Every Day Counts:

Creating Efficiency Through Technology and Collaboration

EDC-3 Final Report

May 2017

EDC
every day counts

U.S. Department of Transportation
Federal Highway Administration

"Every Day Counts and other technology initiatives have really been critical in helping States save money and save time."

— Bud Wright, American Association of State Highway and Transportation Officials Executive Director

Quality Assurance Statement
The Federal Highway Administration provides high-quality information to serve government, industry, and the public in a manner that promotes public understanding. Standards and policies are used to ensure and maximize the quality, objectivity, utility, and integrity of its information. FHWA periodically reviews quality issues and adjusts its programs and processes to ensure continuous quality improvement.

Foreword

Every Day Counts (EDC) is the Federal Highway Administration's program to advance a culture of innovation in the transportation community in partnership with public and private stakeholders. Through this State-based effort, FHWA coordinates rapid deployment of proven strategies and technologies to shorten the project delivery process, enhance roadway safety, reduce congestion, and improve environmental outcomes.

This report summarizes the status of innovation deployment at the end of 2016 for the 11 innovations in the third round of EDC, which focused on creating efficiency through technology and collaboration. The report is intended as a resource for transportation stakeholders implementing innovation deployment plans and to encourage ongoing innovation in highway project delivery to better serve the Nation.

"One of the things that's been very beneficial in our partnership with the Federal Highway Administration is the idea of Every Day Counts. The initiative is not limited to the 11 ideas in EDC-3. It's a mindset. It's a culture of innovation."

— Malcolm Dougherty, California Department of Transportation Director

CONTENTS

"We're being more effective, we're being more efficient, we're saving lives, and we're really moving our transportation network in Pennsylvania into the 21st century. The State Transportation Innovation Council is a big piece of that."

— Leslie Richards, Pennsylvania Department of Transportation Secretary

ACRONYMS AND ABBREVIATIONS

3D	three-dimensional
4D	four-dimensional
5D	five-dimensional
AASHTO	American Association of State Highway and Transportation Officials
ADOT	Arizona Department of Transportation
AHTD	Arkansas State Highway and Transportation Department
AID Demonstration	Accelerated Innovation Deployment Demonstration
Alaska DOT&PF	Alaska Department of Transportation and Public Facilities
ALDOT	Alabama Department of Transportation
Caltrans	California Department of Transportation
CDOT	Colorado Department of Transportation
CMF	crash modification factor
ConnDOT	Connecticut Department of Transportation
DDOT	District Department of Transportation
DDSA	data-driven safety analysis
DelDOT	Delaware Department of Transportation
DOT	department of transportation
EDC	Every Day Counts
FAST Act	Fixing America's Surface Transportation Act
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FLH	Federal Lands Highway
GDOT	Georgia Department of Transportation
GIS	geographic information system
GPS	Global Positioning System
GRS-IBS	geosynthetic reinforced soil-integrated bridge system
IDOT	Illinois Department of Transportation
IHSDM	Interactive Highway Safety Design Model
Iowa DOT	Iowa Department of Transportation
IQED	implementing quality environmental documentation
ITD	Idaho Transportation Department
ITS	intelligent transportation system
KDOT	Kansas Department of Transportation
KYTC	Kentucky Transportation Cabinet
LiDAR	light detection and ranging
Louisiana DOTD	Louisiana Department of Transportation and Development
LTAP	Local Technical Assistance Program
MaineDOT	Maine Department of Transportation
Maryland SHA	Maryland State Highway Administration
MassDOT	Massachusetts Department of Transportation
MDT	Montana Department of Transportation
MDOT	Michigan Department of Transportation
MDOT	Mississippi Department of Transportation
MoDOT	Missouri Department of Transportation
MPO	metropolitan planning organization
NCDOT	North Carolina Department of Transportation
NDDOT	North Dakota Department of Transportation
NDOR	Nebraska Department of Roads
NDOT	Nevada Department of Transportation
NEPA	National Environmental Policy Act
NEXT beam	North Extreme Tee beam
NJDOT	New Jersey Department of Transportation
NMDOT	New Mexico Department of Transportation
NYSDOT	New York State Department of Transportation

ACRONYMS AND ABBREVIATIONS continued

ODOT	Ohio Department of Transportation
ODOT	Oklahoma Department of Transportation
ODOT	Oregon Department of Transportation
PennDot	Pennsylvania Department of Transportation
RIDOT	Rhode Island Department of Transportation
SCDOT	South Carolina Department of Transportation
SPF	safety performance function
SHRP2	second Strategic Highway Research Program
South Dakota DOT	South Dakota Department of Transportation
STIC	State Transportation Innovation Council
TDOT	Tennessee Department of Transportation
TIGER	Transportation Investment Generating Economic Recovery
TxDOT	Texas Department of Transportation
UDOT	Utah Department of Transportation
UHPC	ultra-high performance concrete
VDOT	Virginia Department of Transportation
VTrans	Vermont Agency of Transportation
WisDOT	Wisconsin Department of Transportation
WISE	Work Zone Impacts and Strategies Estimator
WSDOT	Washington State Department of Transportation
WVDOT	West Virginia Department of Transportation
WYDOT	Wyoming Department of Transportation

"An innovative culture is difficult to quantify, but it starts with innovation champions and making sure the message reaches every person in the department that they are empowered to innovate. It's a top-down, bottom-up mentality."

— Jennifer Cohan, Delaware Department of Transportation Secretary

Every Day Counts

Every Day Counts (EDC) is the Federal Highway Administration's program to work in partnership with the **American Association of State Highway and Transportation Officials** and other transportation stakeholders to foster a culture of innovation. It focuses on accelerating project delivery and getting proven innovations quickly and broadly deployed to benefit road users. Designed to complement other initiatives centering on innovative technologies, practices, and investment, EDC plays an important role in helping transportation agencies fulfill their obligation to the American people to deliver the greatest value for the tax dollars spent.

Every 2 years, FHWA works with State departments of transportation, local governments, tribes, private industry, and other stakeholders to identify a new set of innovative technologies and practices that merit widespread deployment through EDC. The selected innovations share common goals of shortening project delivery, enhancing the safety and durability of roads and bridges, cutting traffic congestion, and improving environmental sustainability. The **third round of EDC** (EDC-3), which promoted the adoption of 11 innovations in 2015 and 2016, built on the success of deployment efforts during EDC-1 in 2011 and 2012 and EDC-2 in 2013 and 2014.

After the process of selecting EDC innovations for each 2-year deployment cycle is completed, transportation leaders from across the country gather at regional summits to discuss the innovations and commit to finding opportunities to implement those that best fit the needs of their State highway programs. Information gathered at the summits is brought back to **State Transportation Innovation Councils** (STICs), which bring together public and private stakeholders to evaluate innovations and spearhead their deployment. STICS are active in all 50 States, Washington, DC, Puerto Rico, the U.S. Virgin Islands, and Federal Lands Highway (FLH).

EDC's collaborative, State-based approach to deploying innovation enables States to be in the driver's seat and decide which innovations will work best for them and their customers. Working through STICs, States can consider innovations FHWA recommends, along with technologies and practices from sources such as the AASHTO **Innovation Initiative** and the **second Strategic Highway Research Program** (SHRP2), and adopt those that add value to their highway programs.

"It's clear that when you deploy innovation and accelerated construction techniques, the public notices and that buys you credibility."

– Shailen Bhatt, Colorado Department of Transportation Executive Director

FHWA's role in the EDC process is to provide national leadership in encouraging adoption of innovations that can improve the Nation's transportation system. The agency forms a deployment team for each EDC innovation to assist States in their implementation efforts. Using feedback from stakeholders obtained through communication opportunities such as the EDC summits, the teams offer technical assistance, training, and outreach to help the transportation community adopt innovations and make them standard practice. FWHA also offers assistance through its **State Transportation Innovation Council Incentive** (STIC) and **Accelerated Innovation Deployment Demonstration** (AID Demonstration) programs to encourage and provide incentives for innovation deployment.

The EDC program has had a significant positive impact on the transportation community's adoption of new technologies and processes. Every State has used 10 or more of the 32 innovations promoted during the first three rounds of the EDC program, and some have adopted more than 20. Several of those innovations are now mainstream practices in many States. The program has also fostered a transportation workforce that is adept at putting innovation to work to address transportation challenges. The 2015 **Fixing America's Surface Transportation Act** included EDC by name, directing FHWA to continue cooperating with stakeholders to deploy new practices and technologies and create a culture of innovation in the transportation community.

View video on how FHWA works with transportation partners to deploy innovations that save time, money, and lives.

> "Necessity is the mother of innovation. As we look at new ways of doing things, it's really out of necessity. We can't be so afraid to take risk that we're not willing to be innovative."
>
> *— Thomas Tinlin, Massachusetts Department of Transportation Highway Administrator*

EDC-3 Innovation Implementation

Every state adopted one or more of the 11 innovations during the EDC-3 two-year deployment cycle. Many of those technologies and processes are now widely used across the country to shorten project delivery, enhance safety, and reduce congestion.

The maps illustrate the innovation implementation stage in each State in December 2016, the end of the 2-year cycle of EDC-3. The charts show the number of States in each implementation stage in December 2016. The charts also compare the December 2016 state of practice to the January 2015 baseline data and December 2016 goals set by States.

"State" is used as a general term that includes the State transportation department, metropolitan planning organizations (MPOs), local governments, tribes, private industry, and other stakeholders in a State or territory. Information is provided for the 50 States, Washington, DC, Puerto Rico, the U.S. Virgin Islands, and FLH, a total of 54 entities.

The following table defines the innovation deployment stages displayed on the maps and charts.

Innovation Implementation Stages

Not Implementing	The State is not pursuing the innovation under EDC (in some cases the State has already implemented the innovation).
Development Stage	The State is collecting guidance and best practices, building support with partners and stakeholders, and developing an implementation process.
Demonstration Stage	The State is testing and piloting the innovation.
Assessment Stage	The State is assessing the performance of and process for carrying out the innovation and making adjustments to prepare for full deployment.
Institutionalized	The State has adopted the innovation as a standard process or practice and uses it regularly on projects.

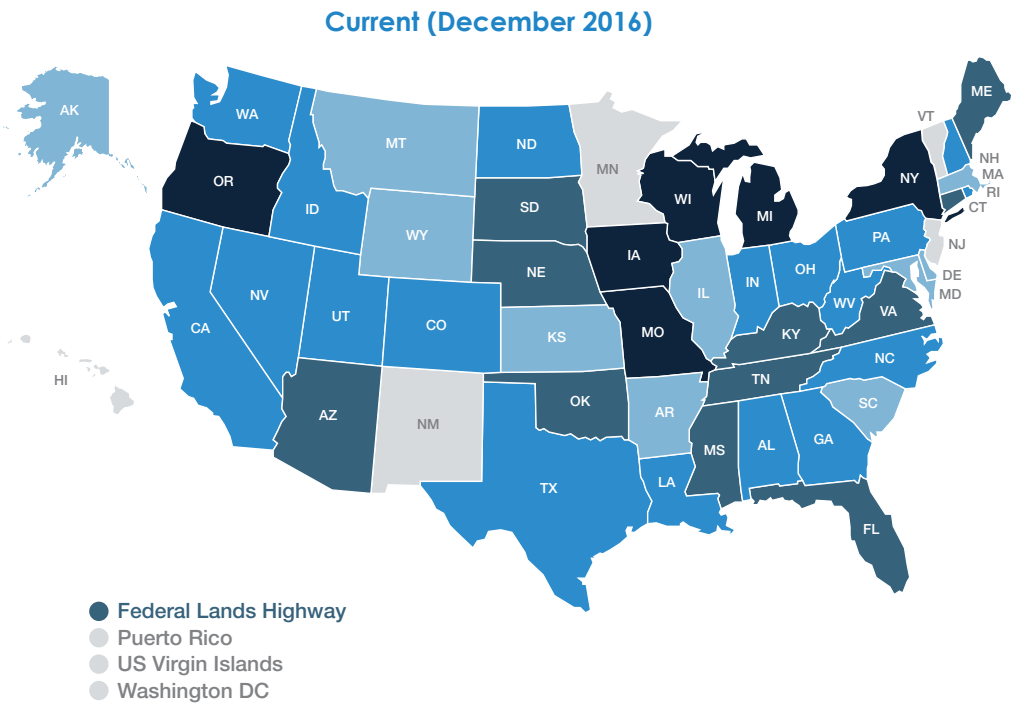
3D Engineered Models: Schedule, Cost, and Post-Construction

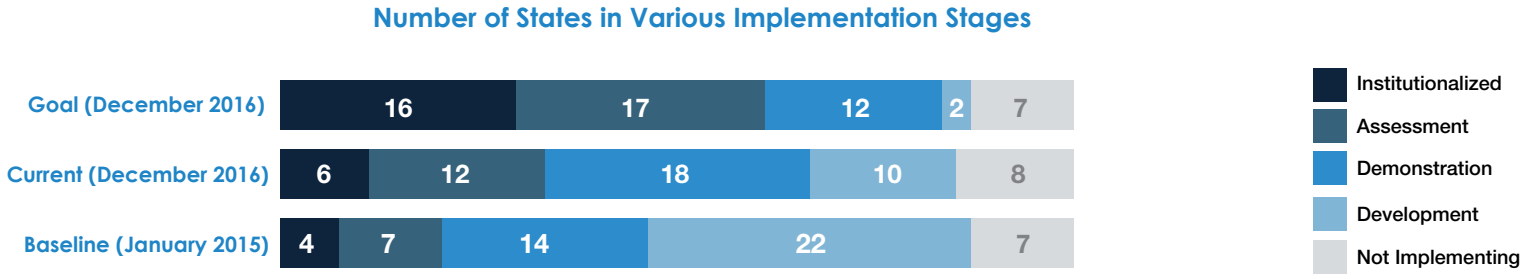
Three-dimensional (3D) engineered models are widely used by the highway community to more effectively connect a project's design and construction phases. These models can also be applied to other phases of the project delivery cycle to positively affect safety, costs, contracting, maintenance, and asset management.

After encouraging adoption of 3D models in EDC-2, FHWA continued to promote the technology in EDC-3 with a focus on three practices: using survey data for roadway inventory and asset management purposes, incorporating schedule (4D) and cost (5D) information into models to streamline construction schedules and improve cost estimating, and using post-construction survey data to correct design models and create accurate as-built record drawings.

Project Planning, Design and Construction

Using 3D engineered models in project planning, design, and construction is becoming a widespread practice, with 29 States and FLH implementing it or planning how to make it a standard practice. Another six States have institutionalized the practice.

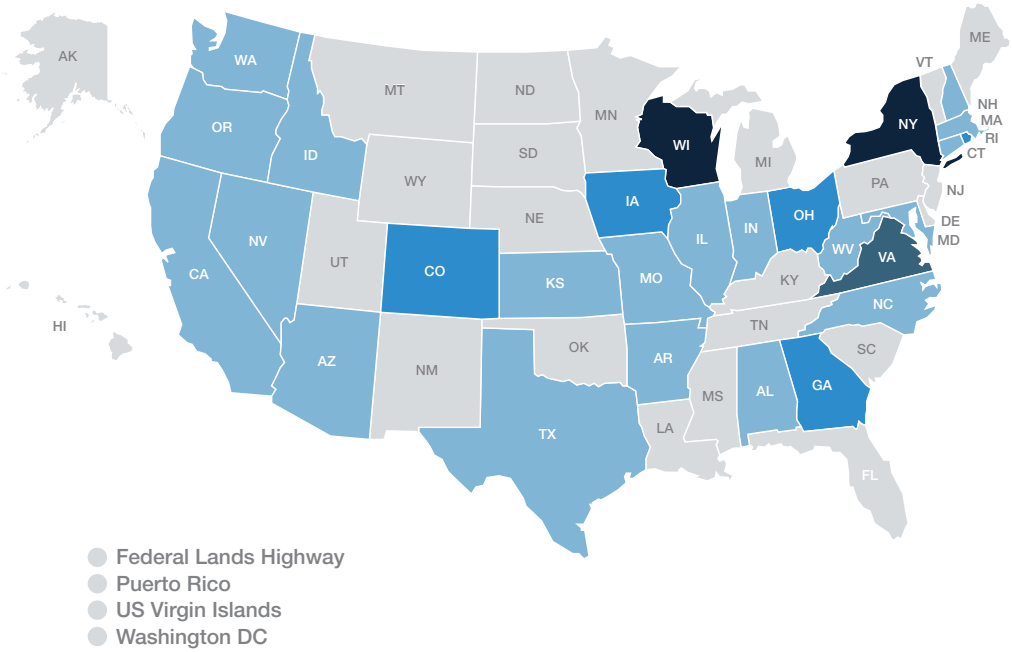




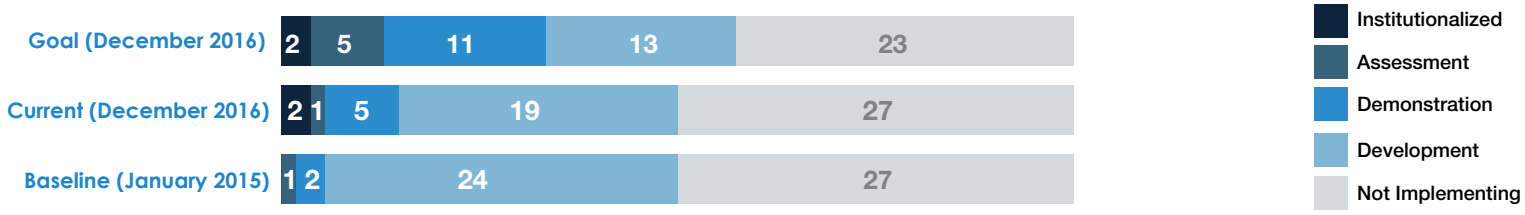
Schedule and Cost

Six States are exploring the use of 4D and 5D modeling by incorporating schedule and cost data into 3D design models to improve project management and provide more accurate cost estimates. Two additional States—New York and Wisconsin—have institutionalized the practice.

Current (December 2016)



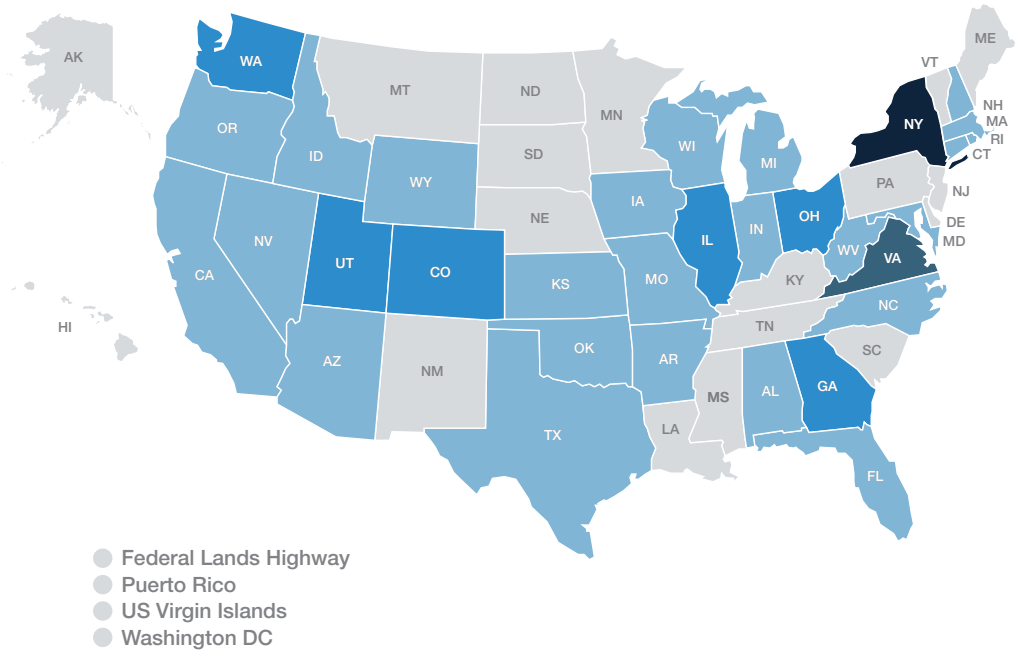
Number of States in Various Implementation Stages



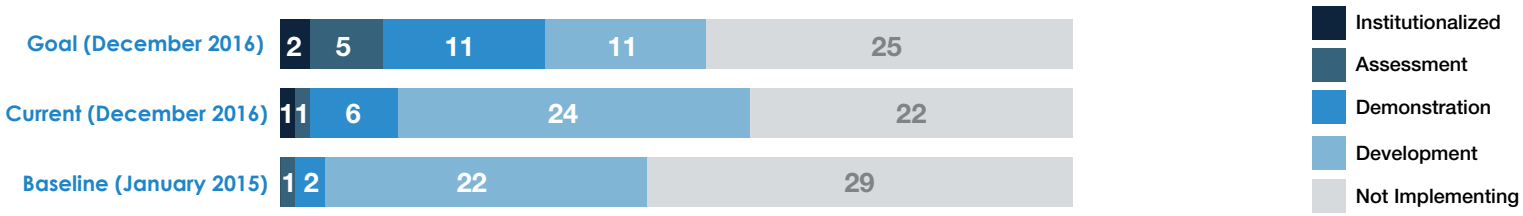
Post-Construction

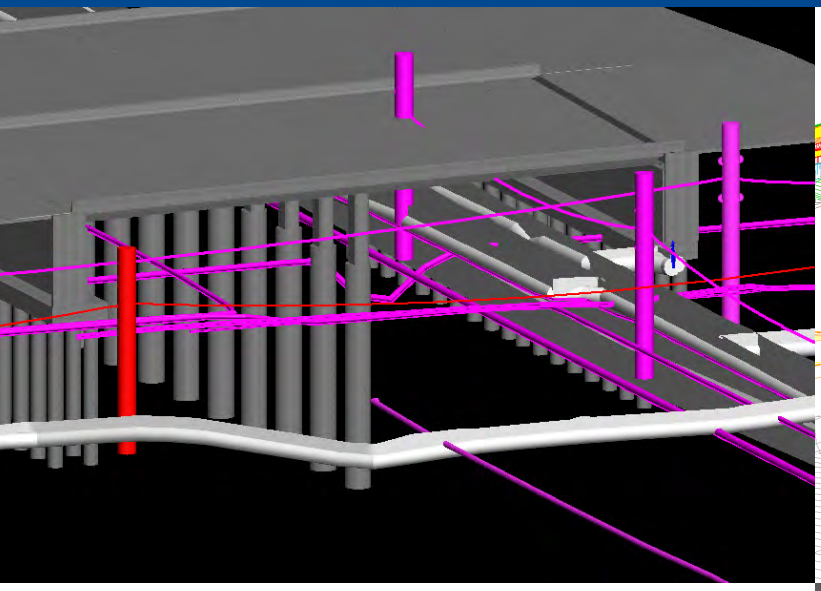
New York has institutionalized the use of 3D engineered models in post-construction applications. Another seven States are using 3D models in post-construction applications, such as using 3D data for roadway inventory and asset management purposes and creating accurate as-built records of 3D design models.

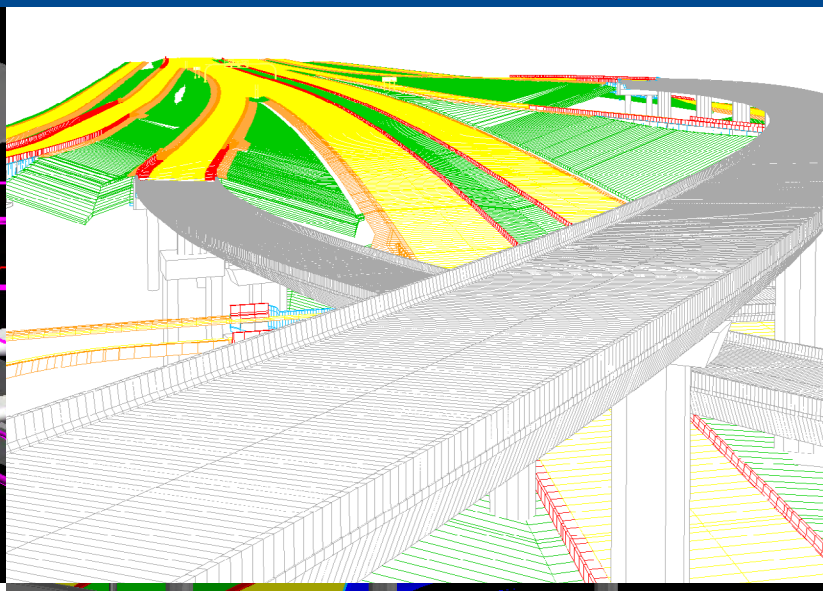
Current (December 2016)

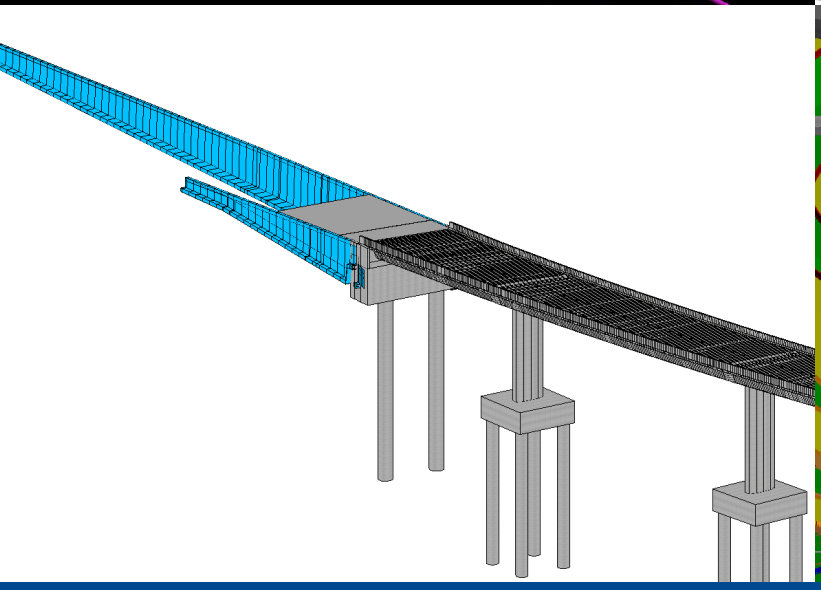


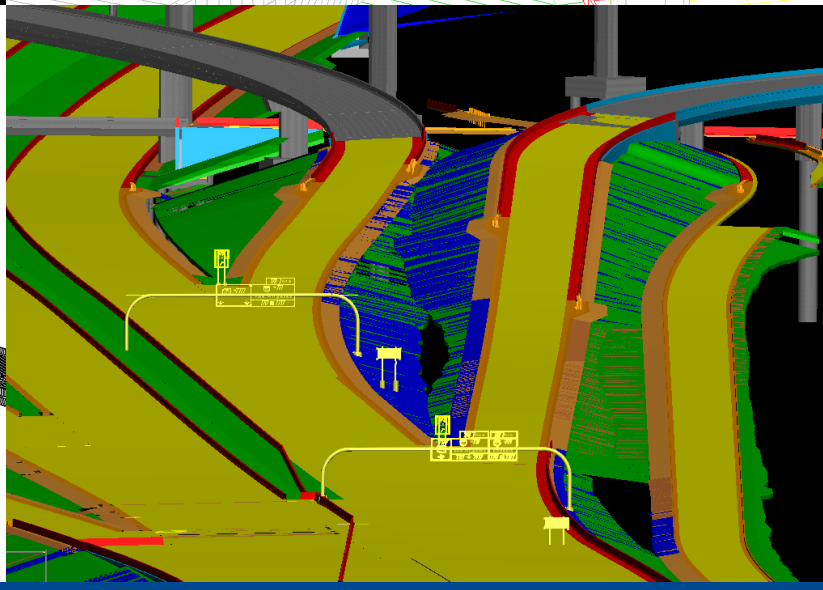
Number of States in Various Implementation Stages











Innovation SPOTLIGHT

Arizona

The Arizona Department of Transportation (ADOT) defined goals and a vision to focus the agency's efforts to deploy 3D engineered models in areas where they can add value. One approach the agency is pursuing is providing electronic files to contractors at the prebid stage for the majority of large projects. Benefits include reducing printing costs as well as the time and cost of converting paper plans to electronic files. Providing files with vector control data also enables contractors to create 3D models more efficiently, improving bid quality and lowering costs.

ADOT piloted the use of 3D modeling on a design-build project and modeled all elements of the project. On an ADOT project delivered with the construction-manager-at-risk contracting method, the contractor and designer collaborated on development of a 3D model for the earthwork.

Highlights: 3D Engineered Models

California

The California Department of Transportation (Caltrans) updated its directive on sharing electronic files to include 3D engineered models. Caltrans now shares 3D engineered models with bidders for all projects with earthwork. The agency finalized a specification for automated machine guidance to complement the directive. The agency is using a SHRP2 grant on a project to build a database for capturing and using 3D subsurface utility data.

Federal Lands Highway

FLH is deploying 3D engineered models to more effectively connect a project's design and construction phases. FLH is using 3D engineered models in the design of 123 of the projects in its multiyear active projects program. Thirty-three projects incorporating 3D engineered models have advanced to the construction stage.

Florida

The Florida Department of Transportation (FDOT) conducted a rough cost-benefit analysis of earthwork projects using 3D engineered models. The analysis showed that projects completed using 3D models saved time and money compared to similar projects that did not use 3D. Contractors report that using 3D models increases their earthwork production rate and reduces the need to rework areas of projects.

Idaho

The Idaho Transportation Department (ITD) is developing a 3D specification for automated machine guidance and surveying and establishing 3D policies and procedures. A statewide 3D engineered models email group was set up to facilitate communication among Idaho stakeholders and enable them to share 3D project details, best practices, lessons learned, and information requests.

Maine

The Maine Department of Transportation (MaineDOT) developed a course on "MaineDOT Review of Contractor Model—Process Flow for the Review of 3D Models in InRoads" and will use it to train highway designers in 2017. The agency plans to develop an online version of the course. MaineDOT will also offer training for construction inspectors on using 3D data and processes in the project inspection process.

Michigan

The Michigan Department of Transportation (MDOT) plans to pilot the use of electronic engineered data on selected projects. The agency is initiating a research project to investigate the return on investment from providing electronic information to contractors. MDOT began a post-construction data collection process on several projects using mobile light detection and ranging (LiDAR) technology. Project objectives include developing construction as-built requirements and recommendations for mobile LiDAR collection.

Missouri

The Missouri Department of Transportation (MoDOT) institutionalized 3D engineered models for project planning and design and created an implementation plan to take 3D design tools and workflows to the construction phase. MoDOT is developing specifications and policy for construction inspection and contract administration using 3D methods and training construction staff. The agency plans to identify a pilot project to document construction inspection and administration using 3D methods. The agency received STIC Incentive program funds to test survey equipment and develop 3D guidelines for construction staff.

Highlights: 3D Engineered Models

Rhode Island

The Rhode Island Department of Transportation (RIDOT) is exploring the integration of 3D models and bridge information modeling into the engineering process for post-construction and asset management activities. The agency is developing a work platform to address the full life cycle of projects from design through operations. Integrating visualization and mapping in the project life cycle will help RIDOT prioritize maintenance activities in the future.

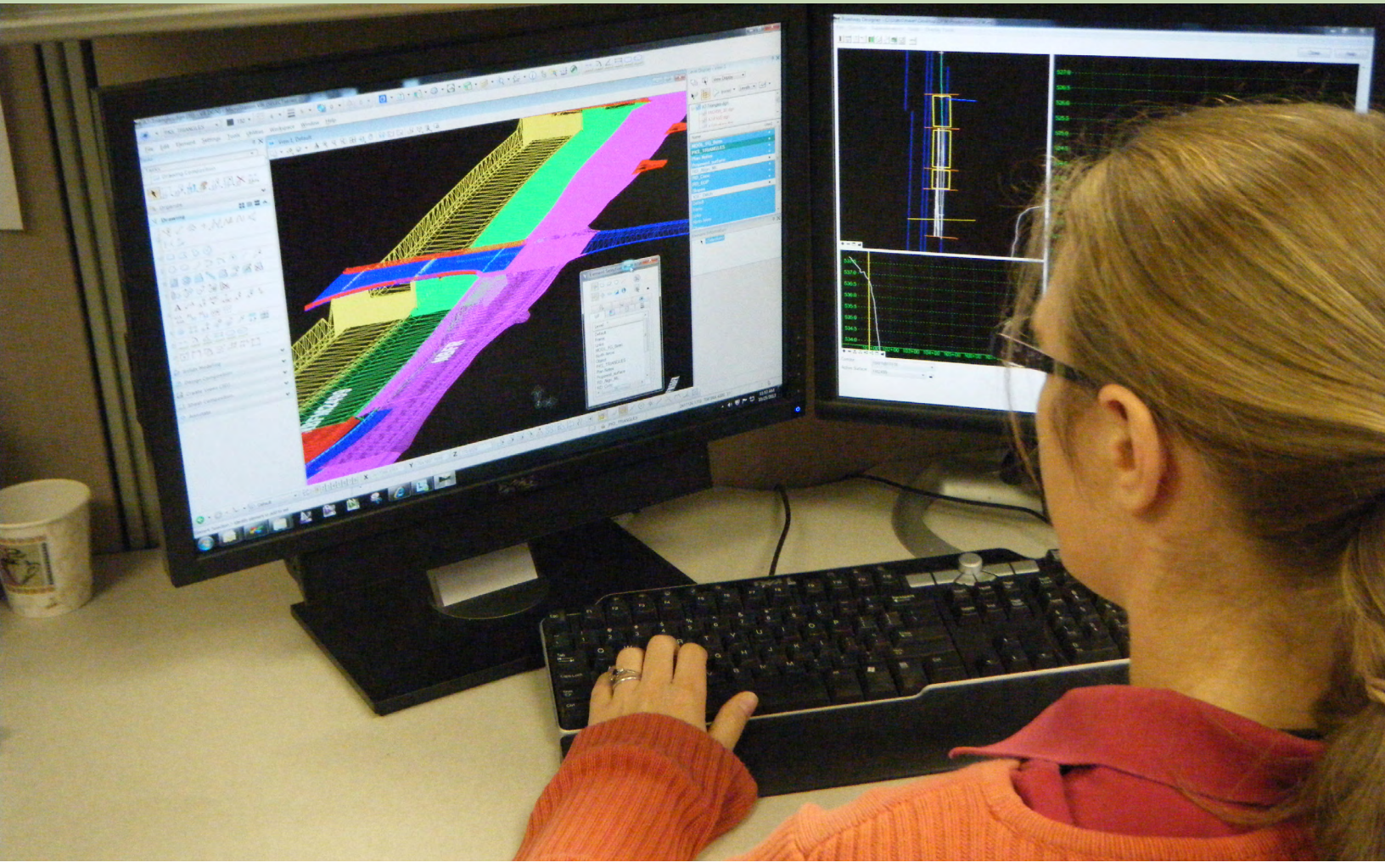
Texas

At the Texas Department of Transportation (TxDOT), the 25 district offices have identified about 100 projects across the State over the next 2 years that will use 3D engineered models in their design. The agency completed the 4D—or schedule—component of a 3D model project for a complex interchange with ramp reversals on State Highway 358.

Washington

The Washington State Department of Transportation (WSDOT) is developing procedures to maintain electronic final records for projects, which will pave the way for using 3D models in post-construction processes. WSDOT deployed an electronic archive program that complies with the agency's obligation to retain records for 75 years.

WSDOT is conducting a research project that uses Global Positioning System (GPS) -enabled electronic devices to gather data in the field and provide paperless inspection reports. The agency expects the searchable database generated by the inspection tools to become an increasingly valuable resource as the agency develops further tools to use it.



Data-Driven Safety Analysis

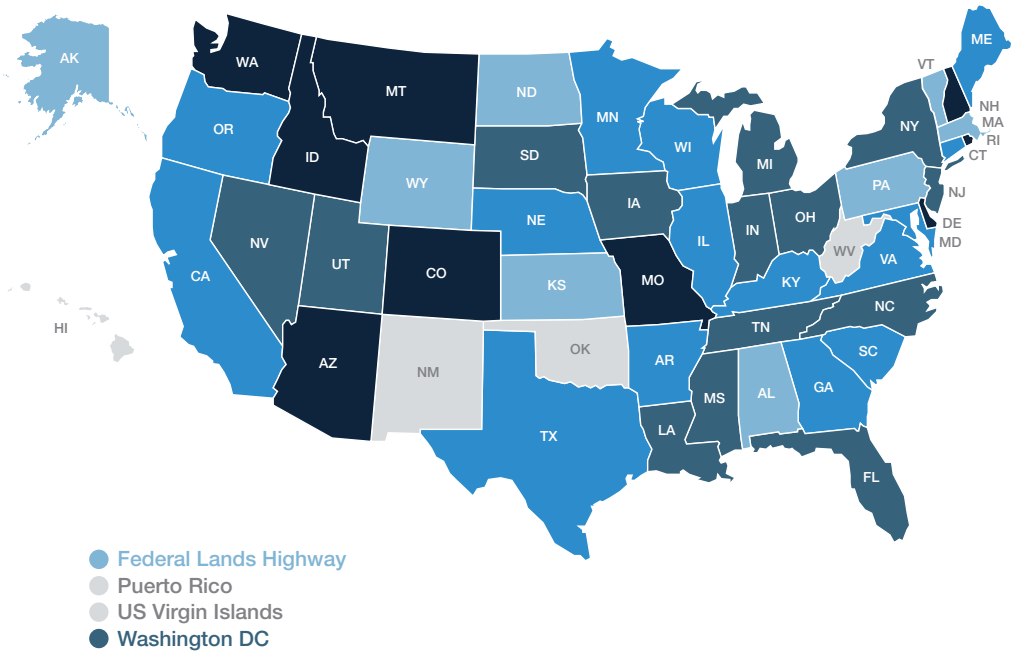
Data-driven safety analysis (DDSA) promotes the integration of safety performance into highway investment decisions with the goal of saving lives. Advances in highway safety analysis can provide transportation agencies with the reliable data they need to make effective investments in safety improvements.

EDC-3 focused on broadening the use of two approaches to better target highway safety investments and reduce crashes and fatalities. Predictive approaches combine crash, roadway inventory, and traffic volume data to provide more reliable estimates of an existing or proposed road's expected safety performance. Systemic approaches screen a road network for high-risk features associated with severe crashes and identify low-cost safety treatments.

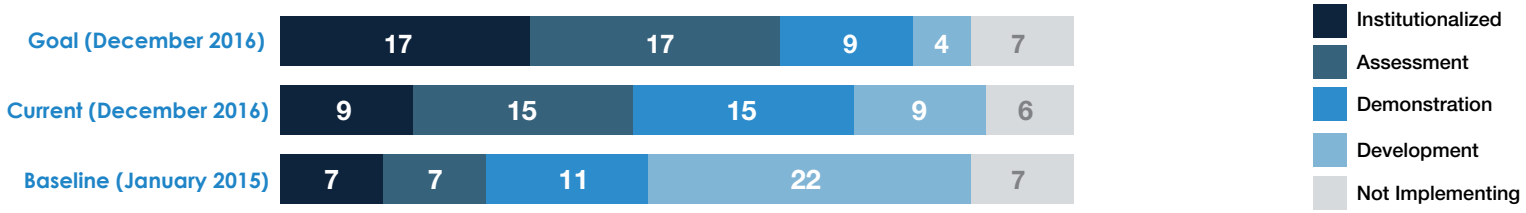
Project Development

The benefits of DDSA in project development have attracted interest across the country. Nine States have incorporated predictive safety analysis as a standard practice in their project development processes and policies. Another 29 States and Washington, DC, are applying DDSA in project development.

Current (December 2016)

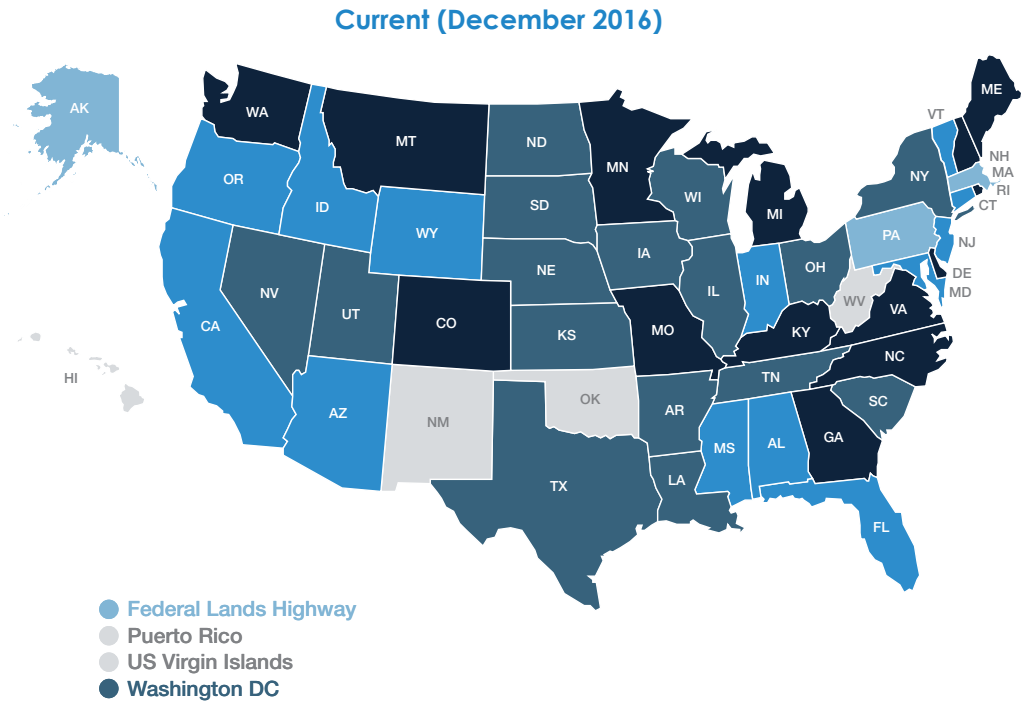


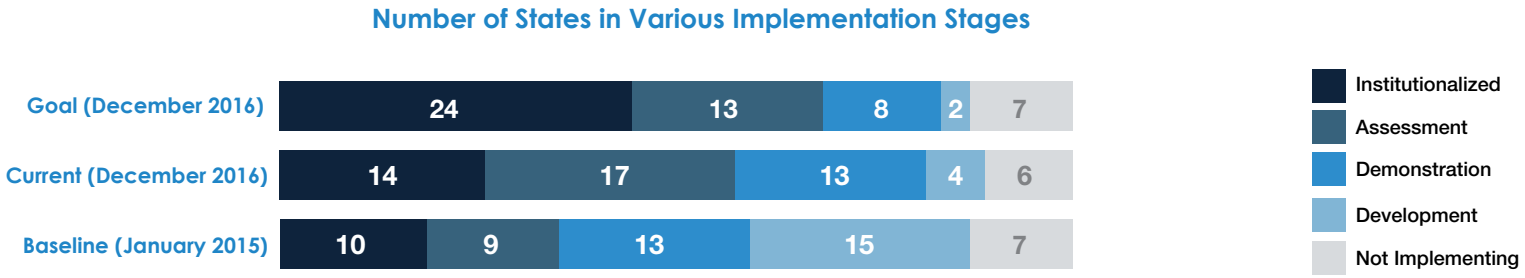
Number of States in Various Implementation Stages



Safety Management

Many States are pursuing the use of DDSA to improve safety management. Fourteen States have made predictive and systemic safety analysis a standard part of their safety management process. Another 29 States and Washington, DC, are applying DDSA to their safety management process.





Innovation SPOTLIGHT

Michigan

MDOT is using STIC Incentive program funds to develop a strategy for incorporating DDSA into the agency's routine processes. On a Federal-Aid Highway Program project, MDOT is using AASHTO ***Highway Safety Manual*** predictive safety analysis methods to document a group of proposed design exceptions. This is the first time the agency has used performance-based practical design in the design exception process and the first time it has used predictive safety analysis as part of performance-based practical design.

MDOT has an updated *Highway Safety Manual* spreadsheet with safety performance functions (SPFs)—statistical models used to estimate average crash frequency—that reflect regionalized differences. MDOT completed calibration of predictive safety algorithms for State roads to account for Michigan-specific urban segments and urban intersections and plans to develop similar calibration for rural segments and intersections in 2017. In April 2016, MDOT and the Michigan Local Technical Assistance Program (LTAP) held Interactive Highway Safety Design Model (IHSDM) training for State and local agency participants. MDOT now requires proposed safety projects on State roads to be documented with *Highway Safety Manual* analysis methods, and additional consideration is given to local projects whose jurisdictions do the same.

Ohio

The Ohio Department of Transportation (ODOT) implemented DDSA for locations funded through the agency's Highway Safety Improvement Program. ODOT expanded DDSA in its project development process by adopting the use of safety-integrated project maps on routine maintenance and resurfacing projects. The maps use *Highway Safety Manual* predictive crash analysis methods to identify priority locations where safety improvements should be considered when programming a project that overlaps the areas. ODOT revised its applicable manuals and guidelines and provided training to implement this change.

ODOT advanced a pilot AASHTOWare® Safety Analyst project with the Mid-Ohio Regional Planning Commission to expand the use of DDSA on the local road system. The agency executed a shared-use agreement with the commission, which can now use the software tool on its local road system.

Highlights: Data-Driven Safety Analysis

California

Caltrans is advancing several DDSA-related programs. The agency trains project and program staff on the use of DDSA on intersection projects. Caltrans adopted a policy requiring DDSA in the planning and analysis stages of intersection improvement projects and developed an analysis tool to identify the benefits of DDSA for intersections. Caltrans designers use the IHSDM tool on an ad hoc basis.

Colorado

The Colorado Department of Transportation (CDOT) implemented a Transportation Systems Management and Operations Evaluation process for all agency projects. The evaluation incorporates diagnostic safety analysis along with operations and system engineering analyses in the project development process. The agency updated SPFs for all Colorado highway segments. CDOT used the SPFs to conduct a statewide network screening of level of service of safety to identify areas with high potential for crash reduction.

Connecticut

The Connecticut Department of Transportation (ConnDOT) developed a strategic plan for safety analysis. The Connecticut Transportation Safety Research Center is leading an effort to develop tools and techniques similar to those in the *Highway Safety Manual*, including a method to create SPFs for rural, undivided, two-lane roads in in the State. ConnDOT used the IHSDM tool in an I-95 planning study to quantify the safety impacts of various design alternatives, including narrow travel lanes and shoulders.

In December 2016, ConnDOT project managers met to discuss how to incorporate IHSDM use in the design exception process to quantify the safety impacts of transportation decisions. ConnDOT plans to use the IHSDM crash prediction module for select projects that necessitate a design exception. As designers gain experience with the tool, the agency expects to use other IHSDM evaluation models.

Florida

FDOT is incorporating the *Highway Safety Manual* into standard processes and training staff on its use. The agency, which considers Safety Analyst a fully institutionalized tool, coordinated with Florida International University on a November 2016 workshop for designers and project developers on applying the software tool. FDOT is updating its *Highway Safety Improvement Program Guidance Manual* to include DDSA as an integral factor. To complement its efforts on State roads, FDOT is working with the University of Florida to develop a systemic screening tool for use with potential safety countermeasures on local roads.

Illinois

The Illinois Department of Transportation (IDOT) developed SPFs to perform system screening for all State routes and intersections. Between July and December 2016, the agency redeveloped the models to better reflect current crash data. The resulting potential for safety improvement values are ranked into safety tiers (critical, high, medium, low) to consider during project planning, programming, and development. The ratings are useful when setting project limits and improvements to adequately account for operations, maintenance, and safety needs. All sites with critical values are evaluated for potential improvements.

IDOT calibrated Illinois crash data, developed SPFs that can be used to predict crashes for various roadway improvement types, and modified its prediction tool to include the SPFs. The predictive methods are used routinely in IDOT District 1 in the Chicago area and are becoming more common in other districts. At the local level, IDOT developed about 40 safety plans in counties experiencing the majority of traffic fatalities and serious injuries.

Highlights: Data-Driven Safety Analysis

Kansas

The Kansas Department of Transportation (KDOT) updated its geographic information system (GIS) for public roads so it can use the AASHTOWare® Safety Analyst tool more effectively. KDOT uses *Highway Safety Manual* analysis methods during the preliminary design stage to evaluate design alternatives. The agency is incorporating the Safety Analyst tool into its Highway Safety Improvement Program by developing a database of intersections for analysis. Research is complete on new statewide calibration factors for rural multilane highways and intersections and is underway to develop statewide calibration factors for urban and suburban arterial intersections, freeways, and interchanges. Traffic studies conducted by area and district offices include *Highway Safety Manual* analysis methods when appropriate.

Louisiana

The Louisiana Department of Transportation and Development (DOTD) is working to use DDSA more effectively in its network screening for Highway Safety Improvement Program projects. The agency drafted a new project selection guide that includes a feasibility form for safety projects. Designers use the FHWA IHSDM tool regularly and are moving toward performance-based design using safety analysis. The Louisiana DOTD let two districtwide projects for systemic safety improvements on curves, including high-friction surface treatments.

Montana

In Montana, all projects at the pavement preservation level and above receive a safety analysis. The Montana Department of Transportation (MDT) updated its data analysis capabilities with a new Safety Information Management System. It also developed a Roadway Department Implementation Plan that includes Montana-specific SPFs and diagnostic norms for rural roads for total crashes and roadway departure crashes. Intersection SPFs and diagnostic norms are under development.

Nevada

The Nevada DOT (NDOT) is working with the University of Nevada, Reno to load crash and roadway data into the Safety Analyst tool. When the database is completed, NDOT plans to use the tool in urban areas. NDOT is moving toward making systemic safety improvements instead of concentrating on addressing safety at spot locations. The agency initiated a second round of Safety Management Plans that focus on two locations in Clark County and one in Washoe County. The goal of the plans—which analyze safety concerns in specific areas using crash data and other criteria—is to improve safety, mobility, and safety for all road users.

New Jersey

The New Jersey Department of Transportation (NJDOT) provides technical assistance to MPOs as they conduct *Highway Safety Manual* analyses for safety projects. NJDOT helped counties with analyses for their 2016 applications for projects funded under the Local Safety Program. NJDOT used STIC Incentive program funds to acquire Safety Analyst software. The agency is working on data assessment, analysis, and assembly so it can provide the data files needed for use with the software.

North Dakota

The North Dakota Department of Transportation (NDDOT) developed Local Road Safety Plans for the State's counties and major cities. NDDOT dedicated funds to local road safety projects and is implementing projects developed during the planning process. The agency plans to adopt a Highway Safety Improvement Program implementation plan that includes a systemic safety analysis process for the State highway system. NDDOT completed a decision document for implementing a State Road Safety Plan.

Highlights: Data-Driven Safety Analysis

Pennsylvania

The Pennsylvania Department of Transportation (PennDOT) is adding *Highway Safety Manual* analysis processes to its project development and selection stages. PennDOT is also updating its *Highway Safety Guide* to include new regionalized SPFs and provide guidance on using the *Highway Safety Manual* for Highway Safety Improvement Program applications.

PennDOT developed a *Highway Safety Manual* class to teach transportation professionals how to use the new State-specific SPFs. The class provides students with real-world examples and demonstrates computer applications for using the manual for traffic studies, design exceptions, and alternatives analysis.

Virginia

The Virginia Department of Transportation (VDOT) integrated DDSA into its *Traffic and Safety Analysis Manual* and frequently uses DDSA in interchange access requests, environmental documents, and alternative analysis. The agency included an action plan it created from a 2016 peer exchange on safety analysis in project development in its Strategic Highway Safety Plan. VDOT uses predictive safety strategies to prioritize needs in its Highway Safety Improvement Program plan. It uses *Highway Safety Manual* principles to evaluate projects submitted for the State's Smart Scale program, which uses safety as a key evaluation metric.

Wisconsin

Using FHWA's **State Policies and Procedures on Use of the Highway Safety Manual**, the Wisconsin Department of Transportation (WisDOT) identified project development processes that could be enhanced using DDSA approaches. WisDOT also used FHWA's **Scale and Scope of Safety Assessment Methods in the Project Development Process** to evaluate the applicability of Highway Safety Manual methods to WisDOT processes. WisDOT published a policy and guidance on the use of crash modification factors (CMFs) to compute the expected number of crashes after applying a safety countermeasure at a site, including a list of preferred CMFs.

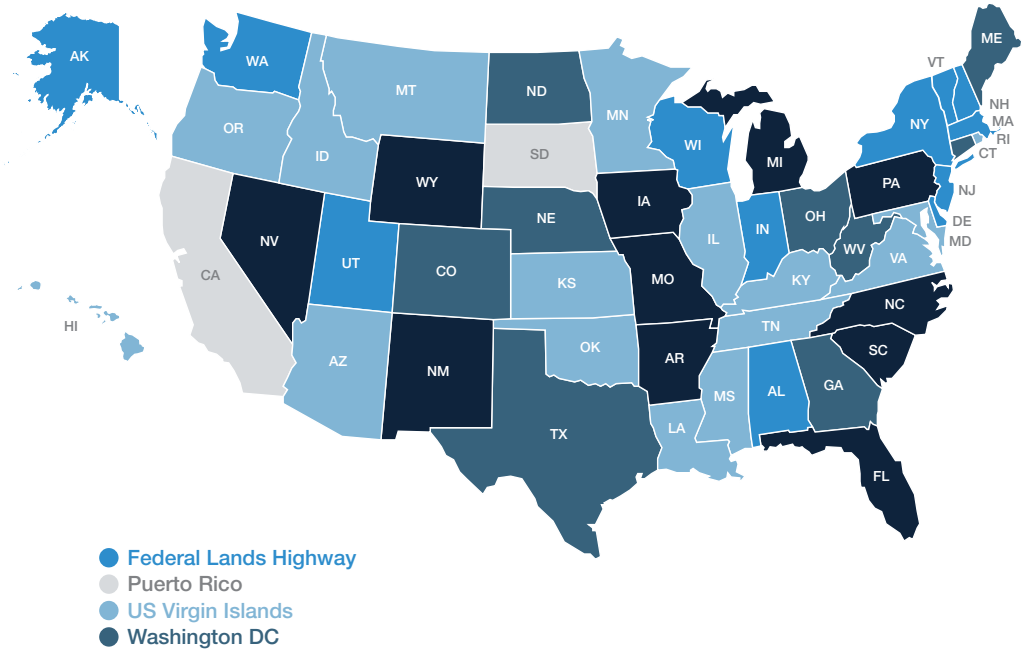
e-Construction

FHWA encourages transportation agencies to exchange the paper-based approach to construction document management with **e-Construction**—the collection, review, approval, and distribution of construction documents in a paperless environment. The EDC effort involves using readily available technologies to improve construction document management.

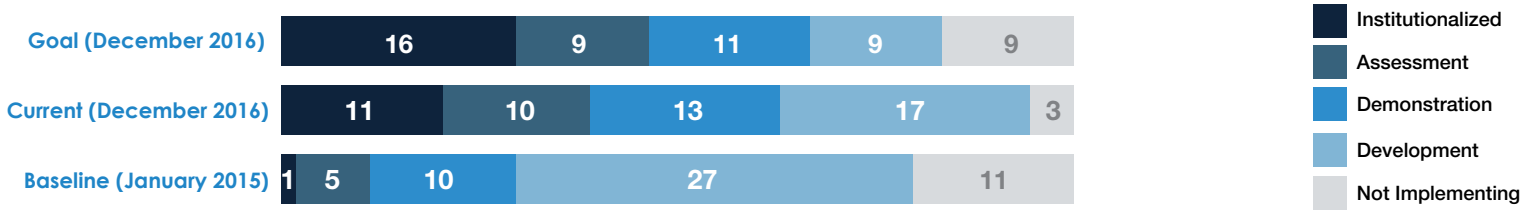
e-Construction saves money by decreasing paper use, printing, and document storage costs and time by reducing communication delays and transmittal time. It improves communication by allowing faster approvals, increased accuracy, and better document tracking. e-Construction is also an **AASHTO Innovation Initiative focus technology**.

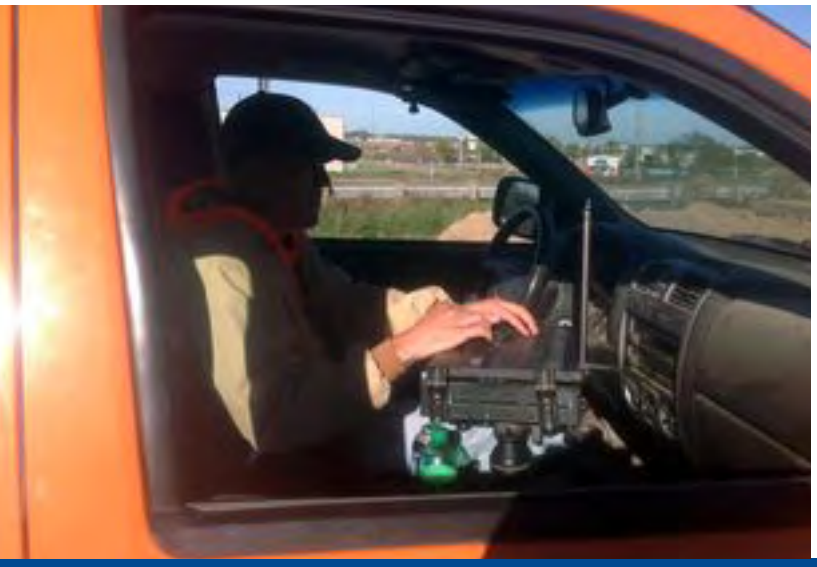
Using a paperless approach to project document management is generating interest across the country. Eleven States have made e-Construction a mainstream practice. An additional 21 States, Washington, DC, and FLH are using e-Construction tools.

Current (December 2016)



Number of States in Various Implementation Stages





Innovation SPOTLIGHT

Iowa

The Iowa Department of Transportation (Iowa DOT) has implemented 100 percent paperless contract execution on construction projects from the pre- to post-construction stages. The agency achieved that goal in August 2016 when it added a requirement for all contracts to be signed digitally to its previous e-Construction advances. It is the first State highway agency to require digital signatures on all construction contracts.

The Iowa DOT uses mapping software on its tablets to collect location data on pavement cores and samples and post-construction documentation on culverts, signs, and traffic signals. It conducted a pilot project on paperless tickets for hot-mix asphalt at jobsites and plans to develop a specification in 2017. The agency is working on a return-on-investment summary to quantify its savings with e-Construction use.

Highlights: e-Construction

Arkansas

The Arkansas State Highway and Transportation Department (AHTD) advertises and awards all contracts electronically. AHTD also uses paperless contracting systems for document management, collaboration, and signatures for construction-related documentation on all projects. AHTD is transitioning to mobile devices for real-time data entry on construction inspections and project activities.

California

Caltrans conducted a pilot project to evaluate the use of mobile devices in the construction administration process. The goal was to evaluate the potential to improve staff performance, reduce support costs, incorporate long-term sustainable solutions into business practices, and improve project communication and issue resolution. The pilot focused on using tablets to administer construction contracts, using an electronic daily report application, and introducing an electronic document management system. The results, scheduled for publication in 2017, showed significant efficiency and environmental benefits.

Colorado

CDOT is expanding its e-Construction program and conducting a number of initiatives. The agency is deploying software for use on construction and right-of-way documents and using electronic plan sets, digital signatures, and electronic maintenance work orders. CDOT is pursuing several e-Construction pilots. One is a construction management application that allows project engineers to input construction data such as daily reports and weather and sync the information to the software used with contractors. Another pilot is an e-ticketing project to evaluate technology that could eliminate 140,000 asphalt tickets collected at jobsites every year.

Connecticut

ConnDOT uses a variety of e-Construction tools, including a cloud-based document storage system for engineering and project-related documents. The agency implemented the use of electronic signatures on internal documents, reducing transit time and eliminating thousands of printed pages. ConnDOT piloted the use of digital signatures externally on construction orders, cutting a 20- to 30-day approval process to 3 to 5 days.

Using mobile devices allows project inspectors to access the State's construction reporting system and other resources in the field, reducing travel time and increasing productivity. The agency found that using GPS tools and 3D engineering data for inspection on several projects saved time and improved measurement accuracy.

Florida

FDOT has used an e-Construction documentation process for all construction contracts since July 2016, institutionalizing paperless processes in the State. STIC Incentive program funds enabled FDOT to complete its effort to provide field staff with mobile devices to use in the e-Construction process. FDOT reports that e-Construction benefits include instantaneous data collection and the ability to troubleshoot and resolve issues in the field. After spending $1.1 million to implement e-Construction, the agency estimates it will save about an hour per day per field user, or $22 million a year.

Kentucky

The Kentucky Transportation Cabinet (KYTC) uses the AASHTOWare® Mobile Inspector application to eliminate duplicate data collection and entry efforts, saving hours of staff time each day. KYTC construction field offices have touch-screen monitors with pdf software, which allows for paperless submittal and review of project drawings and decreases the time needed to approve changes.

Highlights: e-Construction

Michigan

e-Construction is institutionalized at MDOT, which has let a total of $2 billion in transportation construction contracts using paperless techniques. The next phase for MDOT is rolling out e-Construction to local agencies for which MDOT lets contracts. MDOT has met with 45 other transportation agencies, some multiple times, through webinars and peer exchanges to share its e-Construction story and the game-changing efficiencies the innovation generates.

Missouri

MoDOT, which has institutionalized e-Construction, reports that benefits include time savings for field staff, faster turnaround on approvals of change orders and design exceptions, and the ability to provide documents to contractors faster through online processes. MoDOT is implementing e-Projects, a document management site that houses all documentation related to a project in one location, providing easy access to information.

Construction inspectors report that using computers and mobile devices in the field saves them considerable time, eliminating the need to return to the office to input inspection and pay item information. Some inspectors save up to a week by using software to prepare as-built plans on typical resurfacing projects.

Pennsylvania

PennDOT uses its Project Collaboration Center, a Web-based document management system, on all new projects. Pennsylvania's **Engineering and Construction Management System** Web site includes a construction documentation system that allows for input of project site activities and generates estimated payments and project work orders. Construction staff throughout the State use tablets for field data collection. Among the applications users can access are one that downloads plans, specifications, and standards for each project and one that provides a punch list inspectors can use to check the status of project items.

Utah

The Utah Department of Transportation (UDOT) received AID Demonstration funds to develop and implement a paperless contractor registration, disadvantaged business enterprise certification, and prequalification application that it will pilot on about five Federal-Aid Highway Program projects. The pilot is intended to demonstrate technology that optimizes and expedites workflows under a single electronic system.

West Virginia

The West Virginia Department of Transportation (WVDOT) uses electronic bidding to let construction projects and AASHTOWare® **Project SiteManager** software for construction monitoring. WVDOT let 506 construction projects in 2016 and manages all of its 1,087 active projects with electronic systems. The majority of inspectors use laptop computers to access needed files, which saves time and money and enhances transparency.

Wyoming

The Wyoming Department of Transportation (WYDOT) has used e-Construction software to manage project documentation since 2010, but it is converting to a more robust construction management system with additional functions to improve efficiency. WYDOT developed and tested a variety of enhancements, including better application performance, construction documentation uploads, electronic change orders, electronic subcontract processing, project closeout tracking capability, and improved reporting capabilities.

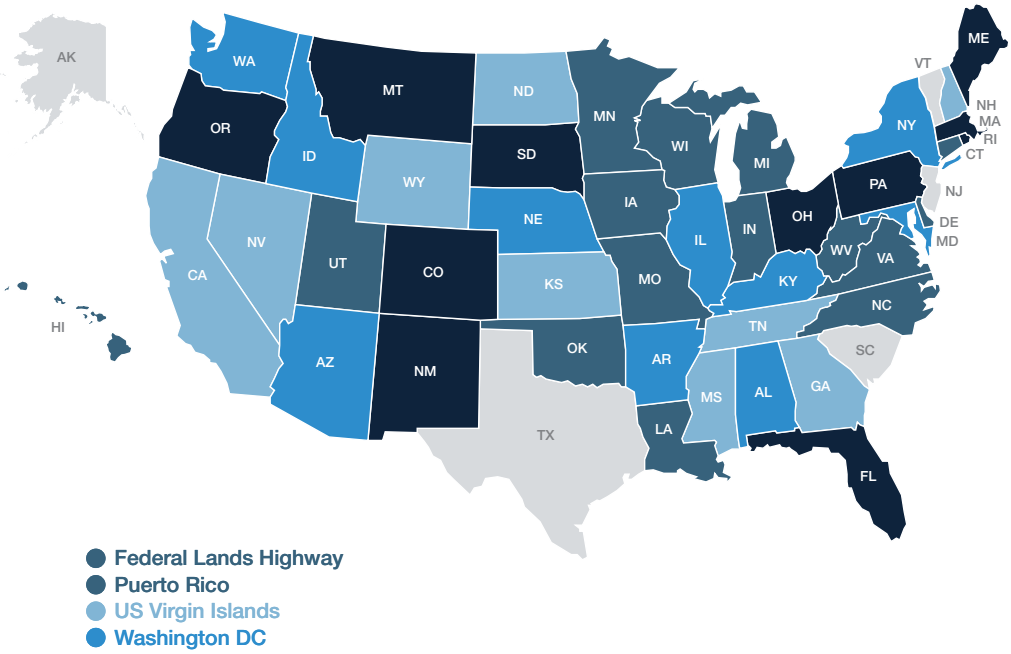
Geosynthetic Reinforced Soil-Integrated Bridge System

Geosynthetic reinforced soil-integrated bridge system (GRS-IBS) technology can help meet the country's demand for small, single-span bridges by delivering low-cost, durable structures that can be constructed with readily available equipment and materials. A GRS-IBS project can be built in weeks instead of months, saving time and cutting work zone congestion.

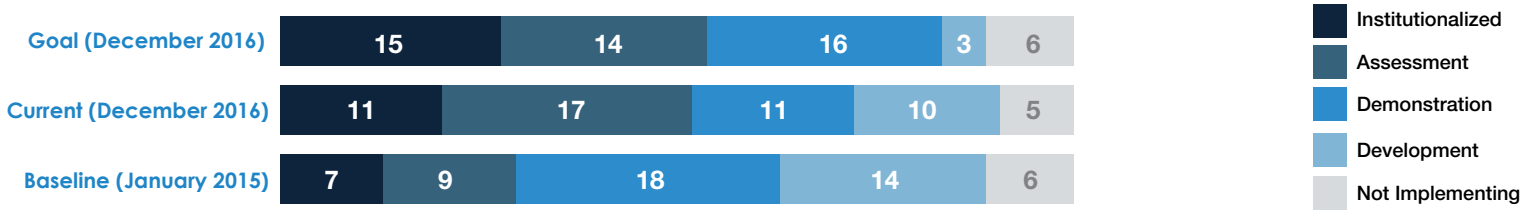
GRS-IBS bridges can cost 25 to 60 percent less than bridges built with conventional methods. They use a simple design that can be adapted to suit environmental or other needs. The technology integrates the roadway approach to the bridge, eliminating the bump drivers commonly feel between the road and the bridge.

Interest continues to grow in GRS-IBS, an EDC innovation since 2011. Eleven States have adopted GRS-IBS technology as a standard practice and use it regularly where appropriate. An additional 25 States, Washington, DC, Puerto Rico, and FLH have used GRS-IBS on projects or are preparing for full deployment of the technology.

Current (December 2016)



Number of States in Various Implementation Stages



Innovation SPOTLIGHT

Federal Lands Highway

FLH, a leader in deploying GRS-IBS technology, has designed and built bridges using the technology in many States. In several cases, FLH was the first to use the technology in a State. Transportation stakeholders were interested in trying the technology, but wanted to see a GRS-IBS structure under construction first. When FLH built four bridges on Sand Creek Road in the Black Hills National Forest in Wyoming, it held a project showcase that enabled transportation professionals from North Dakota, South Dakota, Wyoming, and Federal agencies to observe GRS-IBS construction in action.

Highlights: Geosynthetic Reinforced Soil-Integrated Bridge System

Connecticut

ConnDOT built two structures using GRS-IBS technology. Several additional projects on local and State routes are in the design and planning stages. A structure under construction as part of the Charter Oak Greenway Shared-Use Path project in Manchester is the country's longest GRS-IBS span built to date at 170 feet.

Florida

FDOT developed specifications and plans for the use of GRS-IBS technology on local and State routes after EDC-1, an effort that contributed to the construction of many GRS-IBS structures in the State. FDOT has used GRS-IBS to replace bridges over trails, wetlands, streams, and roadways.

Indiana

After completing two successful GRS-IBS projects, the Hamilton County Highway Department advertised two additional bridge projects incorporating the technology. The bridges on the latest project were skewed to the ditch they cross, creating acute and obtuse corner at the abutments. Crews building the first two bridges cut the blocks used in the construction to accommodate the fixed corner points. In the second set of bridges, planners adjusted the corner details to eliminate the need to cut any blocks, which reduce construction time, cost, and material waste. This detail was incorporated into revised construction guidance nationally.

Massachusetts

The Massachusetts Department of Transportation (MassDOT) has used GRS-IBS technology on several bridge projects, including the replacement of the Ashley Falls Road Bridge over the Housatonic Railroad in Sheffield. The bridge consists of a 105-foot-long steel superstructure on 25-foot abutments, making it one of the largest projects constructed using GRS-IBS. The project earned a National Recognition Award from the American Council of Engineering Companies in 2016. The project was also recognized by Engineering News Record New England with an Award of Merit in the 2015 Best Projects Competition.

New York and Ohio

County governments in New York and Ohio were early adopters of GRS-IBS technology. After trying GRS-IBS on a few projects, the counties realized the technology could generate significant cost savings and reduce the impact of construction on the traveling public. The counties ramped up their use of the technology, educating surrounding counties and becoming national leaders in GRS-IBS deployment. Since the introduction of this technology, the counties in Ohio and New York have used it to replace more than 60 deficient bridges, saving taxpayers thousands of dollars and reducing travel delays while improving the reliability of the Nation's infrastructure.

Puerto Rico

The Puerto Rico Highways and Transportation Authority is analyzing data from a load test on a PR-2 bridge in Yauco built using GRS-IBS technology. Data collected will be used to validate the design parameters used for the bridge. The authority developed a GRS-IBS specification and included a chapter on GRS-IBS abutments in its *Bridge and Structures Design Manual.*

Rhode Island

RIDOT decided to use accelerated bridge construction methods to reduce the impact on the public when it replaced the East Shore Expressway and McCormick Quarry Bridges in East Providence. The bridges, which carry traffic between the East Shore Expressway and I-195, needed to be replaced because they were structurally deficient.

RIDOT combined the use of GRS-IBS abutments and a bridge move to reduce the closure times for each bridge from a year to 80 hours. Using GRS-IBS allowed RIDOT to construct the abutments under the existing structures at the same time it built the new bridges in an adjacent lot. Once the two pieces were completed, RIDOT closed the roads while crews demolished the existing structures and assembled the prefabricated pieces. RIDOT is considering replacing other structures using accelerated techniques.

Improving Collaboration and Quality Environmental Documentation

Shortening the time needed for National Environmental Policy Act (NEPA) approval for construction projects is a core need of the transportation community. Through the **improving collaboration and quality environmental documentation** effort, EDC-3 supported tools to foster collaborative, timely, and transparent interagency reviews that can cut the amount of work and resources required for, save time and money on, and improve the quality of NEPA documents for projects.

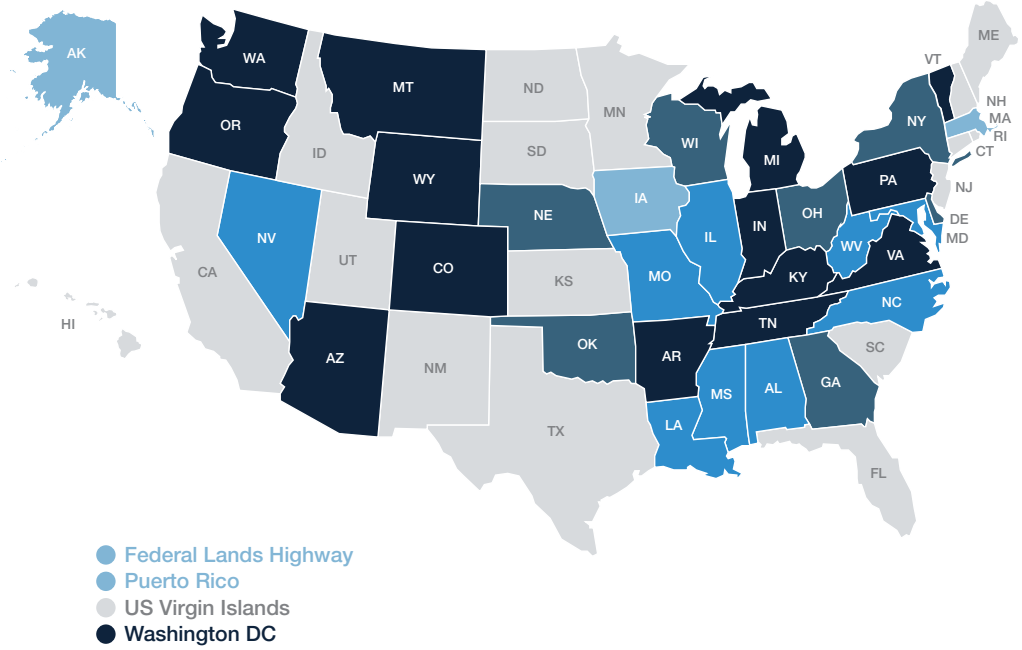
The implementing quality environmental documentation (IQED) effort that started in EDC-2 promotes best practices for simplifying and expediting the development of environmental documents. EDC-3 also incorporated eNEPA, an online workflow tool FHWA created for projects that require an environmental impact statement or environmental assessment.

For EDC-3 progress reporting, the eNEPA implementation stages are based on deployment of eNEPA or any other form of electronic documentation and collaboration system. A documentation and collaboration system is defined as an electronic document-sharing system that facilitates collaboration between two or more agencies.

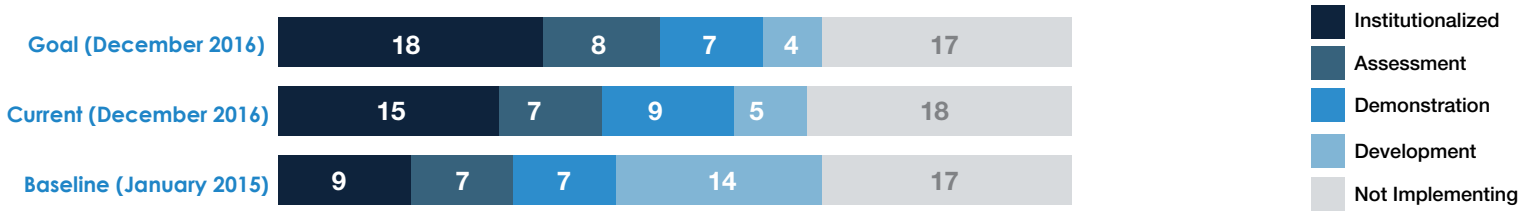
IQED

Strategies to implement quality environmental documentation are now a mainstream practice in 14 States and Washington, DC. Sixteen States have piloted the use of IQED principles on NEPA documents or are preparing for full deployment of IQED.

Current (December 2016)



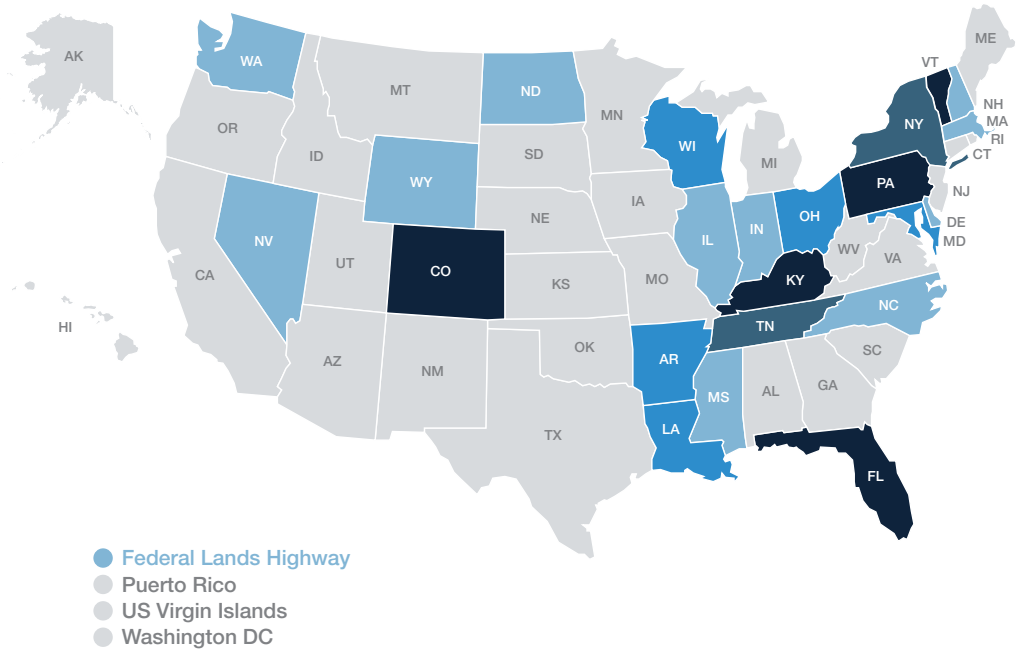
Number of States in Various Implementation Stages



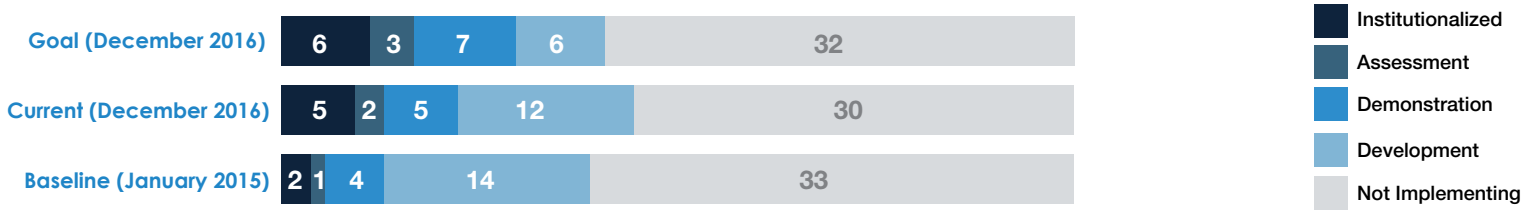
eNEPA

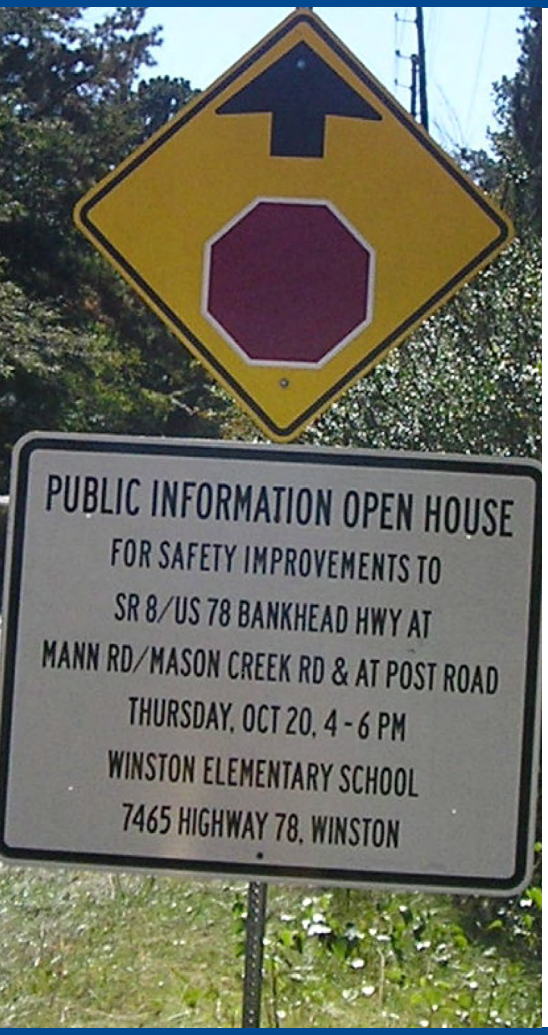
Conducting NEPA review processes electronically is now a standard practice in five States. Seven States are demonstrating and assessing eNEPA or another documentation and collaboration system.

Current (December 2016)



Number of States in Various Implementation Stages





Innovation SPOTLIGHT

Georgia

The Georgia Department of Transportation (GDOT) is pursuing several efforts to shorten environmental processes on transportation projects. GDOT and FHWA signed a memorandum of understanding that eliminates the need for a lengthy evaluation for minor project changes such as easements added in an original right-of-way if they are outside of environmentally sensitive areas. GDOT is updating its *Environmental Procedures Manual* to streamline the environmental process for projects. The focus is on clarifying processes and requirements to improve environmental document quality and produce documents that are approved the first time they are submitted.

GDOT launched an effort to better meet customer expectations on projects under development. GDOT holds debriefing sessions after public outreach meetings to discuss comments received and make response assignments. The goal is to shorten the comment response time. The agency plans to research public advertisements and comment response times to determine how the debriefing meetings are working and what types of projects require more time for comment response.

Highlights: Improving Collaboration and Quality Environmental Documentation

Federal Lands Highway

FLH applies IQED principles on projects to keep environmental documentation brief while ensuring legal sufficiency. Its environmental assessment for a project to improve Raphune Hill Road and Route 381 in the U.S. Virgin Islands is 32 pages and incorporates visualizations to help tell the project story. FLH is using a new checklist for categorical exclusions—actions that do not involve significant environmental impacts— to streamline the review and approval process while meeting the expectations of project partners.

FLH identified projects in Chincoteague National Wildlife Refuge in Virginia and Monterey Bay Sanctuary Scenic Trail in California to pilot the use of eNEPA and is looking for additional projects on which to deploy the tool. It is working with the U.S. Fish and Wildlife Service to integrate eNEPA into their agency processes.

Maryland

The Maryland State Highway Administration (SHA) used IQED principles to develop a finding of no significant impact document for the Maryland 5 intersection reconstruction project in Leonardtown. The project is designed to enhance safety for motorists, pedestrians, and bicyclists and expand pedestrian mobility. The agency plans to incorporate IQED in subsequent environmental documents when appropriate. The agency plans to pilot the eNEPA tool on the review of the environmental assessment document for the MD 28/198 corridor improvement project in Montgomery and Prince George's Counties.

Mississippi

The Mississippi Department of Transportation (MDOT) is collaborating with FHWA to finalize an *Environmental Policy Manual* and a local agency training course on transportation project reviews under Section 106 of the National Historic Preservation Act. MDOT received STIC Incentive program funds to develop the manual and training instructional materials. The agency uses its Environmental Collaboration Web site to keep review agencies abreast of progress on project development. MDOT used the eNEPA tool for an environmental study for a bridge replacement project it conducted with an adjoining State.

Montana

MDT incorporated the IQED approach into the final environmental impact statement for the Billings Bypass project. Using IQED principles helped make the document more understandable to the public when it was used in outreach efforts. MDT added consideration of the use of IQED principles to its procedures for future projects. The agency plans to consider the approach when preparing environmental assessments, environmental impact statements, and project documents related to Section 4(f) of the Department of Transportation Act of 1966.

Nebraska

The Nebraska Department of Roads (NDOR) collaborated with FHWA on updates of contracting standard specifications to improve efficiency, clarity, and effectiveness. The two agencies held meetings with local governments to discuss complex NEPA documents and conducted workshops to clarify expectations and improve the quality of analysis in NEPA documents. They also reviewed Endangered Species Act procedures and agreements to improve efficiency. NDOR implemented new forms for categorical exclusions and instructions for writing clear, concise, and accurate project descriptions.

Highlights: Improving Collaboration and Quality Environmental Documentation

North Carolina

The North Carolina Department of Transportation (NCDOT) is using IQED principles to develop environmental impact statements for the Complete 540 project to extend the Triangle Expressway in the Raleigh area and the I-26 widening project in Buncombe and Henderson Counties. NCDOT is developing a content management system that incorporates many eNEPA concepts.

The State's Kinston Bypass project to make improvements on the U.S. 70 corridor is serving as a GIS pilot project. The pilot's purpose is to evaluate streamlining of the project development process by using GIS data for alternative development and selection of the least environmentally damaging alternative.

Tennessee

The Tennessee Department of Transportation (TDOT) and FHWA finalized a new programmatic agreement on processing actions classified as categorical exclusions, actions that do not involve significant environmental impacts. TDOT is implementing a new environmental document template to assist in streamlining and reducing potential errors in the process to produce environmental documents for transportation projects.

West Virginia

WVDOT used IQED principles to prepare environmental assessment and finding of no significant impact documents for the Thurmond Bridge rehabilitation project. FHWA approved the reader-friendly documents for the project to renovate the bridge, which carries vehicular and pedestrian traffic over the New River in Fayette County.

Wisconsin

WisDOT is finalizing updates to the environmental chapters of its *Facilities Development Manual* to include IQED principles. The agency incorporated IQED principles into its environmental training sessions for staff in the agency's five regions and offered eight sessions across the State during the spring 2016 training cycle.

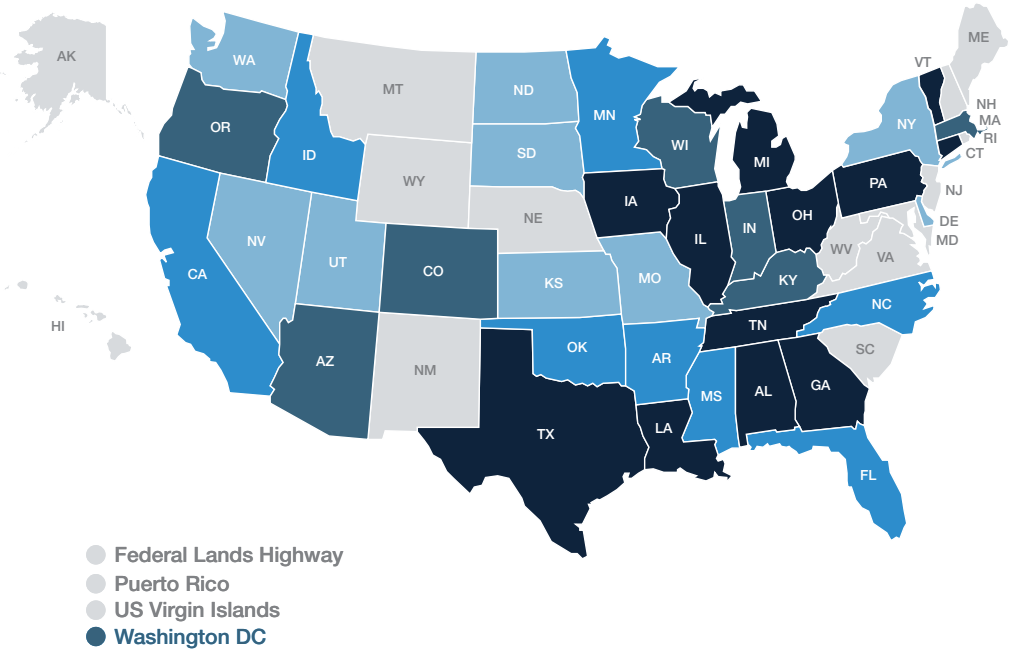
Improving DOT and Railroad Coordination

Each year, transportation departments build hundreds of projects near railroad rights-of-way. With railroad volumes projected to grow, the need for project coordination between DOTs and railroads will also increase. Improving collaboration and streamlining processes will save money and time for highway agencies and railroads and result in faster, smarter highway renewal.

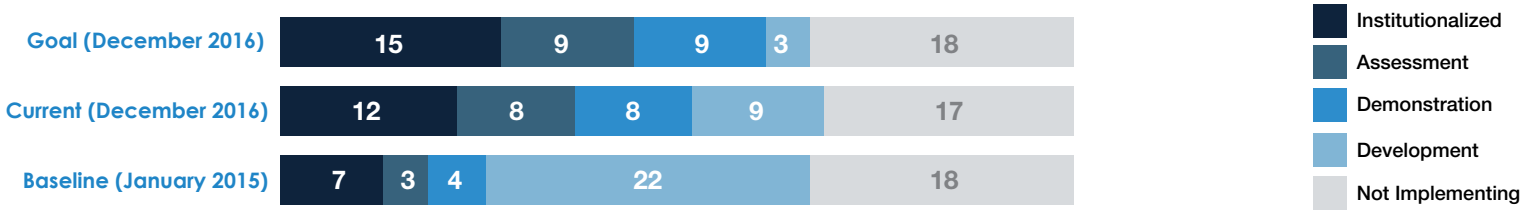
The EDC-3 effort on **improving DOT and railroad coordination** encouraged agencies and railroads to identify issues and negotiate agreements to expedite development of highway projects involving railroad rights-of-way. It features a model agreement library, tools, and training developed under the **SHRP2 R16 project**, which enables agencies and railroads to identify sources of conflict and develop memorandums of understanding for project and program needs.

Twelve States have institutionalized the use of tools and practices to improve DOT and railroad coordination. Another 15 States and Washington, DC, are piloting the innovation or preparing for full deployment.

Current (December 2016)



Number of States in Various Implementation Stages



Innovation SPOTLIGHT

Texas

TxDOT, which has institutionalized coordination with railroads, implemented a process to submit construction agreements to railroads electronically rather than in standard paper format. This enables railroads to load documents into their agreement management systems more easily and obtain internal approvals faster. It also reduces printing and mailing costs and makes it easier to track documents. As a result, railroad agreement processing time dropped from more than 12 weeks to 3 or 4.

TxDOT and two railroads changed common maintenance work-related agreements to simpler maintenance notifications that require no signatures. The agency is working with Union Pacific Railroad to develop a master agreement for maintenance to further reduce processing time.

Highlights: Improving DOT and Railroad Coordination

Alabama

The Alabama Department of Transportation (ALDOT) is using its new guidance and railroad certification and agreement process as it trains county engineers on how to evaluate railroad crossings. The agency reports that with the new systems in place, the railroad certification and agreement process has greatly improved, leading to faster and more efficient delivery of projects that involve railroad property, especially local agency projects.

Connecticut

ConnDOT regularly uses two master agreements with Amtrak. One agreement is specific to the Hartford Line and allows ConnDOT to give direction on work elements quickly with a project authorization letter. The other is a blanket agreement for all ConnDOT work involving Amtrak rights-of-way that allows work to proceed with a project authorization letter. Preparation and execution of the letter can be accomplished in under a month, while developing a traditional formal agreement can take more than a year.

ConnDOT has initiated an effort to develop a master agreement, similar to the one with Amtrak, for work done by Metro North Railroad on federally funded projects. Once executed, the agreement will allow the use of authorization letters to expedite projects. The agency is also working with Metro North Railroad to coordinate resources and track outages on projects on the New Haven Mainline.

District of Columbia

The District Department of Transportation (DDOT) held a SHRP2 R16 workshop in December 2016 to enable agency and railroad staff to discuss how they work together and identify best practices. DDOT reports that the workshop will help agency staff move forward on developing a common framework for defining processes and identifying specific needs for railroad agreements. Next steps are to set up quarterly meetings to collectively review active rail projects and develop processes for both one-of-a-kind and standard projects.

Iowa

The Iowa DOT, which has mainstreamed processes to coordinate with railroads, has standard specifications for work on or near Union Pacific Railroad, Canadian Northern Railway, and Canadian Pacific Railway property. The agency is finalizing specifications for work involving BNSF Railway property and developing specifications for short-line railroads in the State. The Iowa DOT developed an online road worker safety training program for inspection staff on railroad-related projects.

Michigan

MDOT has master agreements with almost all of the 27 railroads that operate in the State and for all of the five rail lines the State owns. The agreements cover the design, construction, funding, and administration of railroad-highway grade crossing improvement projects. MDOT regularly meets with the railroads in the State to discuss projects and issues.

Highlights: Improving DOT and Railroad Coordination

Oklahoma

The Oklahoma Department of Transportation (ODOT) executed railroad-ODOT agreements for individual roadway and railroad at-grade crossing upgrades. Upgrades include new railroad warning signals and gate mechanisms as well as new concrete crossing surfaces. ODOT regularly executes railroad-ODOT construction and maintenance agreements for new and replacement grade-separation bridges. Two large ODOT projects at the bidding stage involve building rail bridges that require the use of temporary tracks during construction. ODOT holds bimonthly conference calls with BNSF Railway and Union Pacific Railroad to review the status of ODOT projects with rail involvement.

Tennessee

TDOT has institutionalized coordination with railroads in the State and has master agreements with CSX, Illinois Central Railway, and Norfolk Southern Railway. Benefits of coordination include enhanced partnering with railroads, early identification of issues railroads may have with project plans, and time savings on project development processes. For example, TDOT worked with Norfolk Southern to streamline the process for resurfacing projects, reducing the time it takes for railroad approvals.

TDOT staff meet twice a year with representatives of the major railroad companies. Department and railroad representatives conduct joint site visits on upcoming, current, and past highway projects. TDOT sends preliminary project plans to railroads to provide early notice of upcoming work and obtain comments, and it addresses any railroad concerns before developing final plans.

Vermont

The Vermont Agency of Transportation (VTrans) developed an on-call contract delivery template and a sole-source emergency contract template for awarding contracts to railroads to perform maintenance on State-owned rail lines. The on-call contract—designed for nonemergency work—reduces the number of contracts the agency needs to administer from 20 to eight. The on-call term is 2 years with the potential for a 2-year extension.

Wisconsin

WisDOT is creating an information technology solution to track coordination on projects that involve highway-railroad coordination. The database will help individual projects go more smoothly and allow development of statewide and regional reports. WisDOT provides lists of upcoming projects to affected railroads to enable them to better plan for the projects. It holds monthly conference calls with BNSF Railway as part of its effort to improve partnerships with railroads. The agency held nine railroad coordination training sessions throughout the State for 325 agency staff members and is planning another statewide training effort in 2018.

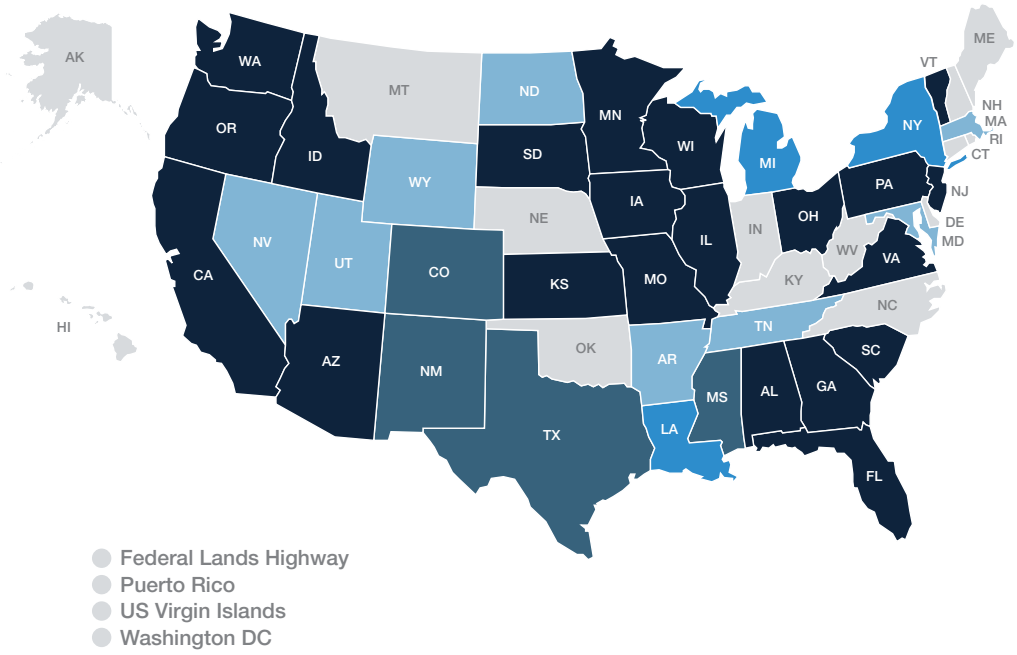
Locally Administered Federal-Aid Projects: Stakeholder Partnering

Stakeholder partnering brings local public agency representatives together with State and Federal colleagues to increase program compliance and streamline the project delivery process under the Federal-Aid Highway Program. After promoting stakeholder partnering in EDC-2, FHWA continued the effort in EDC-3.

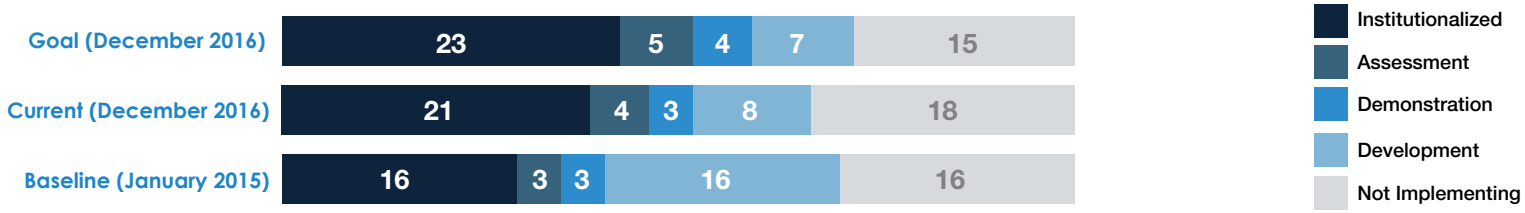
Stakeholder partnering groups meet regularly to identify program-level issues, review project development processes, and work on solutions through a defined decisionmaking process and action plans. Stakeholder partnering improves communication and trust among those involved and increases consistency by establishing a cooperative environment for reviewing project development compliance requirements and policies. It also provides a platform to initiate process enhancements, training, and other ways to improve program integrity.

Stakeholder partnering on local projects is now an institutionalized practice in 21 States. Another seven States are making progress on their efforts to establish stakeholder partnering groups of local, State, and Federal representatives.

Current (December 2016)



Number of States in Various Implementation Stages



Innovation SPOTLIGHT

Oregon

The Oregon Department of Transportation (ODOT), which has a mature stakeholder partnering program, is beginning to quantify time and cost savings for its partnering initiatives. ODOT's statewide initiative to improve local project delivery included expanding State funding in lieu of Federal funds, improving the focus and efficiency of certified project delivery, and establishing obligation targets for Transportation Management Areas, urban areas with populations greater than 200,000. These goals involve working with local, regional, State, and Federal partners to monitor project delivery performance measures, which are under development.

Oregon maintains a confederated model of partnering groups that allows for a robust partnering network. ODOT created a Certification User Group to streamline and improve the delivery of federally funded projects in urban areas by certified local public agencies. The group provides a forum for sharing information and best practices and facilitating communication among ODOT, Federal agencies, and local agencies. ODOT is planning a 2017 peer exchange to share the State's stakeholder partnering experiences with counterparts in Georgia, Nevada, and Washington.

Highlights: Locally Administered Federal-Aid Projects: Stakeholder Partnering

Alabama

In Alabama, where stakeholder partnering is institutionalized, ALDOT holds regular stakeholder partnering meetings that are expected to enhance relationships between ALDOT and local stakeholders. A group member is developing a stakeholder partnering committee charter for the full group's approval, which could lead to expanding the size of the meetings to include more local stakeholders and FHWA.

New Jersey

NJDOT achieved its goal of institutionalizing stakeholder partnering and is moving forward on implementing its stakeholder partnering committee. Committee members represent MPOs, counties, municipalities, private industry, and FHWA. A committee workshop on inactive Federal-Aid Highway Program projects enabled stakeholders from 24 organizations to discuss inactive project causes and potential solutions. They created several working groups to evaluate why projects may not be awarded, billed, and completed in a timely manner and develop recommendations to improve the project delivery process.

South Dakota

The Transportation Advisory Council—the South Dakota Department of Transportation's partnering group for local and tribal stakeholders—was instrumental in developing administrative rules for the state's new Bridge Improvement Grant program for local projects. The group drafted recommendations that the South Dakota DOT passed on to the Transportation Commission for approval. The group is updating the South Dakota DOT's Local Roads Plan, a guide for planning, designing, and building roads and bridges on local highway systems. It is also developing standardized structure designs that could be used on a variety of local projects.

Vermont

VTrans has a number of partnering mechanisms and communication strategies in place for working with local agencies. The consensus is that the Vermont local program is well received and communication with local agencies is excellent, indicating the agency is accomplishing much of what a formal stakeholder partnering group is designed to achieve.

A spring 2016 survey evaluated the desire of local agencies to establish a stakeholder partnering group, and 86 percent of those responding indicated a group could be beneficial. VTrans is considering a 1-year pilot process to introduce the stakeholder partnering group concept to the local agency community.

Regional Models of Cooperation

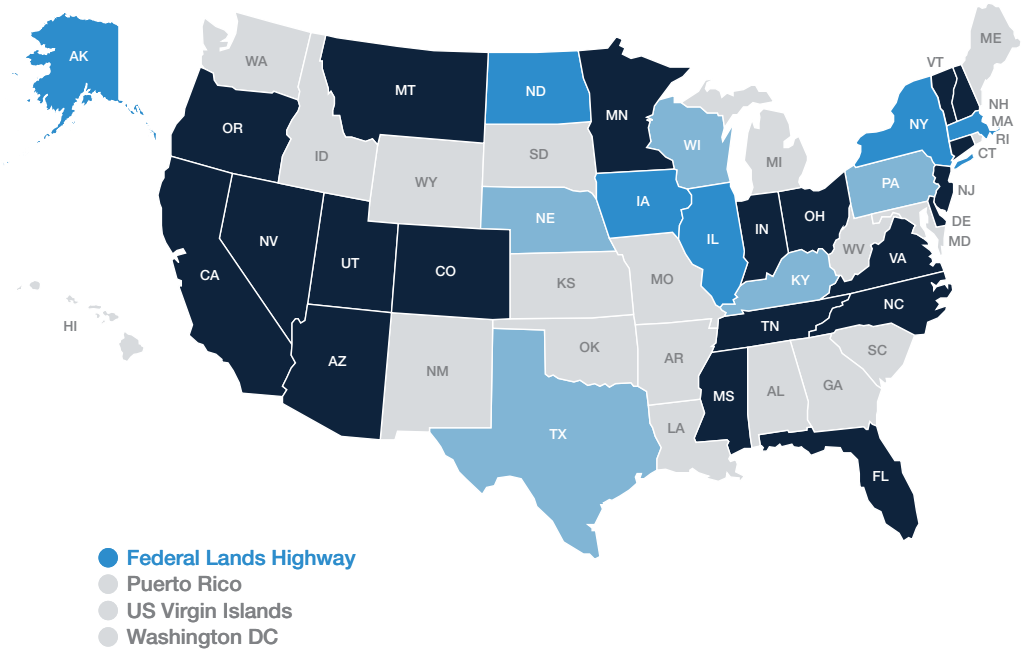
Although traffic congestion does not stop at geographic borders, transportation planning often does. Using **regional models of cooperation** can help State highway agencies, regional planning groups, and other stakeholders develop agreements and coordinate planning across jurisdictional boundaries.

In EDC-3, FHWA promoted a framework and process for developing agreements across agency boundaries, improving communication, collaboration, policy implementation, and performance management. Regional models of cooperation can yield benefits such as faster project delivery, less traffic congestion, and more efficient freight movement.

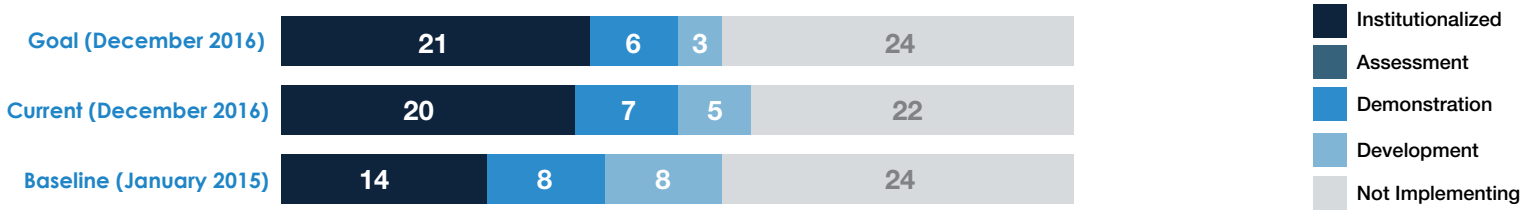
Planning Products and Studies Across Agencies

Use of regional planning on highway, transit, freight, air quality, congestion mitigation, and other transportation issues is institutionalized in 20 States. MPOs, State DOTs, and other stakeholders in six States and FLH are at the demonstration stage on the innovation.

Current (December 2016)



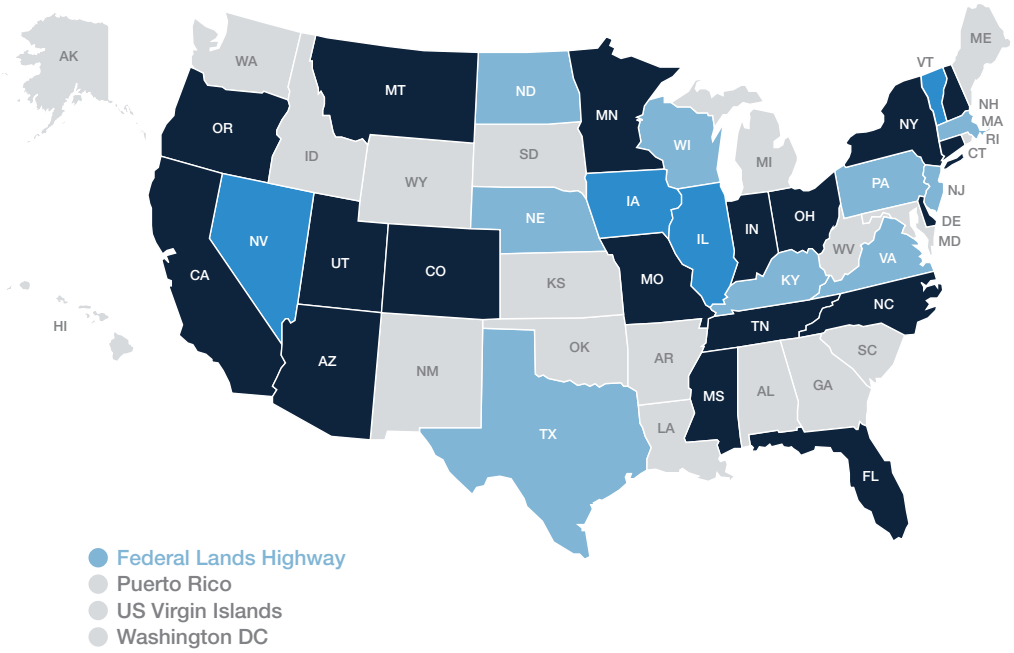
Number of States in Various Implementation Stages



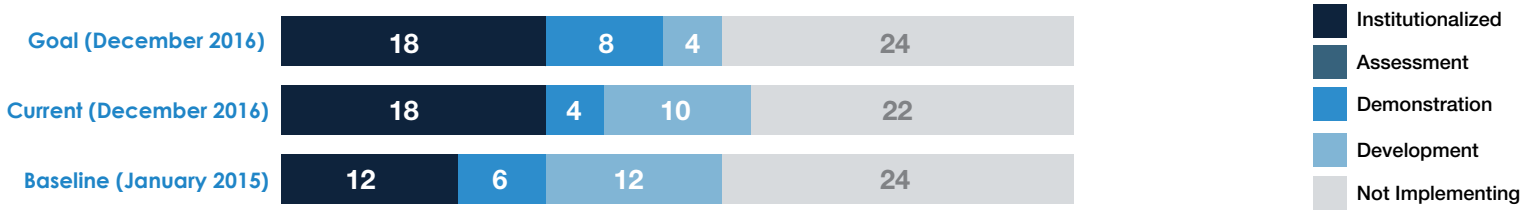
Data Models and Tools

MPOs, State DOTs, and other stakeholders in 18 States have institutionalized the sharing of data, models, and tools such as geographic information systems, transportation models, safety data, and asset management information. Another four States are conducting demonstration projects.

Current (December 2016)



Number of States in Various Implementation Stages



Innovation SPOTLIGHT

Florida

FDOT policy calls for performance-based programs and plans. FDOT's efforts to collaborate with multimodal planning agencies, transit agencies, freight interests, and other stakeholders are key to the policy's success. FDOT initiated its collaboration on transportation performance with annual workshops that began in 2014. The workshops with MPOs spurred a pilot project to share performance data with four of Florida's 27 MPOs (two large and two small) in an exploratory study of preparedness for the national performance measures. FDOT's collaboration efforts also include the 2016 Performance Summit for Transportation Partners, which brought partners and stakeholders into the discussion of performance measures and planning.

Highlights: Regional Models of Cooperation

Alaska

Regional cooperation among diverse stakeholders in a large State with a dispersed population can be challenging, so the Alaska Department of Transportation and Public Facilities (DOT&PF) identified stakeholders and schedules regular virtual meetings to discuss opportunities for collaboration. Discussion topics include data collection, transportation modeling, national performance goals and targets, and changing rules and regulations at the Federal and State levels. The Alaska DOT&PF virtual peer exchanges support multijurisdictional and multiagency planning and facilitate cooperation among State, local, regional, and tribal governments and Federal land management agencies.

Arizona

The Maricopa Association of Governments, Central Arizona Governments, Sun Corridor Metropolitan Planning Organization, and Pima Association of Governments signed a resolution establishing the Joint Planning Advisory Council for the Sun Corridor. The council meets regularly to address planning and economic topics in the corridor, which encompasses the area between Tucson and Phoenix. The corridor is experiencing high growth levels and is expected to be home to 85 percent of the State's population in the future.

Delaware

The Wilmington Area Planning Council hosted a 2015 planning roundtable in Delaware for the Mid-Atlantic region, which shares many planning challenges as part of a dense network of cities that stretch from Virginia to Pennsylvania. Roundtable participants, which included members of MPOs and regional commissions as well as local American Planning Association chapters, reviewed progress on projects involving multiagency collaboration. The Baltimore Metropolitan Council plans to host the next roundtable in Maryland in spring 2017. The Mid-Atlantic Roundtable has fostered communication and coordination on regional transportation issues since 2005.

Iowa

Roles and responsibilities related to travel demand models in Iowa have fluctuated with changes in software, processes, and staffing availability. Through the Iowa Standardized Model Structure project, the Iowa DOT works with its partners to provide a comprehensive and standardized framework of best practices for developing and applying travel demand modeling. To ensure that the quality of travel demand modeling remains high, the Iowa DOT offers MPO staff training on modeling and assistance on project analysis and model updates.

Mississippi

MDOT prepared a **Unified Long-Range Transportation Infrastructure Plan** concurrently with the State's coastal and regional MPOs. Conducting the planning efforts at the same time brought together multiple entities in a coordinated effort to address the topics of congestion, safety, and commerce. MDOT developed a statewide travel demand model that incorporates all of the MPO areas and cooperated with MPOs and other freight stakeholders on a Mississippi Statewide Freight Plan.

Missouri

MoDOT, MPOs, and regional planning commissions use a collaboration Web site as a tool to facilitate information sharing among the planning partners, surrounding State DOTs and MPOs, and FHWA and Federal Transit Administration staff. The partners also conduct monthly coordination meetings. A regional U.S. DOT MPOwerment Summit allowed Missouri MPOs to share best practices on their collaboration effort with MoDOT.

Highlights: Regional Models of Cooperation

New Hampshire

The directors of New Hampshire's nine regional planning commissions, which are required by State law to develop comprehensive regional plans, meet monthly to coordinate their efforts.

The commissions worked together on **A Granite State Future**, the State's most extensive visioning, regional planning, and public involvement campaign. In the process, the commissions found that collaboration and flexibility are essential to accommodate everyone's needs and develop a stronger final product.

New York

Members of the New York State Association of Metropolitan Planning Organizations, a coalition of New York's 14 MPOs, work together on initiatives to provide high-quality transportation planning to the public. Initiatives include obtaining and using the same foundational freight data for analysis, assisting in the development of the New York State Freight Plan, and collaborating with the New York State Department of Transportation (NYSDOT) to collect data for the National Household Travel Survey.

Utah

In partnership with UDOT and the Utah Transit Authority, Utah's four MPOs integrate their Regional Transportation Plans into the State's **Unified Transportation Plan**. They completed the first Unified Plan in 2007, the second plan in 2011, and the most recent in 2015. The agencies adopted this collaborative approach to serve the public more effectively and efficiently. The partners recognize that the success of one transportation mode benefits all modes and the success of each MPO region benefits the entire State.

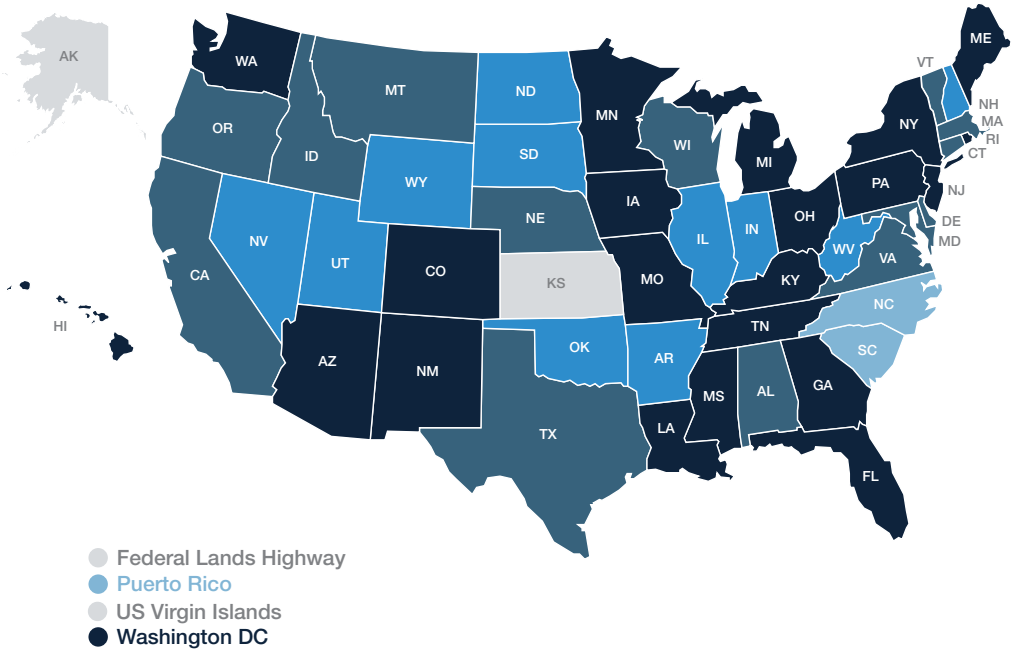
Road Diets (Roadway Reconfiguration)

A **road diet** is a low-cost strategy that reconfigures a roadway cross-section to safely accommodate all users, increase mobility and access, reduce crashes, and improve a community's quality of life. During EDC-3, FHWA encouraged State and local agencies to consider road diets as a safety-focused alternative for mixed-use streets.

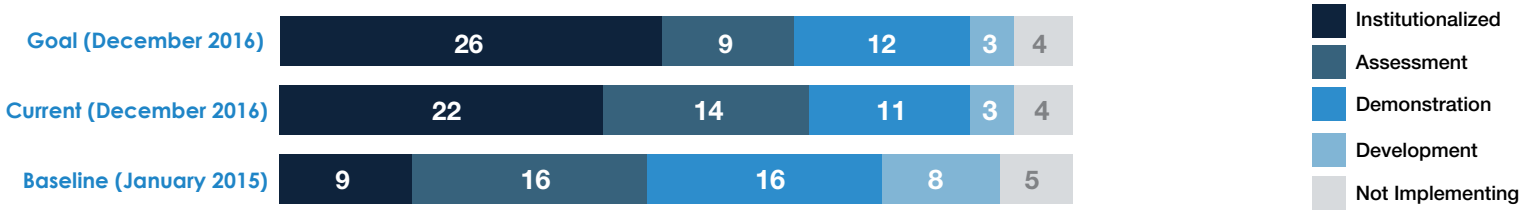
A common type of road diet involves converting a four-lane, undivided road to three lanes with two through lanes and a two-way turn lane in the middle. The reclaimed space can be allocated to uses such as bike lanes, pedestrian refuge islands, bus lanes, and parking. Research shows that road diets can reduce crashes from 19 to 47 percent.

The use of road diets to enhance safety and mobility attracted widespread interest across the country. They are a standard practice in 21 States and Washington, DC. Another 25 States are installing road diets and developing processes for identifying potential sites for roadway reconfiguration.

Current (December 2016)



Number of States in Various Implementation Stages



Innovation SPOTLIGHT

New Mexico

The New Mexico Department of Transportation (NMDOT) set a goal to institutionalize road diets during EDC-3. To meet the goal, NMDOT developed a road diet guide to help transportation practitioners use this proven safety countermeasure. New Mexico's EDC-3 Road Diet Committee developed an implementation plan that included reviewing other States' policies, hosting a peer exchange, and introducing the guide in workshops. NMDOT also included road diets in its Strategic Highway Safety Plan.

After the EDC-3 Road Diet Committee completed the guide in December 2016, NMDOT adopted it for use in assessing the appropriateness of facilities for roadway reconfiguration. The guide will be used by NMDOT's staff and transportation partners, including metropolitan and regional planning organizations, local and tribal governments, and the transportation planning and engineering communities.

Highlights: Road Diets (Roadway Reconfiguration)

Hawaii

In October 2016, FHWA and the city of Honolulu hosted a peer exchange and workshop at which more than 70 stakeholders from Hawaii and Guam learned about road diets and shared their experiences with the safety countermeasure.

Hawaii transportation professionals are using road diets as a strategy to make streets safer and more accommodating for all users. Honolulu's Complete Streets Team reviews ongoing street rehabilitation efforts and makes recommendations on lane narrowing or restriping to better accommodate pedestrians, bicyclists, or additional parking. On Kaua'i, road diets figure prominently in the Lihu'e urban core mobility project, which received Transportation Investment Generating Economic Recovery (TIGER) program funding.

Louisiana

The Louisiana DOTD, which has institutionalized the use of road diets, created a list of potential sites for road diets on State-owned roads. The agency distributed the list to its districts to use as a guide for considering road diets at the sites.

Missouri

Urban areas in Missouri are taking the lead in embracing road diets. The Kansas City Public Works Department conducted a road diet analysis of undivided four-lane streets, with a primary focus on improving safety and adding bicycle facilities to roads during resurfacing projects. St. Louis County has a road diet policy that provides factors to consider when determining the feasibility of a roadway reconfiguration. The cities of Springfield and Columbia have completed several successful road diet projects.

New Jersey

NJDOT developed a public outreach **video** that provides information on how road diets work and the benefits they provide, using case studies on road diets installed in New Jersey's county, town, and shore environments. NJDOT is also conducting a pilot study to determine effective ways for counties and municipalities to select, develop, and implement road diets on local roads.

Tennessee

TDOT installs road diets to reduce fatal crashes. The agency is developing road diet criteria for its Complete Streets guide to to help transportation practitioners make decisions on road diet use.

The city of Nashville adopted a complete streets policy that incorporates road diets as a strategy to achieve accessibility for all users and improve connectivity to homes and jobs. One successful outreach method used in Nashville for road diet projects is a Public Involvement Mobility Fair. Participants can "walk the corridor," which involves visiting a potential road diet project to experience the area firsthand as a pedestrian. This enables transportation practitioners to better explain and show the benefits of road diets to the public.

Vermont

VTrans drafted a road diet selection and implementation guide. Although the guide is not yet final, VTrans applied the road diet selection criteria developed for the guide and completed an initial review of State roads to identify possible corridors for road diets. VTrans staff presented the information to regional planning commissions to make them aware of potential road diet projects.

Photo Credit: Texas DOT

"We have a huge system and not a lot of money, so the idea of driving innovation to get better results for the people we serve is important. We put it in our mission and our value statements and we talk about being bold and willing to take risks."

— Ed Hassinger, Missouri Department of Transportation Chief Engineer

Smarter Work Zones

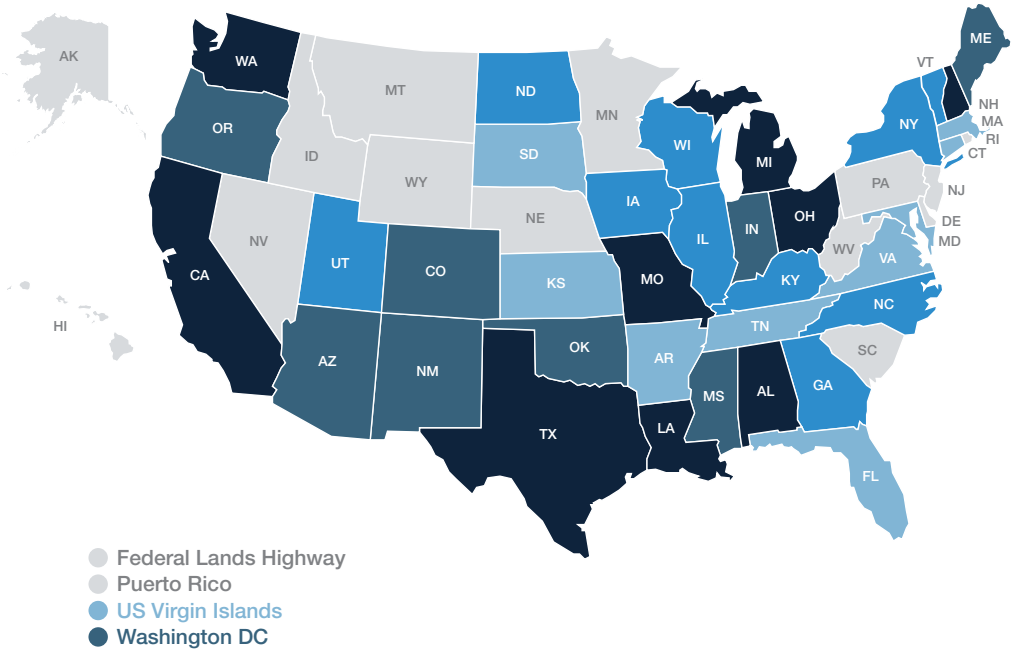
The EDC-3 effort on **smarter work zones** encouraged the adoption of two efficient work zone strategies: project coordination and technology applications. Project coordination involves construction planning that minimizes the impact of work zones and generates time and cost savings. Cities and regions are combining multiple projects in an area, correlating right-of-way acquisition and utility work, and coordinating work among agencies.

Technology applications such as queue management and speed management involve using intelligent transportation systems (ITS) to manage work zone traffic. Queue management systems alert drivers to work zone backups so they can slow down safely. Speed management solutions, such as variable speed limit signs, manage work zone traffic in real time.

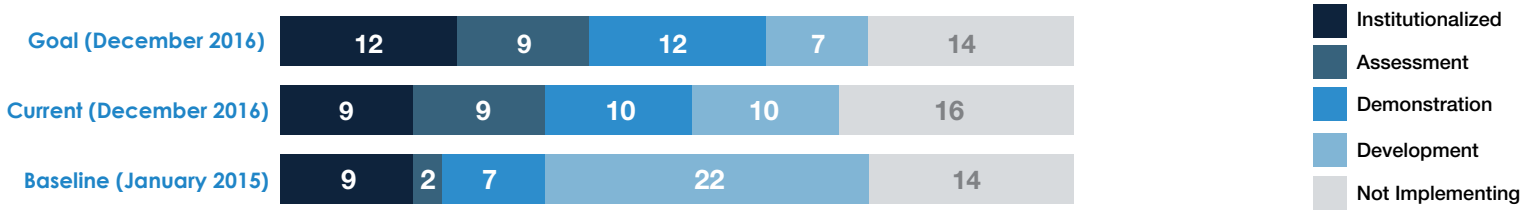
Project Coordination

Nine States have made it a standard practice to use project coordination to reduce work zone impacts. Another 18 States and Washington, DC, have incorporated project coordination strategies or work zone software tools into planning, design, operating, and maintenance processes.

Current (December 2016)

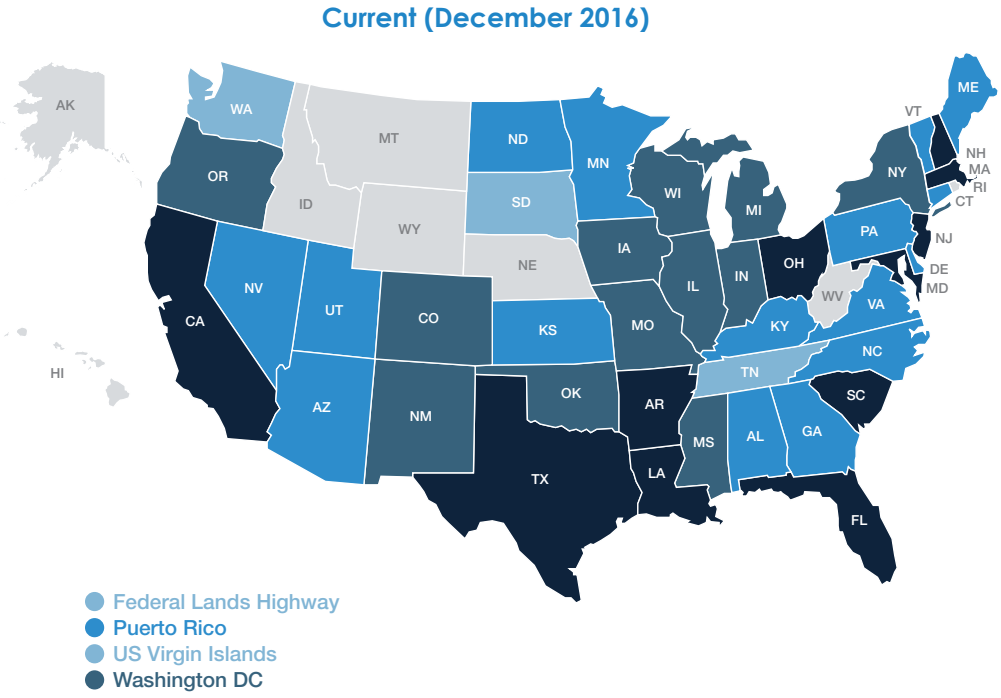


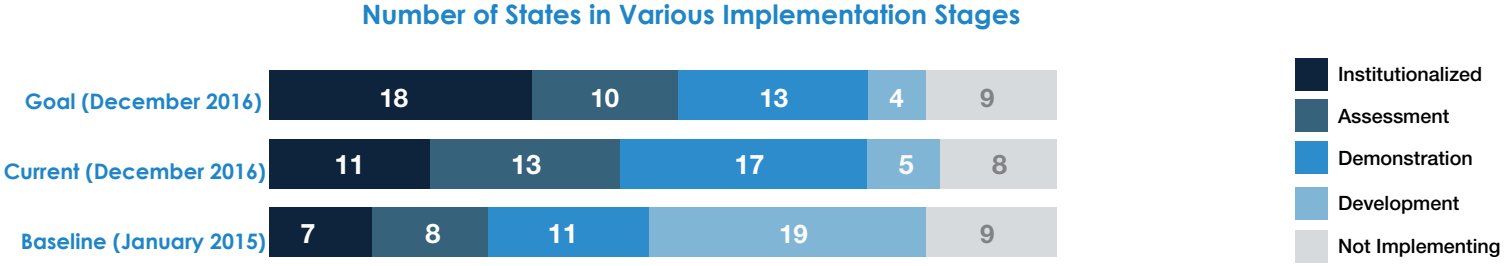
Number of States in Various Implementation Stages



Technology Applications

Eleven States have made using technology tools and strategies to manage work zone impacts a mainstream practice. Another 28 States, Puerto Rico, and Washington, DC, are incorporating technology applications into work zone planning, design, operating, and maintenance practices.





Wisconsin

WisDOT completed two queue warning system pilot projects and is evaluating safety, speed, and capacity improvements associated with each deployment. An initial evaluation of one system showed a notable reduction in weekday crashes compared to another project in a similar area that did not use a queue warning system. WisDOT is working with a university partner to develop a queue warning system decision support tool to help identify future candidates for the technology while the projects are in the planning phase.

Highlights: Smarter Work Zones

Arkansas

AHTD is using an automated work zone information system on many projects on the freeway system as a queue protection countermeasure. The agency is developing a Statewide Automated Work Zone Information System program that it plans to begin implementing in 2017. AHTD expects the program to provide for more consistent procedures and better measurement of work zone performance in the future. AHTD plans to post information from the system on the IDrive Arkansas Web site.

District of Columbia

DDOT created a Citywide Transportation Management Plan to track and analyze work zone and special event impacts over a rolling 5-year period. The system helps DDOT identity areas of significant cumulative impacts, generate cost-effective mitigation strategies, and ultimately improve safety and mobility across the city. DDOT received STIC Incentive program funds to expand its Citywide Transportation Management Plan system.

Illinois

IDOT awarded on-call contracts using smarter work zone ITS in three agency districts. The agency used the ITS contracts to deploy smarter work zones in a variety of scenarios, including emergency maintenance, bridge inspections, and construction projects. IDOT completed a research project to improve the effectiveness of its smarter work zone technology deployments. The agency plans to evaluate and validate the research findings and incorporate them into future deployment of smarter work zones.

Iowa

The Iowa DOT developed and continues to expand its Traffic Critical Projects initiative, which integrates consideration of traffic operations into all aspects of project development. The initiative has opened the door to the use of smarter work zone technologies, and the agency continues to deploy them where appropriate. The agency established a statewide equipment services contract that integrates all appropriate smarter work zone equipment with the statewide Traffic Management Center and advanced traffic management system software, improving consistency, flexibility, and reliability.

Massachusetts

MassDOT has institutionalized its use of smarter work zone technology. Over the past 2 years, the agency has deployed and evaluated numerous technology applications, including a dynamic lane merge system, queue warning system, and travel time information and alert systems. MassDOT developed a concept of operations for the agency's smarter work zone program to guide planners and designers in determining if a smarter work zone system should be applied to a project and the recommended application. The agency uses smarter work zone technology applications in all construction work zones that meet a specific impact level and a preset scoring criteria threshold.

Highlights: Smarter Work Zones

Multistate

Four States—Florida, Iowa, Missouri, and Tennessee—are participating in the SHRP2 **Work Zone Impacts and Strategies Estimator** (WISE) software pilot project. The States are testing the software tool and identifying ways to use it in the project coordination and planning stages of project development to optimize schedules and minimize work zone safety and mobility impacts. The pilot States participated in a webinar to share their experiences and lessons learned working with WISE.

New Jersey

NJDOT developed an operations bulletin with scoring criteria for project designers to use as a guide when determining the suitability and deployment of smarter work zones on projects to mitigate work zone-related congestion. The agency also updated its Scope Statement—Preliminary Engineering Checklist to incorporate smarter work zone deployment in the ITS/Traffic Operations Strategies section.

Photo Credit: Texas DOT

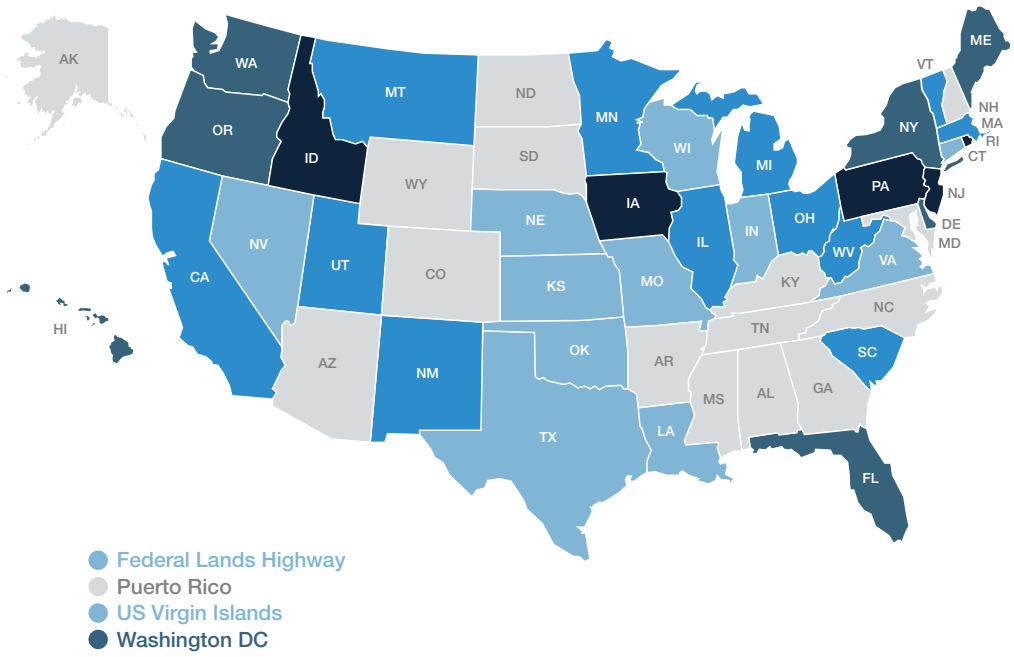
Ultra-High Performance Concrete Connections for Prefabricated Bridge Elements

Ultra-high performance concrete (UHPC) is a steel fiber-reinforced portland cement concrete with mechanical properties that exceed those of conventional concrete. UHPC can be used to improve the strength, simplicity, and durability of prefabricated bridge element connections. Better connections with UHPC can benefit the use of prefabricated bridge elements to accelerate bridge construction.

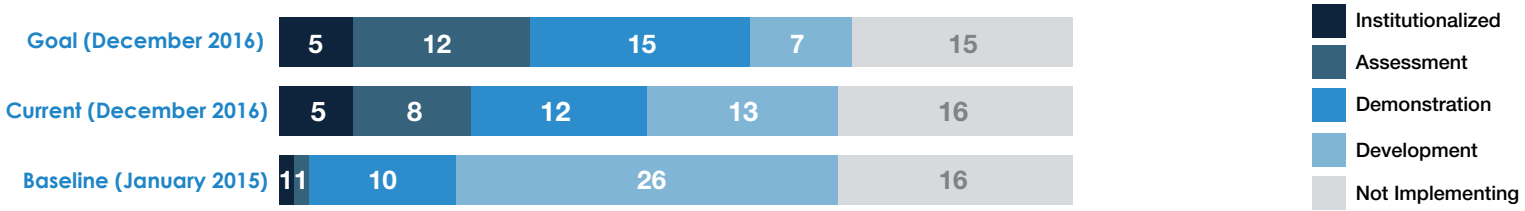
The EDC-3 effort focused on demonstrating the advantages UHPC offers as an option for connecting prefabricated bridge elements. Field-casting of UHPC connections between prefabricated components results in a strong connection that provides better long-term performance. The mechanical properties of UHPC allow for the redesign of common connection details in ways that promote both ease and speed of construction.

Five States have made UHPC connections a standard practice on bridge projects that use prefabricated elements. Another 19 States and Washington, DC, are using UHPC connections on bridge construction projects or making plans to institutionalize use of the technology.

Current (December 2016)



Number of States in Various Implementation Stages



Minnesota

Hennepin County used UHPC connections between precast deck panels to accelerate the rehabilitation of the Franklin Avenue Bridge, a historic crossing in downtown Minneapolis heavily used by drivers, pedestrians, and cyclists. Using precast panels allowed construction crews to remove and replace the entire bridge deck in a 17-week timeframe in 2016. Using UHPC for the connections simplified the construction activities and increased the quality of the completed structure. The 1,000-foot span's reconstruction is the second-largest project to date in the United States to use field-cast UHPC connections between precast bridge deck panels.

Highlights: Ultra-High Performance Concrete Connections

California

Caltrans identified two multispan structures for pilot projects using UHPC to connect precast columns to precast bent caps. The projects, scheduled for 2017 construction, will help the agency develop design details and guidance to quickly and uniformly implement accelerated bridge construction while mitigating project risk. Caltrans is developing a performance-based specification for the use of UHPC in California structures.

Connecticut

ConnDOT is using UHPC on a project to replace the superstructure of the Route 97 Bridge over Beaver Brook in Sprague. The agency plans to install precast prestressed concrete deck units on the existing substructures and use UHPC for closure pours. ConnDOT plans to use UHPC on a bridge project to repair deteriorated steel beam ends in connection with a research project the agency is conducting with the University of Connecticut. ConnDOT is participating in a Transportation Pooled Fund Program project to develop a **structural design guide for UHPC**, which the agency believes will be a useful resource as it expands its use of UHPC on projects.

Delaware

The Delaware DOT (DelDOT) completed several projects using UHPC and is planning more for 2017 and 2018 construction. The agency used UHPC to connect box beams on a bridge on Daisy Road over the Pocomoke River and precast deck panels on an I-95 bridge over State Route 7. DelDOT used UHPC to connect precast beams on a project to build a bridge over a salt water conveyance channel in the Prime Hook National Wildlife Refuge.

Federal Lands Highway

FLH finalized its UHPC specification, which includes construction criteria for cement, aggregate, curing, admixtures, and steel fibers. FLH will use the specification on three upcoming projects. FLH plans to use UHPC closure pours on precast deck panels on the Arlington Memorial Bridge project in Washington, DC, in 2017. Use of UHPC for deck panel closure pours is also planned for two Yellowstone National Park projects, the Yellowstone River Bridge in 2021 and the Lewis River Bridge in 2022.

Florida

FDOT maintenance projects used UHPC in superstructure applications. FDOT, which has no restrictions on the use of the technology in construction or maintenance projects, plans to develop a specification for UHPC. FDOT is conducting research to study slab beam bridges with UHPC joint connections and develop UHPC joints for use in substructures.

FDOT used UHPC on a project on the Martin Downs Boulevard Bridge over Danforth Creek in Palm City. It was the first time FDOT used UHPC to repair joints between void slab units to prevent cracks from recurring along the joints. An I-95 bridge project in design for 2017 construction will use UHPC to connect precast deck panels to reduce traffic delays.

Highlights: Ultra-High Performance Concrete Connections

Idaho

ITD created standard detail sheets for UHPC connections on deck-bulb tee and voided slab superstructures. The agency's *Bridge Design Manual* requires use of these details on all State highway system bridges and recommends consideration of their use on local bridges. ITD used UHPC in the construction of one bridge and is monitoring the structure to evaluate performance. The agency is scoping three bridge replacement projects for 2017 that will incorporate UHPC. On two projects, UHPC will be used to make connections between deck bulb-tee girders, which will facilitate the construction of prefabricated bridge elements. The third project will use UHPC to make connections between precast elements

Iowa

The Iowa DOT, which has used UHPC connections on several bridge projects, developed standards for bridges with adjacent concrete box girders with UHPC joints. The Iowa DOT is studying the constructability and performance of a UHPC overlay applied on a deteriorated bridge deck. The UHPC overlay was installed on a bridge on County Road L in Buchanan County, the first time a UHPC overlay has been deployed on a deteriorated bridge deck in the United States. Iowa hosted the **First International Interactive Symposium on Ultra-High Performance Concrete** in Des Moines on July 2016.

Massachusetts

MassDOT plans to use UHPC closure pours on two bridge projects: Route 85 over the Assabet River in Hudson and Rochester Road over the Weweantic River in Carver-Middleborough. The agency is developing UHPC standard details for inclusion in its *Bridge Manual*.

Ohio

ODOT is piloting the use of UHPC in closure pours on a bridge deck replacement project in Licking County. The agency identified a bridge project on which to use UHPC connections to tie in full-depth precast deck panels.

Oregon

ODOT has a goal to use accelerated bridge construction tools, such as prefabricated bridge elements with UHPC connections, when appropriate to shorten construction time on projects. Work is underway on a project to replace the Rock Creek Bridge in Washington County, which includes a precast deck panel with UHPC connections. The Chenoweth Creek Bridge replacement project in Wasco County scheduled for 2017 will use deck-bulb tee girders with UHPC flange connections.

South Carolina

Work is underway on a four-span bridge on S-770 over Hanging Rock Creek in Kershaw County that incorporates UHPC. One span uses a precast modified North Extreme Tee (NEXT) D beam developed by the South Carolina Department of Transportation (SCDOT) and Clemson University. After the NEXT beams are placed, the shear keyways between sections are filled with UHPC grout. Two spans use standard hollow core precast slabs connected with UHPC shear keys. The fourth span uses precast, presetressed solid slab sections connected with UHPC grout. SCDOT expects monitoring of the long-term durability of the different types of construction on the bridge to yield a wealth of information it can apply on future projects.

EDC
every day counts

U.S. Department of Transportation
Federal Highway Administration

www.fhwa.dot.gov/innovation/everydaycounts

FHWA-17-CAI-005