was selected to monitor the landslide included three ShapeAccelArrays (SAAs); two slope-inclinometer casings to monitor ground movement; five vibrating wire piezometers to monitor groundwater levels; five thermistor strings to measure ground temperature; a rain gauge to collect precipitation data; and an air-temperature gauge to collect air-temperature readings.

Data from all instruments is collected twice daily using an automated, on-site data collection system. Power and phone service are not available at the site so solar panels and satellite communications are used for power and data transmission. The data is sent to a server and can be viewed by the project engineering geologists and other interested parties. The data collection and transmission system allows monitoring of the data without travel to this remote location which is costly and difficult during the winter months. This site has been monitored since August 2018 and the nearly continuous data has allowed engineering geologists to draw preliminary conclusions about the relationships between landslide movement, precipitation and groundwater recharge, and the state of the degrading permafrost.



Drilling on Denali Park Road in the middle of the Pretty Rocks Landslide with the Alaska Range visible in the background.

Turner-Fairbank Highway Research Center and WFL geotechnical personnel worked together to install the communication base station for the drill hole monitoring equipment, rain gauge, and air temperature equipment just outside the western limits of the landslide.

3D Rock Face Survey, Yellowstone National Park, Wyoming

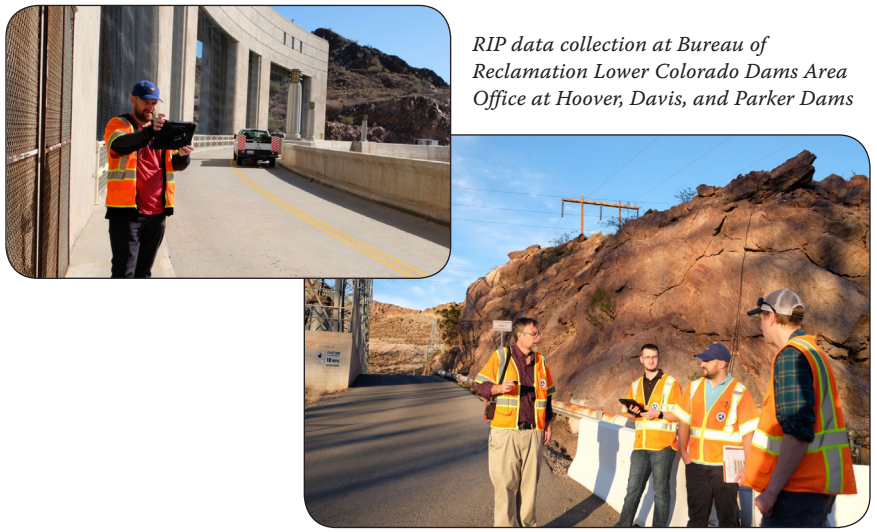
In summer of 2018, the WFL Geomatics Group surveyed the westerly face of Golden Gate Rock, a formation along Grand Loop Road in Yellowstone National Park. This detailed rock-face survey was needed to analyze the existing mitigation work previously completed on the rock face and to assess future mitigation needs. Survey crew members used the Lecia MS50 scan station to scan the rock surfaces to create a 3-dimensional point cloud. There were many challenges in collecting this data. The canyon is steep with the walls rising 200 to 300 feet above the roadway, making setup and collection very difficult. The many facets of the rock faces created shadows in the data set, facilitating the need for very precise planning in the scanning process. Also, the volume of traffic on the roadway and public curiosity in the project added yet another layer of difficulty. The result was a continuous point cloud of approximately 2000 linear feet of rock face yielding a very rich data set. Detailed geotechnical analysis of the rock features in this area are currently underway, and the point cloud data is allowing much of the analysis to be performed electronically.

A New Approach to Bridge Abutments: Tom Miner Creek and Rock Creek Bridges, Montana

The Tom Miner Creek and Rock Creek bridges were replaced due to undermining and structural damage. The new bridge decks are supported directly on Geosynthetic Reinforced Soil – Integrated Bridge System (GRS-IBS) abutments. These innovative abutments are constructed using reinforced soil backfill consisting of gravel with closely spaced layers of geotextile fabric and masonry block facing. Segmental Retaining Wall Units (SRWU) were utilized instead of generic concrete masonry units (CMU) due to challenges on past projects in meeting strength and freeze-thaw durability requirements for standard concrete facing blocks. The SRWU blocks are readily available and meet the required strength and freeze-thaw requirements. This approach provided additional benefits by having the SRWU manufacturer provide their standard products and details for corners and top-of-wall coping that have historically been complex to construct for standard CMU blocks.
The bridge deck was constructed of precast voided slabs and required a mechanism to connect the panels into one system. Typical practice has been to use high-strength grout with welded plates or post-tensioning rods for the joint between the precast panels. This project was the first in FLH to use a grouted key-way design with Ultra-High Performance Concrete (UHPC) for the joints. UHPC forms an extremely strong adhesive bond with a prepared concrete surface, providing an excellent opportunity to use it in joints between precast concrete panels. Typical structural concrete performs best in compression; therefore, reinforcing steel is used to provide the tensile strength in the composite system. UHPC provides excellent tensile strength and allows us to eliminate installing transverse post-tensioning rods which are traditionally used to tie voided slabs together. Transverse post-tensioning rod installation is an intricate operation; by eliminating them from the design, both design and construction were simplified. WFL currently has another project in design that will incorporate UHPC, and will continue to look to implement it on future projects with decked bulb tees or precast concrete deck panels.

National Road Inventory Program Adds a New Partner

After an initial pilot data collection effort in late 2017, Road Inventory Program (RIP) kicked off Cycle 1 for the BOR in February 2018. The RIP Team will work with BOR to compile road and parking inventories and perform condition assessments on the FLTP network. Data collection for all 5 BOR regions is expected to last through FY20. In FY18, data collection was completed in the Lower Colorado Region and started in the Upper Colorado Region. BOR joins the NPS and FWS as the three core partner agencies for the FHWA National RIP.



RIP data collection at Bureau of Reclamation Lower Colorado Dams Area Office at Hoover, Davis, and Parker Dams

The FLH Office of Bridges and Structures

With inspection teams located in all three FLH Divisions, the increased efficiency of the Bridge Inspection Program (BIP) has resulted in a combined total of 860 National Bridge and National Tunnel Inventory inspections completed in 2018. In addition the team has conducted a detailed field investigation for NPS in support of a substructure study for the nearly one-mile long John Coffey Memorial Bridge on the Natchez Trace Parkway in Alabama. An in-depth inspection and detailed report for the USFS

was performed on the Wallace Bridge, a suspension trail bridge in George Washington/Jefferson National Forest in Virginia. The team continues to provide specialized assistance in various ways by: assisting the National Highway Institute (NHI) on developing a new Tunnel Inspection Refresher course; working closely with our FLMAs and Tribal Agencies to further educate them on National Bridge Inspection Standards and National Bridge Inventory data submittal requirements; providing GRS-IBS Bridge Design guidance to the Resource Center/BIA. In addition our CFL and WFL staff met with a recipient of an American Architectural Foundation fellowship from France who is gathering information on the preservation and maintenance of historic NPS bridges.

Closeup of bridge wingwalls (left), (right) Inspections require "hands-on" field work. This BIP team member shown climbing up a wingwall, earned the nickname "Spiderman". Cuyahoga Valley National Park, Ohio

Floodplains, Geomorphology and Roadway Design: A Multi-Disciplinary Collaborative Approach, Larimer County Road, Colorado

In September 2013, heavy rains resulted in catastrophic flooding along Colorado's Front Range including the North Fork of The Big Thompson River, severely damaging 10 miles of Larimer County Road 43 (LC 43). The severe damage and urgent need to re-establish and protect the roadway facility warranted highly accelerated design and contractual delivery strategies. Initial project development, including design, environment, permitting, and right-of-way acquisition was completed in less than 5 months, which allowed construction operations to commence in September 2014. Through interdependent teamwork and integrated project delivery, drainage was strategically reconstructed to optimize the resiliency of the roadway and river system. The design and construction approach was founded on integrating the transportation facility with the natural stream corridor, while considering in its entirety the long-term resilience of LC 43 and the North Fork of the Big Thompson watershed. The vision and expectation to not only complete the project in an accelerated timeline, but also improve the resiliency of the canyon required the project team to streamline project development, leverage available resources, and engage the construction industry as a project partner early in the process. Total project delivery was completed in less than 28 months with total project cost of under $50M with over 89% "funds on the ground". Initial project schedules anticipated a 5-year delivery timeline with budgets exceeding $100M.

CFL hosted a state DOT and FHWA-wide Geotechnical Workshop that included a field trip to the Larimar County Road flood repair project to explain the innovation and cross-functionality this project required. The Workshop exhibited the same coordinated team effort that made the project a success, featuring presenters from multiple disciplines (Project Management, Environment, Hydraulics and Bridge) along with Geotech.

Hurricanes Maria & Irma Emergency Repairs — Puerto Rico

On the morning of Wednesday, September 20, 2017, Hurricane Maria hit the island of Puerto Rico with 155 mph sustained winds and over 37 inches or rain. The Category 5 hurricane's direct hit to Puerto Rico was the third-strongest storm to make landfall in the U.S. and was the worst atmospheric event Puerto Rico had experienced in the last 80 years. Hurricane Maria plowed across the island destroying homes, roads, and bridges. The storm knocked out power and communications across the entire island and triggered heavy flooding. After weeks without power, communications, and a stable road transportation network, the residents of the island suffered through food, water, and fuel shortages, water-related disease outbreaks, and lack of access to hospitals and banking systems.

On October 21, 2017, FEMA issued a $59.5M Mission Assignment to our Eastern Division for emergency repairs of Puerto Rico's non-federal aid transportation infrastructure. The mission required EFL to restore safe and reliable travel to the Island's secondary and tertiary road system of about 9,000 miles. To determine the locations and extent of the road damages, EFL sent three teams starting on October 25 to perform damage assessments. By November 10, 2017 a total of 140 sites had been identified. Between November 17 and November 29, 2017, EFL issued fourteen Design-Build letter contracts to 10 local highway construction contractors. By December 15, 2017, EFL with support from CFL and WFL deployed 8 bilingual project engineers and 3 construction inspectors under the supervision of EFL's Construction Operations Engineer. The final scopes of work negotiated with contractors included the design and construction of 15 bridge replacements, 19 bridge repairs, and 59 roadway landslides/road embankment repairs. The first road repair site at PR-555 KM 4.3 was completed in 68 days; the first full replacement for bridge #1499 "Los Olvidados" was completed in 116 days.

Overall, the projects consisted of emergency repairs located in 34 out of the 78 municipalities. Repairs included, but were limited to: landslide repairs, construction of gabions, temporary bridge repairs, construction of low-water crossings, installation of pipe culverts, and design and installation of modular and other bridge systems. FLH work provided for the following technical assistance: professional engineering design services, survey, material testing and quality control, soil sedimentation and erosion control, maintenance of traffic, coordination with utility companies and utility work as needed, removal and disposal of existing damaged structures and debris, clearing and grubbing, excavation, backfilling, embankment construction, concrete placement, placement of pavement surface, installation of guardrails and terminals, placement of pavement markings and signing, and other miscellaneous work.

In total 93 sites were restored with 95% completed within 6 months. Through this mission, EFL delivered a total of $54.7M in work with about $3M of CE costs. In addition to FEMA Emergency Repairs, EFL also worked concurrently to deliver ERFO assistance to El Yunque National Forest, executing two letter contracts with one local contractor worth about $6.6M.

Hurricanes Maria & Irma Emergency Repairs — US Virgin Islands

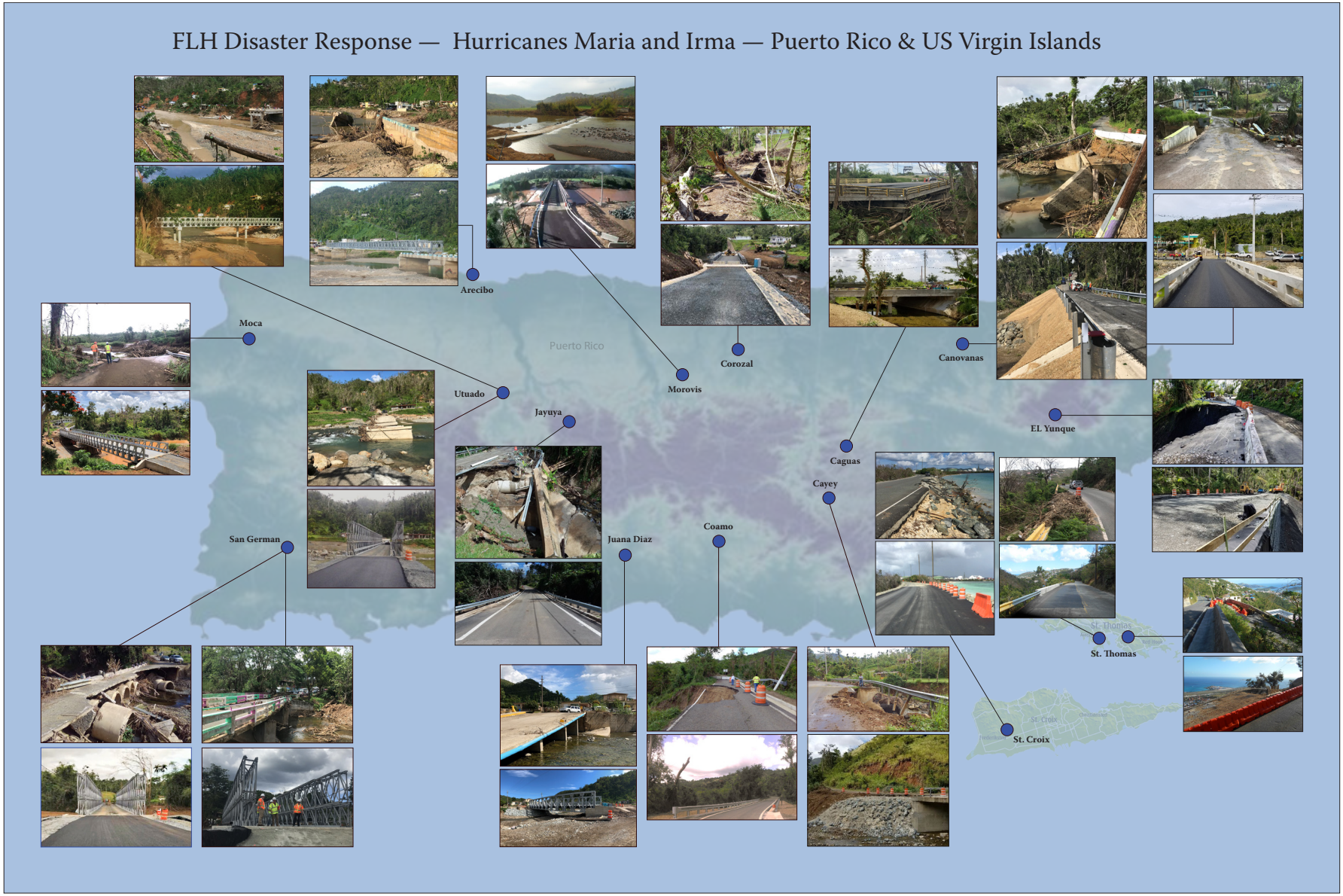
The islands of St. Croix and St. Thomas in USVI were hit by category 5 Hurricane Irma on September 7, 2017, and within a span of two weeks hurricane Maria, hit the islands again. The two hurricanes brought unprecedented devastation on a massive scale. Power, communication, and water supply was cut off and airports and sea ports were shut down. There were shortages of food, fuel, drinking water and other essentials on the islands. Asphalt and concrete plants were severely damaged, and rendered non-operational. After the hurricanes, EFL received emergency funds to immediately start the infrastructure remedial and restoration work. To start work immediately, EFL awarded letter contracts in St. Thomas and St. Croix to repair and restore slides, washed out roadways, and traffic signals that were blown away by the storms. In St. Thomas, washed out roadways, retaining walls, and slides were repaired at several locations for a total sum of $2.3M. Traffic signals at 21 different intersections were restored and rehabilitated for a total sum of $7.9M. In St. Croix, washed out roadways were restored for a total sum of $1.3M, and traffic signals at 20 different intersections were restored and rehabilitated for a total sum of $5M.

International Visitors Hosted from Japan & South Korea

In support of the FWHA Office of International Programs (OIP) the Eastern Division hosted study teams in January and November. Teams from the Japan National Institute for Land and Infrastructure Management and Infrastructure Development Industry were interested to learn about countermeasures and strategies to enhance productivity and quality assurance in the construction industry.

In June, we hosted a group from the Korea Express Corporation and participants in the FHWA Korean Research Fellows Program who were interested in learning about the FLH Bridge Inspection and Management Programs, RIP and Pavement Management Systems.

EFL Construction Manager provided the Japanese delegation with a presentation on the FLH Construction Process with time included for Q/A and general discussion.



Map of Puerto Rico and the Virgin Islands, provides before & after images of projects completed under FEMA Mission Assignment to restore access across the Island of Puerto Rico and on St. Croix and St. Thomas. Work was completed under a total of 20 contracts with 12 different contractors.

Office of Tribal Transportation

The Office of Tribal Transportation (OTT) administers the Tribal Transportation Program (TTP) and provides stewardship and oversight for direct funding agreements with 135 federally recognized Tribes. The OTT also provides support for all FHWA activities affecting tribal transportation. This support includes the administration of TIGER/BUILD grants awarded to Tribes, and the transfer of funds from States and other local governments to Tribes through the 202(a)(9) transfer process authorized in MAP-21. In FY18, the OTT administered 4 TIGER/BUILD projects, as well as 10 projects funded by other programs through 202(a)(9) transfers. These transfers, provided for under MAP-21, give the OTT authority to receive funds from States or local governments, add them to the FHWA accounting system and then transfer those funds to Tribes as TTP funds. The statute says that the funds will be "credited to appropriations made available for the TTP". Congress authorized these transfers to facilitate cooperation between States or local governments and Tribes for the purpose of advancing infrastructure projects. The stewardship and oversight authority over these funds lies with the OTT Team or the BIA. To date, OTT has managed approximately 20 transfers across 8 different states.

Pennsy Multi-Use Trail, Site Visit, Seneca Nation, Indiana
OTT staff member (left) accompanied by Seneca Nation of Indians DOT Project Manager (right) — The project occupies a segment of the historic Pennsylvania railroad that is being converted to a public multi-use trail for the tribal community. This project utilized funds transferred via a 202(a)(9) agreement allowing faster progress under the Tribes Transportation Program.

Beacon Rock State Park, Columbia River Gorge National Scenic Area, Washington
The OTT team conducted a strategic planning meeting in Vancouver, WA and spent an evening hiking to the top of Beacon Rock.

Site Visit, Canyon De Chelly National Monument, Arizona
Left to right: Navajo DOT Principal Engineer, OTT Tribal Coordinator, OTT Director, FLH Associate Administrator, Navajo DOT Director and Navajo DOT Project Manager (kneeling).

Transportation Safety in Tribal Areas

Each year under the FAST Act, 2% of the available TTP funds (approximately $9 million) are set aside to address transportation safety issues on Tribal land. 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).

On July 5, 2018, FHWA awarded 82 Tribes a total of $17.5 million for 94 projects. Since the program began in 2013, FHWA has awarded $52 million for 547 transportation safety projects. Tribes will have another opportunity to apply for this funding in 2019. Additional information about the funding can be found on the Federal Lands website under TTP Safety.

Transportation Safety Plans have been developed by over 60% of Tribes with this funding. These safety plans have guided Tribes to request additional TTPSF funding, as well as explore other safety funding opportunities to address safety data, engineering, emergency medical services, enforcement, and education projects. Safety infrastructure improvements funded by TTPSF have included: separated pathways, intersection traffic control, roadway departure countermeasures, and ice road safety monitoring.

Gila River Indian Community, Arizona
Gila River Indian Community, in partnership with Arizona Department of Transportation, constructed new right and left turn lanes, pedestrian access points via fencing walk-through gates, and improved vehicular access with new cattle guard boxes along State Route 87. With housing on the west side of the route and a church and cemetery on the east side, the high volume, high speed roadway was unsafe for both drivers and pedestrians. The Tribe utilized funds awarded by the Maricopa Association of Governments in conjunction with Tribal Transportation Program funds.

Pawnee Nation, Oklahoma
The Pawnee Nation was awarded Safe Routes to School funds by the Oklahoma Department of Transportation in 2011, with matched Tribal Transportation Program funds, the Tribe completed a sidewalk improvement project in 2018. The new sidewalks provided safe access for children to walk to and from school. The old sidewalks were falling apart and exposed areas resulted in muddy pits that forced the children to walk on the roadway. The sidewalk project included new fencing and clearly designated crosswalks, improving safety overall for pedestrians and motorists.

Greasewood Springs to Burnside, N15 Fencing Project, Arizona
The project consisted of furnishing all labor, material, equipment and incidentals necessary for the installation of 42.2 miles (21.1 miles on each side of roadway) of fencing, 83 cattleguards, 31 gate installations and graded turnouts along both sides of the highway. Several runs of fence were omitted due to steep drainage or slope conditions. Sag weights were installed at drainages as required. Existing turnouts and access roads that crossed the right-of-way without a gate or cattleguard were obliterated. Density tests at each cattleguard location were taken with no failing tests. A final inspection was held on March 14, 2018 with FHWA, BIA and Chapter Officials at Cornfields Chapter House and the project was completed on March 17, 2018. There were two approved change order requests and a project time extension of additional 30 calendar days was approved. The final construction cost was $2.3M.

Gate installation for Access to Greasewood Springs School, Arizona

Fencing and cattleguard installed at Cornfields Chapter Access Road, Arizona

Fencing installed in hilly area near Sunrise, Arizona

Three Unit Cattleguard Installation at Greasewood Springs Access Road, Arizona

Seneca Nation, Lenox Road Project, Cattaragus County, New York
Tribal residential neighborhood roadway paving, minor drainage, and driveway repairs.

North Valley Creek Bridge Replacement, Flathead Indian Reservation, Montana
Located northwest of Arlee, Montana on the Flathead Indian Reservation, this project removed an existing timber bridge over North Valley Creek and constructed a new 35-foot folded plate girder bridge with GRS abutments and superstructure. Construction and Construction Administration was managed by the Confederated Salish and Kootenai Tribes force account using Confederated Salish and Kootenai Tribes' TTP funds and an Accelerated Innovation Deployment Grant.

Installing Superstructure

Completed Project

Pueblo of Zia – Cabezon Road, New Mexico
Grading and Drainage Improvements, installation of cattleguard underpass, guardrail, realignment of roadway, road grading and culvert drainage installation

Pueblo of Santa Ana, New Mexico
Design and Construction of 6 bus shelters located around the Pueblo

Pueblo of Jemez – Pueblo Place Subdivision, New Mexico
Construction of roadways, sidewalks and installation of lighting

Sand Trail Parking Project, Chugach National Forest, Alaska
The Sand Trail Parking Project, located 9.5 miles east of the City of Cordova along the Copper River Highway, provides a vehicle parking facility at the trailhead to enhance access to Chugach National Forest for recreation and subsistence purposes. Previously, there was no formalized parking available and trail users were parking on the road shoulder or other undesignated parking areas along the Copper River Highway and traversing back to the trailhead. This was causing inefficient and potentially unsafe conditions for users of the trail and highway travelers. Construction Administration was managed by the Native Village of Eyak, with funds from Forest Service, FLAP, and the Native Village of Eyak TTP.

Sand Trail Parking Area and access to Sand Trail

Allen Road — BIA Route 4 Extension Project, South Dakota
The Oglala Sioux Tribe (OST) was awarded PLHD (Public Lands Highway Discretionary) Grant funding in FY2012 ($2 million) and FY2015 ($3 million) received from the FHWA and administered through the TTP under an addendum to the Owner's Federal TTP Agreement. The OST reconstructed 3 miles of BIA Route 4, which included grading, culvert installation, 3 miles of asphalt concrete with geotextile, pavement marking and signage. The project was considered complete on September 15, 2018, with a total cost of $6.8M.

Completed Roadway

N8008 — Round Rock, Arizona
The Weeminuche Construction Authority (WCA) completed $5.1 million in improvements using the Navajo Nation's Federal Funds along N8008 north of the community of Round Rock, Arizona. The projects consisted of all labor, material, equipment and incidentals necessary for the construction of 1.18 miles of grade and drainage work, placement of aggregate base course, new bridge, and miscellaneous construction. The new bridge provides all weather access across the Lukachukai Wash to US191. A final inspection was held with WCA, BIA Navajo Region Division of Transportation, FHWA and Navajo Division of Transportation on November 21, 2017. A final acceptance letter was sent out January 25, 2018.

Looking west along gravel road towards US 191.

Looking east along concrete deck of new bridge.

Images provided courtesy of Navajo Division of Transportation.

Hamilton Cemetary Access Boardroad Project, Yukon River Delta, Alaska
The Association of Village Council Presidents (AVCP), on behalf of the Native Village of Hamilton, constructed this TTP funded boardroad project. The boardroad provides for general pedestrian and cemetery access in the remote village. Prior to this project, people arriving by small boats on the shore of the abandoned village had to walk nearly ½ mile on a rough, unsafe trail through the brush to access the cemetery. The new 10-foot wide elevated boardroad provides safe and comfortable pedestrian access to the cemetery. The galvanized steel helical posts supporting the boardroad keep it high and dry, while also preserving the wetland and tundra beneath. Wooden handrails provide additional safety where the boardroad is higher off the ground.

AVCP force account crews performed all the construction work on this project. Because the site is an abandoned village, a work camp had to be set up to house and feed the work crew. Construction management of the project was provided by a consulting firm. A final inspection was held on September 19, 2018 with members of the Tribal government of the Native Village of Hamilton, FHWA, AVCP, and the consultants who designed the project and managed the construction. The project was completed in October, 2018. The final inspection was held before the work was 100% complete due to seasonal access limitations.

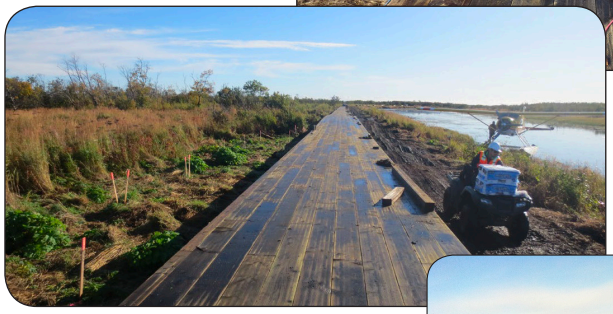
Crew installing steel framing for boardroad.

Work camp set up to house and feed the AVCP construction crew.

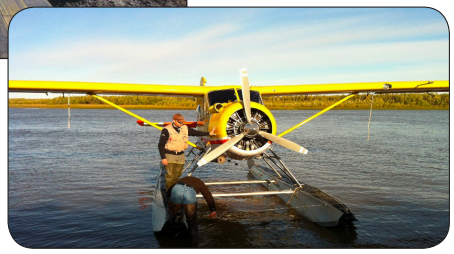
Typical small equipment used for boardroad construction.

Boards partially installed on steel framing.

Crew installing boards onto the steel framing.



Boardroad complete except for bumper boards.



Float plane needed for access to perform inspections. Construction and work camp materials were brought in by barge.

Images provided courtesy of The Association of Village Council Presidents.

BIA Route 2 – Sharp's Corner to Kyle Overlay Project, South Dakota
The BIA 2 – Sharp's Corner to Kyle project consisted of 14.2 miles of mill and overlay over the existing asphalt, as well as a leveling course. Items included in the project were centerline and edge striping, rumble stripes, approach paving, topsoil striping and replacement, seeding, fertilizing and mulching. The project was completed on November 30, 2017, with a total cost of $2.6M.

BIA 41 – BIA 32 North to US Highway 18, South Dakota
Project consisted of 6.7 miles of asphalt concrete overlay which included spot repairs to pot-holes on existing double chip seal roadway, pavement marking and signage. The project was completed on June 12, 2018, with a total cost of $2M.

Before/After

TTP Bridge Program

TTP bridges are funded by a set-aside of up to 3 percent of the TTP funds. In accordance with 23 CFR Part 661, set-aside bridge funds may be used for planning, design, engineering, preconstruction, construction, and inspection of projects to replace, rehabilitate, seismically retrofit, paint, or apply anti-icing and de-icing chemicals, or to implement any countermeasures (including multiple-pipe culverts) for eligible TTP bridges. To be eligible, a bridge must have an opening of at least 20 feet, be classified as a Tribal Transportation Facility, be structurally deficient or functionally obsolete, and listed on the FHWA National Bridge Inventory (NBI). Funds made available for the TTP Bridge Program totaled $13.3 million. There were 59 bridge applications received, for a total funding request of about $34 million. The program funded 35 bridge applications with the $13.3 million allotted.

Rio Grande Bridge Replacement, Santo Domingo Pueblo, New Mexico
The original Rio Grande Bridge constructed in the 1960's had numerous deficiencies and safety concerns: deck delamination, cracking at the wingwall corners, cracking at several piers, failing deck joints, and damage to an approach rail. The new bridge allows safe ingress/egress across the Rio Grande River, accommodating traffic from tribal communities and public. The total bridge replacement cost was approximately $7 million and was fully funded under the TTP Bridge Program. The new structure measures about 690 feet in length with a 5-span, continuous, cast-in-place concrete deck, composite with prestressed concrete girders. The project scope included grade, drain, aggregate base course, and hot asphaltic pavement for the approach roadways, as well as three irrigation and drainage canal crossings through precast concrete pipe. The project was completed in April 2018.

Green Beret Bridge Replacement, Northern Cheyenne, Big Horn County, Montana
The Green Beret Bridge replacement project realigns Muddy Creek Road with a new concrete box culvert. The project is located along Black Springs Road, approximately five miles west of Lame Deer, Montana. The project removed the existing dated wooden structure and replaced it with a new structure approximately 50 feet to the northeast, downstream of the existing structure. The project consisted of a concrete double cell 12'x12' bridge box culvert and associated components, measuring, 26'2" across and 35' in length, including a grade raise to realign the roadway over Rosebud Creek, removal of the old Green Beret wooden bridge, and new guardrail. Approximately 700 feet of roadway centerline was relocated as part of the project. The project was completed in December 2018, and partly funded with approximately $627K of TTP Bridge Program funds, with a total project cost of $652K.

Before

After

Images provided courtesy of Northern Cheyenne Tribe, Montana.

Apache Tribal Community Bridge Replacement (National Bridge Inventory # 09118), Caddo County, Oklahoma
The first GRS bridge built in Caddo County; the new bridge has GRS abutments and 6 girders with a concrete deck and measures 70-feet long. The total construction cost of the project was about $220K. The project was completed in March 2018 and took about 6 weeks from start to finish. This is a non-BIA owned bridge; it is owned by the County, yet it primarily serves the Apache Tribal community.

Before

Images provided courtesy of BIA Southern Plains Region.

After

"If you want the best view of the highest mountains in the eastern United States, you'll drive the Foothills Parkway," said Senator Lamar Alexander. "The scene is so magnificent that it surprises even those of us who have grown up admiring the Smokies. It has taken nearly 75 years to complete, but it is so picturesque that it is worth the 75-year wait."

Foothills Parkway Capstone Project, Great Smoky Mountains National Park, Tennessee
The 16 remaining miles from Wear Valley to Walland, are complete and were officially opened to the public on November 10, 2018 for motorists and cyclists to enjoy. Great Smoky Mountains National Park officials were joined by Senator Lamar Alexander, Congressman John J. Duncan, Jr., Congressman Phil Roe, Governor Bill Haslam, and NPS Southeast Regional Director Bob Vogel to dedicate the long-awaited section of the Parkway. The public is now able to experience this new section of roadway for the first time since construction began in 1966, including the 1.65-mile section known as the 'Missing Link' which is now connected by a series of nine bridges.

The role of EFL was to provide engineering design and construction support services in an environmentally responsible, context-sensitive manner. These projects were delivered using both Design-Build delivery and conventional Design-Bid-Build delivery. As a result of context sensitive design and construction procedures, as well as re-vegetation efforts made around and beneath the bridges, the construction efforts for these projects resulted in minimal impact to the mountainside.

The Great Smoky Mountains National Park serves as one of the economic drivers in the community and with the increased development that has occurred in the surrounding counties, the investment of over $100 million for the construction of these recent projects has greatly benefitted the local economy and employed many. Its completion has provided an alternate means of transportation into and around the Wears Valley area, and will undoubtedly serve to increase tourism there as well as provide a destination for those who desire to see the dramatic views of the Smoky Mountains visible from the Parkway itself.

Lahaina Bypass, Maui, Hawaii

The Lahaina Bypass Project, which included a cast-in-place GRS-IBS Bridge was completed in June 2018 and constructed to mitigate traffic congestion along Honoapilani Highway (State Route 30) through Lahaina Town in West Maui. The project improved vehicular throughput, and provided an alternate route through the area. The new bypass and bridge increases dependability and durability considering shoreline erosion and future sea level rise. This structure sets a national record for abutment height and width between wingwalls. At the highest point it is approximately 28 feet from the top of the road to the bottom of the concrete bridge. In measuring the entire GRS system the structure is approximately 35 feet from the bottom of the reinforced soil foundation to the bottom of the concrete bridge. The width between the face of the wingwall to the adjacent wingwall is approximately 126 feet.

Manning Crevice Bridge Replacement Project, Idaho
Located slightly upstream from the original site, the new Manning Crevice Bridge, is a single-tower one-lane asymmetrical suspension bridge which spans over 300-feet from canyon wall to canyon wall. This project represented the first opportunity for the WFL office to utilize the CM/GC approach. Having the contractor involved in the development of the plans and specifications provided an excellent opportunity for FHWA, USFS and BOR staff to see the value of obtaining contractor input early in the process. This project celebrated a ribbon cutting in June and now 84 years later this completed project provides vital access to tourism and recreation in the Riggins, Idaho area, including the Salmon River, the Gospel Hump Wilderness and the Frank Church River of No Return Wilderness.

The old bridge visible above, in the background, was in poor condition and did not meet today's bridge design standards. It had width, height, and turning limitations as well as being load restricted. The load capacity of the old bridge was limited to 16 tons. The new structure is open to all state legal loads and will not post any (capacity/weight) restrictions. In April 2017, workers performed ground anchor block testing, one of the proven ways to ensure the bridge has the necessary strength to handle all loads. Testing required a massive stressing ram so vast and heavy that a crane was used to set it into each of the nine anchor locations. Ground anchors were tested to a load of 351,000 lbs. (approximately the weight of 30 average elephants). These loads are about ten times the typical soil and rock bar anchors.

The completed project now provides safe access to the opposite side of the river. Seen from different angles the site restrictions of this project are clear.

Manning Crevice Bridge, Salmon River Road, Idaho

Beartooth Highway, Park County, Wyoming
The completed project improved approximately 2.34 miles of U.S. 212, Beartooth Highway. The reconstruction provided overall improved roadway alignment, grade, and width. The project consisted of a 32' wide reconstructed roadway, removal and replacement of an existing bridge, and construction of a 36' new bridge.

Beach Drive and Trail Reconstruction, Rock Creek Park, District of Columbia
The design and construction of this project, in challenging and environmentally sensitive terrain, required a unique approach to preserve the natural aesthetics in an urban parkway corridor. Work included: full depth pavement reconstruction, bridge and parking area rehabilitation, curb and gutter repair, drainage improvements including outlet protection at multiple culvert locations, scour repair at two bridges, storm drain and stormwater, Best Management Practices, traffic signal and street light replacement, vehicle safety improvements including rumble strips and aesthetic roadside barrier, and multi-use trail widening and rehabilitation for pedestrians and bicyclists.

Bucks Lake, Plumas National Forest, California
Safety improvement project included roadway alignment to address rock fall. A reinforced soil slope was constructed for approximately 800 feet on the fill slope.

Cottonwood Pass, Gunnison County, Colorado
Roadway Realignment at elevation of 11,500 feet.

Trinity County Bridges, Klamath Mountains, California
This project, located in the lower reaches of the Klamath Mountains of California, replaced five county-owned bridges at Coffee Creek, Mumbo Creek, North Fork East Fork Hayfork Creek, Little Creek, and Adams Creek. They were all identified as structurally deficient or functionally obsolete, and were approved by Caltrans and the FHWA, California Division Office for replacement under the FHWA Highway Bridge Program. Design-Build and Alternative Technical Concepts were applied and the project was awarded the following distinctions:

- *American Public Works Association 2018 Sacramento Chapter Project of the Year Award*
- *Design Build Institute of America 2018 National Award of Merit — Transportation (other than Aviation) category*
- *League of California Cities and California State Association of Counties Joint 2018 Outstanding Local Streets and Roads Project Awards Program in the Bridge — Efficient and Sustainable Bridge Maintenance, Construction and Reconstruction Projects category*
- *American Society of Civil Engineers — Sacramento Chapter 2017 Outstanding Bridge Project*

Little Creek Bridge, California

Adams Creek Bridge, California

Mumbo Creek Bridge, California

Auto Tour Route Improvements, Kern National Wildlife Refuge, California
This project improved the roadway by reconditioning the existing roadway and adding 4 to 6 inches of aggregate surface course on 10.5 miles of the Auto Tour Routes. This improved overall access to areas of the refuge for wildlife viewing and other recreational activities.

Bridge Replacement, Entrance to Fort Pulaski National Monument, Georgia
1200-foot long bridge completed ($10M) included placement of new riprap on embankment slopes, reconstruction of bridge approaches, and other miscellaneous work.

Yosemite National Park, California
Project included roadway repairs to 16 sites damaged in storm events in January and February 2017, and one site that was damaged by rockfall in June 2017. The work included rockfall repairs, reconditioning of eroded and damaged shoulders and ditches, placement of riprap and rock embankment to stabilize slopes and drainages, rock bolting to stabilize rock slopes, replacement of drainage structures, replacement of damaged masonry guardwall, concrete curb, and asphalt pavement. Work on Wawona Road, included 9 sites, 5 sites on El Portal Road, and 3 sites on Big Oak Flat Road.

Before

After

Daniel K. Inouye Highway (formerly Saddle Road), Hawaii
Final phase of reconstruction to the east side of the Daniel K. Inouye Highway (formerly Saddle Road). Roadway width was upgraded to two 12-foot travel lanes with 8-foot shoulders and included a climbing lane for most of the length of the project.

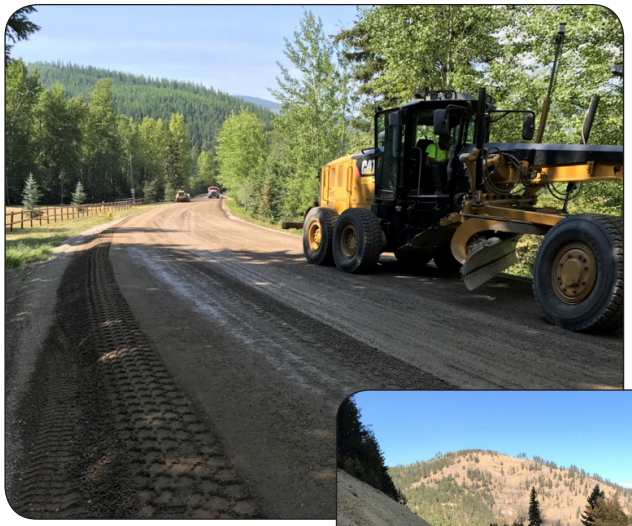
Pavement Improvements, Lake Berryessa, California
The project provided pavement preservation, including full-depth reclamation, asphalt paving, pavement markings, and signing for the Lake Berryessa access roads and parking area facilities.

La Sal Mountain Loop Road, Manti-La Sal National Forest, Utah
The scope of this project included widening of the existing roadway to produce a consistent 22-foot width, and placing new aggregate base and asphalt pavement. Geotechnical, hydraulic, and safety improvements were included.

Blacktail Road, Lakeside, Montana

Blacktail Road (Forest System Road #917) was originally constructed in the early 1960s by the Federal Aviation Administration to access the radar station at the top of Blacktail Mountain. Today the route serves as primary access to National Forest System lands in the Blacktail Mountain area which includes access to the Blacktail Mountain Ski Area, motorized and non-motorized trail systems, Blacktail Mountain Nordic Cross-Country Ski Trail System, various communication facilities, and adjacent private lands.

The proposed project to reshape and pave three miles of existing gravel roadway was the result of a partnership between the US Forest Service, Flathead County, and Western Federal Lands. Additionally, two Aquatic Organism Passage culverts were constructed to allow fish passage along Stoner Creek and its tributaries. Guardrail was also installed to increase safety along the corridor. The advertised contract contained a 3D model of the proposed roadway surface in addition to traditional contract documents. This allowed interested bidders to easily import and visualize the design, as well as utilize the model during construction to capitalize on the efficiencies that 3D construction methods can provide. The winning contractor utilized this 3D model to facilitate Automated Machine Guidance (AMG) for grading operations during construction.



AMG equipped grader shaping the road.

The completed project.

Prefabricated Aluminum Box Culvert, Medicine Bow National Forest, Wyoming

This project replaced a large-diameter culvert damaged in a 2016 precipitation event. The use of an aluminum, prefabricated box culvert with associated headwalls and wingwalls allowed construction to proceed in an expeditious manner in a remote area, where traditional building materials required a significant haul. This is the first time CFL has made use of an aluminum culvert.

Mirror Lake Trailhead Realignment, Mt. Hood, Oregon
Kid-friendly Mirror Lake Trail is one of the most popular hikes in the Mt. Hood region. Unfortunately, you had to arrive early to get a trailhead parking spot or park farther away and walk along busy Oregon State Highway 26 to get to the trailhead. With both commercial trucks and personal vehicles whizzing by at highway speeds, there needed to be a safer alternative.

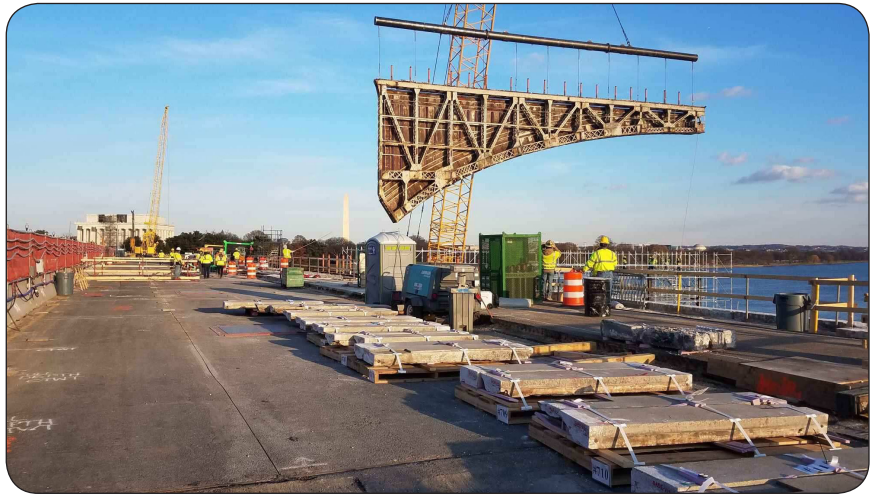
The Mirror Lake Trailhead realignment relocated the trailhead and larger parking lot to a safer location, away from Highway 26. As part of the realignment, a new section of the trail that begins at the new parking lot was also constructed.

One of the unique challenges this new trail presented was the placement of pedestrian bridges. Workers constructed the bridges offsite. However, transporting the bridges via heavy equipment was an environmentally unfriendly choice. Not only would there be potentially harmful damage to the forest and streambeds, but there was also the potential to harm an endangered moss species found at the site. To avoid this potential damage, the bridges were transported to the site via helicopter.

WFL Project Manager (left) meets with USFS Natural Resource Specialist at the site.

Workers guide the bridge into position, coordinating with the helicopter pilot for placement.

Arlington Memorial Bridge, Washington DC/Arlington, Virginia
This Design-Build project awarded at $192M includes design and construction for the rehabilitation of the concrete approach spans, removal and replacement of the concrete deck, replacement of the bascule span at the center of the bridge, concrete repairs to the existing structure, rehabilitation of the bridge substructure, removal and resetting granite curb and railing, repairing and cleaning the bridge's stone masonry and other miscellaneous work.



The 2,162-foot long by 94-foot wide National Monument spans the Potomac River.

U.S. Department of Transportation
Federal Highway Administration

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