Every Day Counts:

Creating Efficiency Through Technology and Collaboration

EDC-3 Progress Report #2

July – December 2015

innovation ingenuity imagination invention
Every Day Counts

U.S. Department of Transportation
Federal Highway Administration

"As powerful as each innovation is in improving project delivery and quality, the greater benefit is in combining innovations on a project or program. We find that when innovations are combined, the benefits are almost exponential."

— Daniel D'Angelo, New York State DOT Deputy Chief Engineerr

Foreword

Every Day Counts is the Federal Highway Administration's initiative 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 December 2015 status of innovation deployment for the 11 innovations in the third round of EDC, which focuses 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.

CONTENTS

ACRONYMS AND ABBREVIATIONS

3D	three-dimensional
4D	four-dimensional
5D	five-dimensional
AASHTO	American Association of State Highway and Transportation Officials
AID Demonstration	Accelerated Innovation Deployment Demonstration
DOT	department of transportation
EDC	Every Day Counts
FHWA	Federal Highway Administration
GRS-IBS	geosynthetic reinforced soil-integrated bridge system
IQED	implementing quality environmental documentation
LTAP	Local Technical Assistance Program
NEPA	National Environmental Policy Act
SHRP 2	second Strategic Highway Research Program
STIC	State Transportation Innovation Council
UHPC	ultra-high performance concrete

Every Day Counts

Every Day Counts is the Federal Highway Administration's initiative 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 two 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**, which promotes the adoption of 11 innovations in 2015 and 2016, builds 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 two-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**, which bring together public and private stakeholders to evaluate innovations and spearhead their deployment in each state.

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** or similar groups, 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**, and adopt those that add value to their highway programs. "EDC and other technology initiatives have really been critical in helping states save money and save time," said Bud Wright, AASHTO executive director.

"It's important that we build on the work we've done so far to ensure the focus on innovation becomes a permanent part of our transportation culture. It's time to take our efforts to the next level."

– Gregory Nadeau
FHWA Administrator

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** and **Accelerated Innovation Deployment Demonstration** programs to encourage and provide incentives for innovation deployment.

The EDC initiative has had a significant positive impact on the highway community's adoption of new technologies and processes. Since EDC's inception in 2010, every State transportation agency has used eight or more of the innovations promoted under the initiative, and some have adopted over twenty. Several of those innovations are now mainstream practices in many states. The initiative has also fostered a transportation workforce that is adept at putting innovation to work to address transportation challenges. "We're saving money, saving time and saving lives, exactly the results we said were possible if we made innovation a standard industry practice," said FHWA Administrator Gregory Nadeau. "And we're making a strong case to Congress and policy makers in the states for future investments in transportation."

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

— Shailen Bhatt, Colorado DOT Executive Director

EDC-3 Innovation Implementation

Every six months, FHWA compiles a status report on the state of practice for the current round of EDC innovations. This section provides details on the 11 innovations in EDC-3 and includes maps and charts that show the progress made in advancing the technologies and practices by the end of December 2015.

The maps illustrate the innovation implementation stage in each state in December 2015. The charts show the number of states in each implementation stage in December 2015. The charts also compare the December state of practice to the January 2015 baseline data and December 2016 goals set by states.

As states implement their innovation deployment plans, the number of states in the advanced (darker blue) stages will increase while the number of states in the initial (lighter blue) stages will decrease with each six-month progress report.

"State" is used as a general term that includes the state transportation department, metropolitan planning organizations, local governments, tribes, private industry and other stakeholders in a state or territory. Information is provided for the 50 states, Washington, D.C., Puerto Rico, the U.S. Virgin Islands and Federal Lands Highway, 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.
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

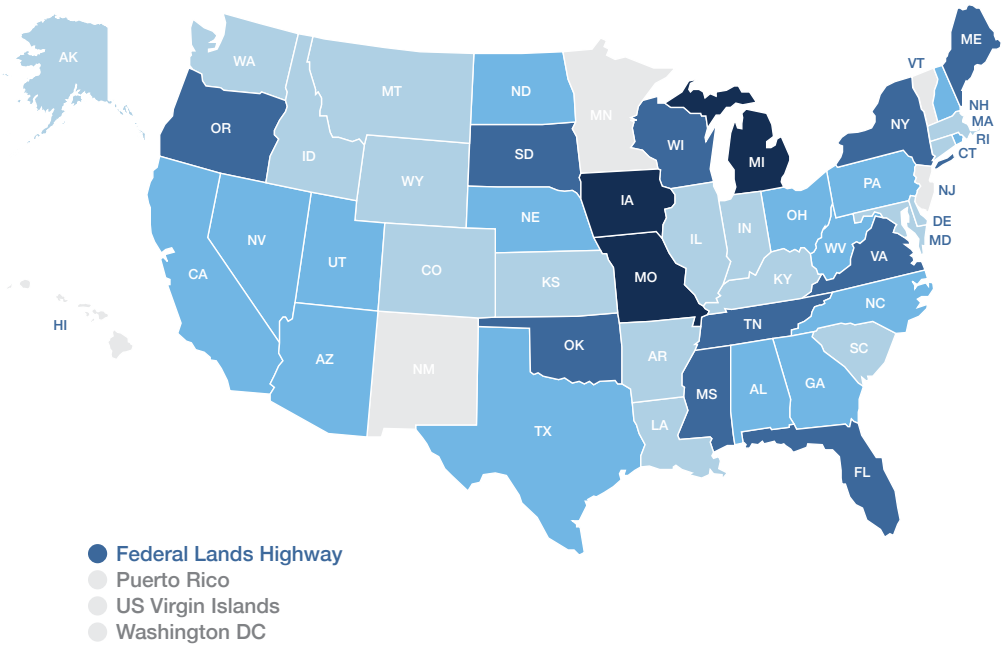
Three-dimensional engineered models are widely used by the highway community to more effectively connect a project's design and construction phases. These models can also be applied to other phases of the project delivery cycle to positively affect safety, costs, contracting, maintenance and asset management.

After encouraging adoption of 3D models in EDC-2, FHWA is continuing 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.

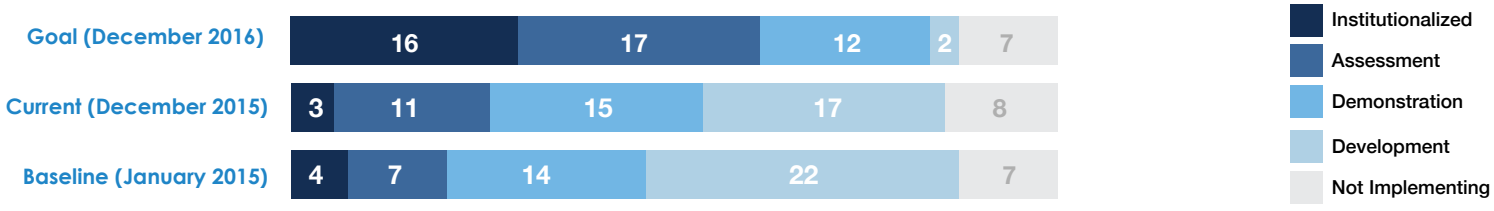
Project Planning, Design and Construction

Using 3D engineered models in project planning, design and construction is becoming a widespread practice, with 25 states and Federal Lands Highway implementing it or planning how to make it a standard practice. Three states have institutionalized the practice.

Current (December 2015)



Number of States in Various Implementation Stages



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.

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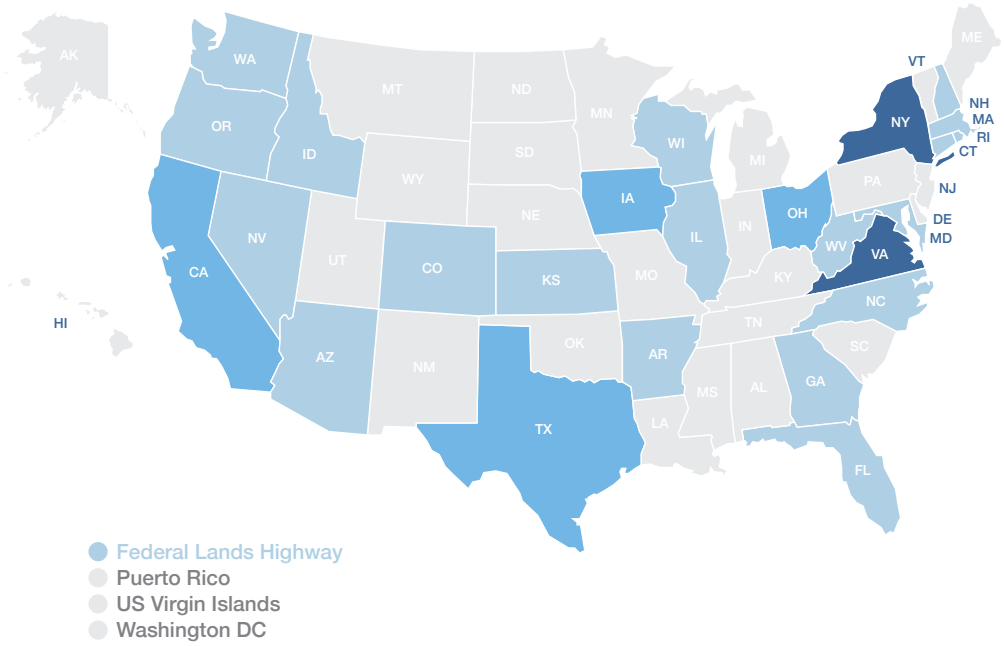

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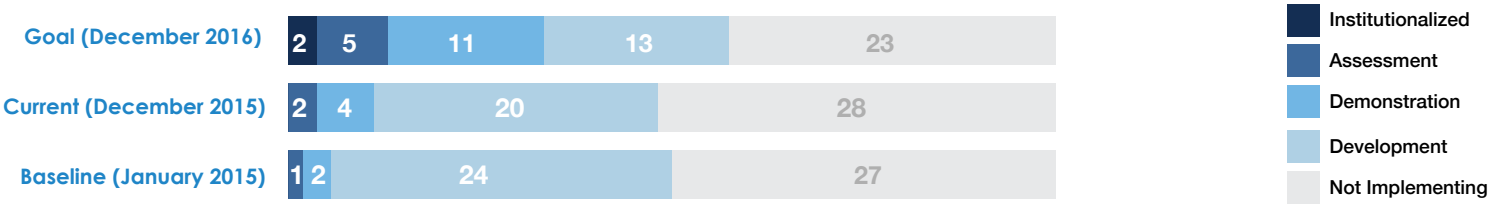

Post-Construction

Five states are applying 3D engineered 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.records of 3D design models.

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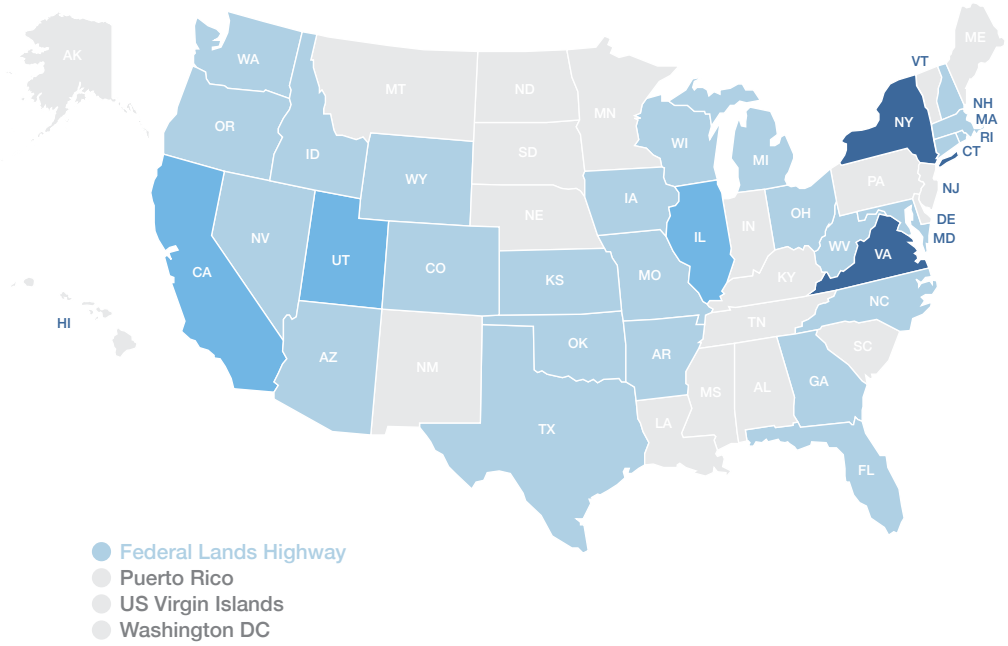

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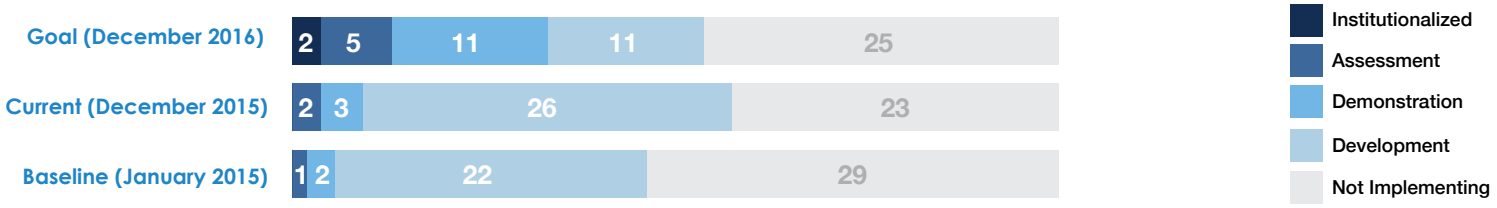

Highlights: 3D Engineered Models

Arizona

An **Arizona** DOT task force is spearheading deployment of 3D modeling for planning, design and construction. It is developing a file format and structure that are compatible with multiple software types, drafting language for releasing 3D data to contractors before they bid on projects and creating a training and outreach plan.

The Arizona DOT provided electronic files to contractors at the prebid stage of a pilot project. Benefits included 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.

Colorado

The **Colorado** DOT is rolling out a 3D engineered modeling specification for projects that use automated machine grading. As part of the rollout, the agency developed a quality assurance document to guide project teams on checking 3D data.

Connecticut

The **Connecticut** DOT is piloting the use of 3D engineered models on a roundabout construction project in Seymour. The department is using 3D files to create presentations for public meetings, inspect the project and produce as-built records. It provided 3D files to contractors for bidding and construction purposes, and the contractor building the roundabout is using the data for automated machine guidance.

Federal Lands Highway

Federal Lands Highway developed a 3D modeling design chapter for its **Project Development Design Manual**. Federal Lands Highway also produced a 3D modeling chapter for its **Construction Manual** and plans to use the document to prepare training materials for construction inspectors.

Florida

The **Florida** DOT's work program for 2016 to 2021 calls for using 3D modeling to design 140 projects. The designer of the I-4 Ultimate project, underway in central Florida, used 3D modeling to identify utility conflicts with proposed foundation locations and to visualize challenges during the construction phase.

The Florida DOT modified its construction standard specifications to permit stakeless construction and formed an agency team to develop project selection criteria. It published a new chapter 25 in its **Structures Detailing Manual** that incorporates 3D modeling to check the tolerance of prefabricated bridge element details.

Idaho

A statewide 3D engineered models email group was set up to facilitate communication among Idaho stakeholders and enable them to share 3D projects details, best practices, lessons learned and information requests. Idaho's STIC plans to hold a 3D modeling workshop in summer 2016.

Iowa

The **Iowa** DOT hosted an FHWA-sponsored 3D engineered models workshop and peer exchange in Des Moines in December 2015. The event enabled participants from state DOTs, design and construction firms, equipment vendors and FHWA to learn about 3D modeling practices in Iowa, Michigan and Utah. At the workshop, participants began developing implementation plans for using 3D models in structural design, contract documents, construction inspection, as-built plans and enterprise data storage. The Iowa DOT is planning four to eight pilot projects using 3D modeling as part of its effort to implement the Civil Information Modeling process.

Highlights: 3D Engineered Models

Michigan

Building on its 2012 commitment to enhance digital project delivery, the **Michigan** DOT updated its project design submittal requirements to require proposed 3D models for all projects. To support the mandate, the agency conducted statewide training and provides ongoing support via virtual user group meetings.

The Michigan DOT performs systematic quality assurance reviews on electronic engineered deliverables, using two reviewers to interact with design teams and document issues. In 2015, the Michigan DOT reviewed electronic engineered deliverables for 108 projects, more than 30 percent of which included 3D model deliverables.

Mississippi

After implementing 3D technology for planning, design and construction in 2014, the **Mississippi** DOT is pursuing the technology on a project-by-project basis. The agency is evaluating jobs that use the technology to identify benefits and lessons learned.

Missouri

The **Missouri** DOT adapted 3D design software to agency and AASHTO design standards and is training agency staff and consultants how to use the software. The agency is updating its policy on 3D data delivery and developing an implementation plan to take 3D design tools and workflows to construction.

Nebraska

The **Nebraska** Department of Roads has 45 projects under development with 3D modeling software and six more ready for construction. The projects will enable the agency to gain experience using 3D modeling technology and refine the process to fit its construction needs. To help with 3D implementation, the agency formed a 3D modeling users group that includes representatives of the agency's Roadway Design and Bridge Divisions and design consultants.

Ohio

The **Ohio** DOT made electronic deliverables available during the bidding process on a project to widen I-71 in Franklin County while maintaining two lanes of traffic in each direction. After awarding the contract, the agency met with the contractor to review the 3D/4D model for the project. Since then, the agency has accepted the contractor's value engineering change proposal to change the maintenance-of-traffic plan on part of the project and provided comments on its 4D plan incorporating scheduling information.

Oklahoma

The **Oklahoma** DOT used 3D modeling and automated machine guidance specifications on six projects and plans to use the technology on all future projects with earthwork greater than 50,000 cubic yards. As projects are completed, the Oklahoma DOT conducts assessments with input from those involved in the projects. As the Oklahoma DOT and contracting community gain experience, the department will look for more opportunities to use the specifications.

Highlights: 3D Engineered Models

Oregon

The **Oregon** DOT is assessing the results of several test projects that used 3D modeling. The agency is working with national experts to build on its **3D Roadway Design Technical Bulletin** to provide guidance on project development and expand 3D use in Oregon beyond earthwork.

Pennsylvania

The **Pennsylvania** DOT uses 3D engineered models at the preconstruction stage to define material quantities, develop accurate bids, and determine clash detection issues and accurate drainage. The agency uses automated machine guidance for grading jobs. For one project, the Pennsylvania DOT used a 3D model to produce an illustration of a bridge to share with the public.

South Carolina

After developing specifications and criteria to provide electronic engineering data for automated machine guidance construction, the **South Carolina** DOT used the technology on three pilot projects. The agency developed and provided training classes on 3D engineered models to stakeholders.

Texas

All 25 **Texas** DOT district offices have 3D design projects underway. The agency is using 4D modeling for the first time to add scheduling information to the 3D design for a bridge replacement project on U.S. 190 in Jasper County. It is working on a 4D simulation for each construction phase to enable planners to better understand the sequencing and avoid costly delays and errors. The agency's goal in developing 4D capability is to keep projects on schedule, identify construction issues earlier and maximize work zone safety.

Utah

The **Utah** DOT used stringless concrete paving successfully on a project on I-80 from Silvercreek to Wanship. The contractor ran the concrete paver using a 3D model and automated machine guidance rather than a traditional physical guidance system using string. Benefits included reduced core failures, accurate concrete thickness, enhanced work zone safety and more efficient operations. The contractor also used automated machine guidance to complete the earthwork on the project.

The Utah DOT is providing information-only electronic files to contractors on projects with 3D models, a first step in its effort to establish electronic files as contractual documents on projects. The agency updated its **Survey and Geomatics Standards** manual as part of its effort to fully deploy 3D engineered models. The agency is using STIC Incentive funds to document 3D decisions and processes for inclusion in a guidance document.

Wisconsin

The **Wisconsin** DOT is implementing 3D modeling on two fronts. The agency is using 3D models on the Southeast Wisconsin Freeway Megaprojects program for grading, paving, milling and bridges. The Wisconsin DOT is also working on a statewide implementation effort. It institutionalized the creation of 3D surface models as a standard design deliverable for all earthwork projects. The design models are intended to assist contractors in prebid and construction activities. The agency plans to seek contractor input on the effectiveness of the design model implementation and suggestions for next steps

Data-Driven Safety Analysis

Data-driven safety analysis 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 focuses 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 data-driven safety analysis in project development have attracted interest across the country. Twenty-three states and Washington, D.C., are applying data-driven safety analysis in project development. Seven states have incorporated predictive safety analysis as a standard practice in their project development processes and policies.

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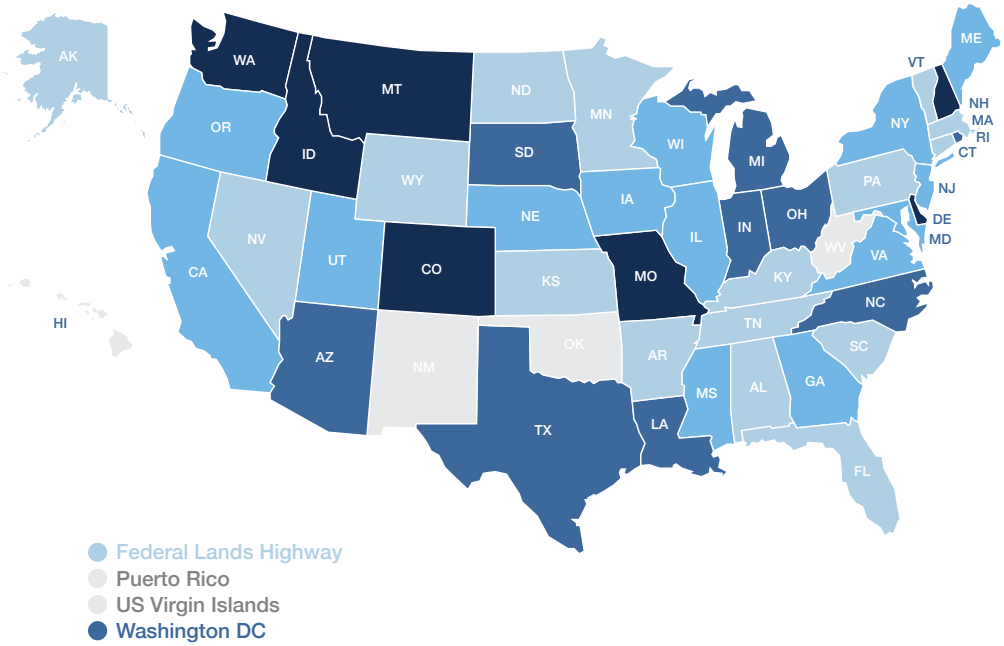

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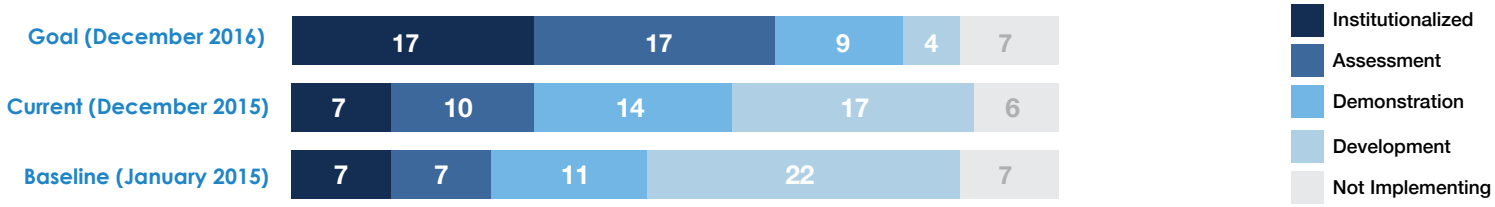

Safety Management

Many states are pursuing the use of data-driven safety analysis to improve safety management. Twenty-eight states and Washington, D.C., are applying data-driven safety analysis to their safety management process. Eleven states have made predictive and systemic safety analysis a standard part of their safety management process.

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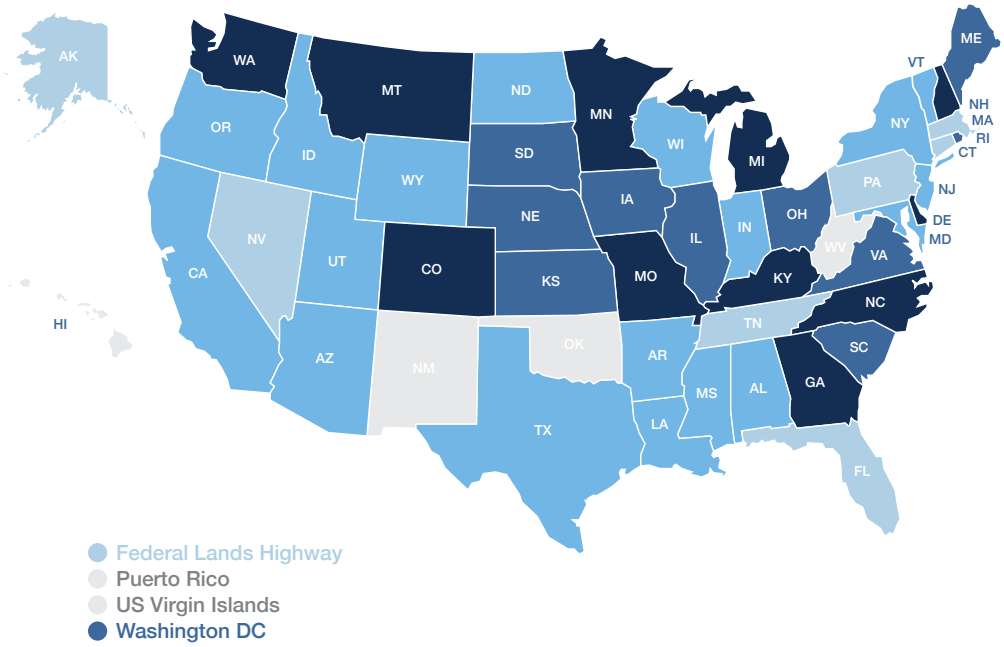

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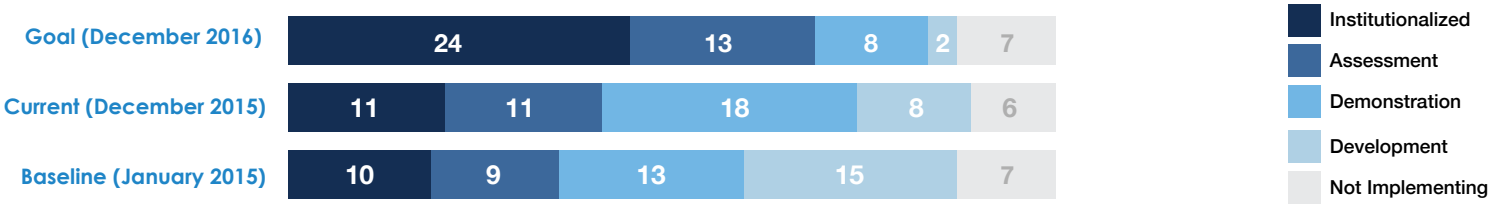


Highlights: Data-Driven Safety Analysis

Alaska

The **Alaska** Department of Transportation and Public Facilities is calibrating key safety performance functions for use with the AASHTO **Highway Safety Manual** as a project screening tool for selecting Highway Safety Improvement Program projects. The agency also plans to use the Highway Safety Manual as a discretionary tool for evaluating project development alternatives.

The Alaska DOT is working with the University of Alabama to develop an online dashboard with custom reporting and mapping capabilities that will enable users to analyze and visualize electronic crash data. Agency staff are also coordinating with the university to provide tools and capabilities for use in systemic safety analysis.

Arkansas

The **Arkansas** State Highway and Transportation Department is piloting systemic analysis by screening its road network for risk factors associated with higher frequency of some crash types and predictive analysis by analyzing the potential for reducing crash frequency and severity. The agency is using data-driven safety approaches in areas such as high-friction surface treatment projects, rumble strip installation and safety corridor projects.

Colorado

The **Colorado** DOT is incorporating safety performance as a key measure in project selection under its major safety programs, including the Highway Safety Improvement Program and FASTER Safety Program. The agency is applying best practices from a fall 2015 peer exchange in Phoenix, Arizona, in its efforts to support local agency systemic safety improvement projects.

The Colorado DOT is rolling out a **Transportation Systems Management and Operations Evaluation** process for all agency projects. The evaluation incorporates predictive safety analysis along with operations and system engineering analyses in the project development process.

Connecticut

The **Connecticut** Local Technical Assistance Program added two speed indicator signs to its free equipment loan program for municipalities. The LTAP is assisting cities and towns with installation of the signs and providing technical support on data analysis and reporting. The signs will gather data on vehicle counts and speeds that can be used in safety analysis and decision making on efforts to reduce speed-related crashes.

Delaware

The **Delaware** DOT routinely uses AASHTO Highway Safety Manual analysis methods to evaluate alternatives for improving safety at high-crash locations.

Florida

The **Florida** DOT used data-driven safety analysis to conduct a statewide study of wrong-way crashes on highways. The agency is using a systemic approach to apply safety countermeasures throughout the state to reduce fatalities and serious injuries. In December 2015, Florida DOT District 7 in Tampa reported that no wrong-way crashes had occurred on interstates in the 11 months since countermeasure implementation.

Florida DOT District 7 also implemented systemic treatments to address lane departure crashes on curves in Citrus, Hernando and Pinellas Counties after analyzing crash data and roadway information. The safety improvements include curve warning signs, speed feedback signs and retroreflective pavement markings for curves on off-system roads.

Highlights: Data-Driven Safety Analysis

Louisiana

The **Louisiana** Department of Transportation and Development completed segment calibration and is exploring data needs for intersection calibration using the AASHTO Highway Safety Manual for predictive safety analysis. The agency developed state-specific safety performance functions for use in roadway network screening and program-level planning decisions. It is using the systemic method to select locations on state-owned roads for roadway departure crash countermeasures.

Maine

The **Maine** DOT has dedicated a portion of its funding to projects using the systemic approach to safety. In the state's work plan for 2016 to 2018, the agency proposes installing 280 miles of centerline rumble strips on a systemic basis.

Maryland

The **Maryland** State Highway Administration is using data-driven safety analysis to select safety improvement projects. The agency is using AASHTO Highway Safety Manual methods on a case-by-case basis to choose engineering design alternatives and performance-based approaches for projects and make decisions on awarding safety improvement funds.

Michigan

The **Michigan** DOT is developing safety performance functions for various site types, such as urban intersections and rural segments, and incorporating them into prediction tools to estimate the frequency of traffic crashes. The agency uses **Safety Analyst software** as a network screening tool on state-owned roads to determine sites with the highest potential for safety improvement and plans to incorporate basic data elements to allow screening on the local system.

Minnesota

The **Minnesota** DOT is using AASHTO Highway Safety Manual analysis methods on an ad hoc basis, primarily to evaluate the safety implications of cross-sectional design dimensions such as lane, shoulder and bridge width. As part of an effort to update its guidance manual on the intersection evaluation process, the agency is looking at how AASHTO Highway Safety Manual methods might be used to make the safety comparison of intersection types more quantitative.

Montana

In **Montana**, all projects more extensive than pavement preservation receive a safety analysis by the Montana DOT's Traffic and Safety Bureau. The Montana DOT updated its data analysis capabilities with a new Safety Information Management System that allows query capabilities of a variety of data sets. It also developed a Roadway Departure Implementation Plan that calls for Montana-specific safety performance functions and diagnostic norms for all rural, on-system roads for total crashes and roadway departure crashes.

New Jersey

AASHTO Highway Safety Manual analysis tools helped the **New Jersey** DOT prioritize projects to fund under its Local Safety Program in fiscal years 2016 and 2017. Before local agencies in the northern part of the state submitted applications, New Jersey DOT staff met with the agencies to review their Highway Safety Manual analysis of their project proposals. In the southern part of the state, where the Local Safety Program is at earlier stages of development, the New Jersey DOT provided experts to perform calculations for project proposals.

New York

The **New York** State DOT is updating its Accident Location Information System with data on 500,000 intersections in the state. The new data will improve the department's ability to perform crash analysis and identify risk factors at intersection locations. New highway categories are being incorporated into ALIS to better align with the categories used in the Highway Safety Manual. Collision diagram and crash rate tools are also being added to ALIS to enhance the ability to perform safety investigations and analyses.

Highlights: Data-Driven Safety Analysis

Ohio

The **Ohio** DOT is incorporating predictive crash analysis into its project development process for highway projects, which will allow better scoping of projects to include safety components up front. The agency is also developing safety analysis guidelines for program managers and engineers to ensure that safety is quantified in alternative analyses for all projects.

The Ohio DOT is partnering with the Mid-Ohio Regional Planning Commission on a pilot project to use the Safety Analyst software tool on a regional level. Using the software could bring the regional commission's crash analysis methods in line with AASHTO Highway Safety Manual and Ohio DOT best practices.

Pennsylvania

The **Pennsylvania** DOT is developing regional safety performance factors to define its guidance for using AASHTO Highway Safety Manual analysis methods in the state. The agency plans to conduct training in 2016 on regional safety performance factors and Pennsylvania-specific crash modification factors. The Pennsylvania DOT is one of several state DOTs participating in a **Transportation Pooled Fund Program study** to expand use of the Highway Safety Manual and is using best practices from the study in its implementation efforts.

Rhode Island

The **Rhode Island** DOT dedicates a portion of its safety funds to systemic safety improvements on the state network. The agency is collaborating with local agencies to develop a Local Safety Action Plan and plans to dedicate part of its annual Highway Safety Improvement Program funds to local projects. It is also developing state-specific safety performance functions and crash modification factors for use in predictive safety analysis.

Utah

The **Utah** DOT has entered route data for nearly the entire state in the U.S. Road Assessment Program's **usRAP** software tool so it can complete statewide analysis of crash risks on the road network. The agency is using usRAP recommendations of potential project locations and countermeasures to program safety projects.

Virginia

The **Virginia** DOT published a **Traffic Operations and Safety Analysis Manual** to help project managers select the most appropriate traffic and safety analysis tools to use during the project scoping phase. The manual provides information on the data requirements and standard assumptions for each analysis tool and guidance on producing consistent output from the tools.

Washington, D.C.

The **District** DOT conducted safety reviews of several Washington, D.C., intersections and corridors and implemented safety improvements for pedestrians, bicyclists and vehicular traffic. Improvements include crosswalks, traffic signage, advance warning signs and traffic calming measures.

The District DOT is working with the Metropolitan Police Department to update the Traffic Analysis and Reporting System database to conform to the police department's new crash data. The District DOT is also adding crash data modules, query structures, reporting functions, geographic information system mapping features and dashboards to the database.

Wisconsin

The **Wisconsin** DOT is working on a project to implement the AASHTO Highway Safety Manual in the agency's guidelines and procedures, including the project development process. The agency is incorporating the manual into its intersection control evaluation process to quantify safety. It is developing state-specific safety performance functions and crash modification factors for use in safety management and project development. It is also automating parts of its safety screening analysis process to develop an online tool to map crashes and roadway geometric deficiency data.

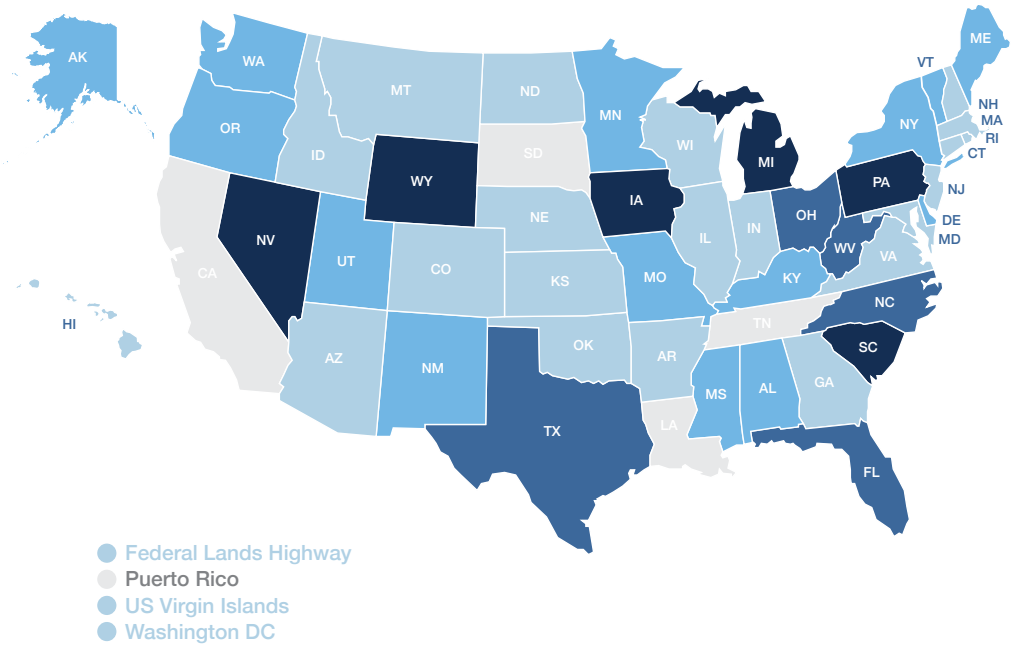
e-Construction

FHWA is encouraging 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. Six states have made e-Construction a mainstream practice. An additional 19 states are using e-Construction tools.

Current (December 2015)



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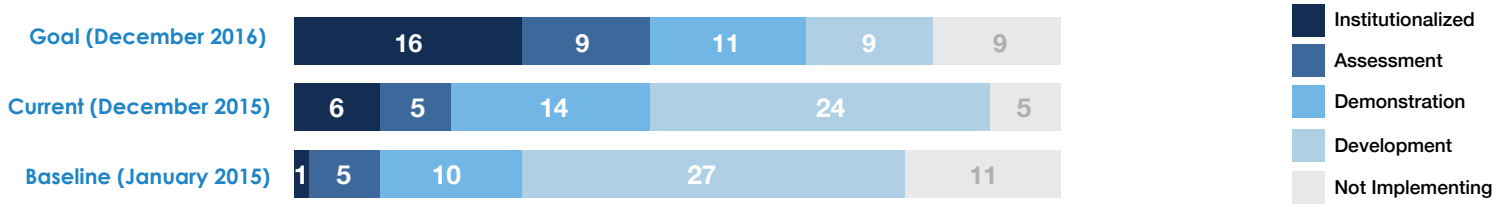

Highlights: e-Construction

Arizona

The **Arizona** DOT uses DocuSign electronic signature technology for construction contract documents, which allows faster turnaround time between the state DOT and contractors and makes it easier to identify incomplete files. It uses tablets for construction inspection, which is contributing to process improvements on projects. The agency is researching state statutes to determine if changes are needed for it to implement a paperless project bidding process.

Arkansas

The **Arkansas** State Highway and Transportation Department is exploring the use of tablets and expanding the use of laptops for field inspection and documentation. An agency pilot program uses Doc Express™ as a document management, collaboration and e-signature tool for all construction-related documentation.

Florida

The **Florida** DOT has made the decision to require e-Construction documentation process in all construction contracts let after July 1st, 2016. The Florida DOT will have approximately 500 to 600 active construction contracts in a given year. It is finishing the pilot phase of Project Solve, its collaboration tool for the department and stakeholders to conduct business in a paperless environment. As it moves forward, the department will continue to test and refine workflows using the tool. The department is also testing a mobile device manager for its tablets, which is expected to provide an easier way to deploy system and application updates.

The Florida DOT updated its construction standard specifications to reflect e-Construction implementation and developed an **e-Construction How-To Guide** for stakeholders. It held an **e-Construction peer exchange** with the Massachusetts DOT in September 2015 to discuss implementation activities and best practices.

Georgia

The **Georgia** DOT is piloting three approaches to AASHTOWare Project SiteManager data input. Three user groups will try the options for 30 days each and offer input on which works best. The target date for implementing the selected method is July 2016.

The Georgia DOT is piloting the electronic execution of four contract awards via DocuSign electronic signature technology. If the pilot goes well, the agency will move in spring 2016 to full implementation of e-signature processing instead of paper document routing. The agency is implementing ProjectWise collaboration software as an electronic filing cabinet for maintaining complete project files from concept through acceptance.

Idaho

The **Idaho** Transportation Department is reviewing its material-related forms to determine the need to update, discard or migrate them into the AASHTOWare Project SiteManager software it uses. The department plans to grant contractors limited access to SiteManager so they can enter data on their own samples and test results to save the state time.

Indiana

The **Indiana** DOT is working on a project to update computer-aided design software as a precursor to e-Construction. This involves development of an application to allow for the connection of stakeholders on a construction project to view, edit, share and manage CAD data.

The Indiana DOT is developing field applications and standards to support e-Construction. Among the apps under development are one to collect information on erosion, sediment and storm water control issues; one to gather pay item data to calculate quantities of materials installed; and one to record data for daily reports on construction crew activities.

Iowa

The **Iowa** DOT hosted e-Construction peer exchanges with the Utah DOT in November 2015 and the North Dakota DOT in December 2015. A **report** summarizes the Iowa–North Dakota peer exchange.

Highlights: e-Construction

Iowa DOT field staff use tablets for a variety of e-Construction purposes, including using the GPS function to collect location data for hot-mix asphalt cores and samples. The agency completed its first pilot project using paperless tickets at the job site and plans two more in 2016, one for hot-mix asphalt and one for portland cement concrete.

Kentucky

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

Maine

The **Maine** DOT piloted aspects of e-Construction on five projects in 2015, including the use of Mobile Inspector™ for field data collection, Dropbox for file sharing and tablets. On the Sarah Mildred Long Bridge replacement project, the contractor was a driver of using e-Construction for document management. The project is using Constructware® software to manage records, such as submittals, requests for information, approvals and correspondence.

Massachusetts

The **Massachusetts** DOT is moving forward on its plan to implement e-Construction. The agency is developing a process for an electronic inspector's daily report for use on megaprojects and an e-signature process for contract modifications. It is also working on a virtual desktop that will enable field staff to access department databases from a personal computer or tablet.

Two pilot projects involving e-Construction are underway. On the I-91 Viaduct project in Springfield, the Massachusetts DOT and the contractor are using Microsoft® 365 for project document sharing and storage. On the Commonwealth Avenue Bridge project in Boston, radio-frequency identification tags and sample barcoding are being used for precast concrete elements.

Minnesota

Project staff at the **Minnesota** DOT used the AASHTOWare Project Construction and Materials software system to manage construction documentation on seven projects. The projects involved various types of work and ranged in size from $471,000 to $1.7 million.

Mississippi

Starting in January 2016, all contractors bidding on **Mississippi** DOT projects are required to use electronic bidding. The agency is providing training opportunities on electronic bidding for contractors. The Mississippi DOT is updating to a newer version of AASHTOWare Project SiteManager to improve efficiency. For example, the update will allow electronic sample tracking with the use of bar coding. The agency is piloting electronic processing of contract change orders on projects in one district and plans to roll out the process to all districts in 2016.

Nevada

The **Nevada** DOT uses Field Manager® construction management software for all new construction projects. Before implementing the software, the Nevada DOT consulted with other states that use it, including Michigan and Utah, and trained its field staff. Now all project information is in one location and available to all agency staff, which is expected to speed up project closeouts and improve project management.

New Hampshire

The **New Hampshire** DOT is developing special provisions to include in future contracts that will require contractors to provide the equipment necessary for electronic grade control.

New Mexico

Starting in September 2015, the **New Mexico** DOT implemented mandatory e-bidding. The agency uses Bid Express® as the e-bidding tool. The agency worked with the state's contracting community to inform stakeholders about the new requirement and train them on the e-bidding process.

Highlights: e-Construction

Pennsylvania

The **Pennsylvania** DOT uses its Project Collaboration Center, a SharePoint-based document management system, on all new projects. Recent enhancements include the ability to create document storage folders for future archiving in the agency's Electronic Document Management System and an advanced search feature to make it easier to find documents.

Pennsylvania's Engineering and Construction Management System website was expanded to include the CDSv3 construction documentation system, which allows for input of project site activities and generates estimated payments and project works orders. The system is being used on projects of all sizes and complexities.

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 where inspectors can check the status of items.

South Carolina

The **South Carolina** DOT shares all correspondence on design-build projects, including design plans for review, through ProjectWise collaboration software. Several districts are piloting the use of ProjectWise on projects and testing tablets for real-time data entry on AASHTOWare Project SiteManager. All plans and proposals are available to contractors through the South Carolina DOT extranet.

Texas

The **Texas** DOT, which institutionalized electronic bidding in 2009, is updating its software from a client-based application to a web-based system. The new system is scheduled for implementation in March 2016. The department deployed e-signatures in 2015 and uses them to execute all project documents.

Vermont

The **Vermont** Agency of Transportation completed a demonstration project on the Electronic Field Book data collection system in 2015 and is on track to use it on all construction projects in 2016. The mobile-enabled version of AASHTOWare Project SiteManager was tested during the 2015 construction season. The agency will use feedback from the test to guide future deployment of this tool.

Washington

The **Washington State** DOT's Headlight pilot project deployed 100 tablets in 13 offices across the state for use in project inspections. Based on user feedback, the agency is working with the software developer to refine the inspection application to make it more effective and user friendly.

The Washington State DOT developed an electronic content management program to provide long-term archiving of final contract records that complies with state law. An agency project office used the ECM Portal in a pilot project. Rollout of the program is expected in March 2016.

West Virginia

The **West Virginia** DOT conducted an e-Construction peer exchange with colleagues from the Arkansas State Highway and Transportation Department in October 2015. The participants provided insights on e-Construction initiatives in both states, which are documented in a **report**.

The West Virginia DOT plans to pilot Doc Express digital signature technology on three construction projects to determine whether any workflow, feasibility or legal issues arise. The agency is developing a process to enable digital approval of design engineers' plan sheets. The agency is working with the contracting industry to develop electronic weight tickets for asphalt and concrete.

Wyoming

The **Wyoming** DOT 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. The agency 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 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. Eight states have adopted GRS-IBS technology as a standard practice and use it regularly where appropriate. An additional 27 states, Washington, D.C., Puerto Rico and Federal Lands Highway have used GRS-IBS on projects or are preparing for full deployment of the technology.

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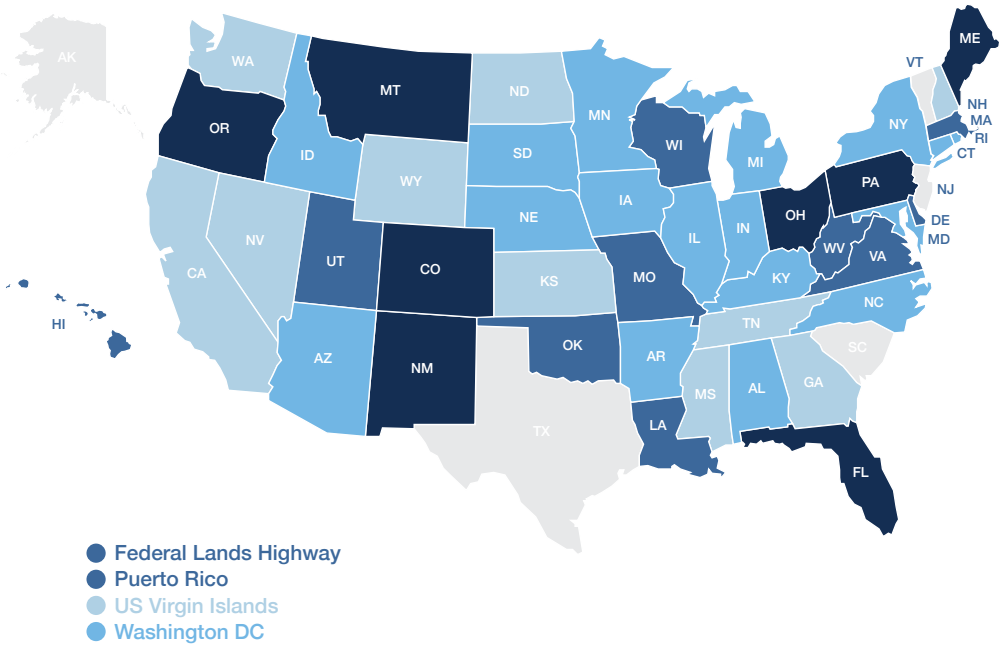
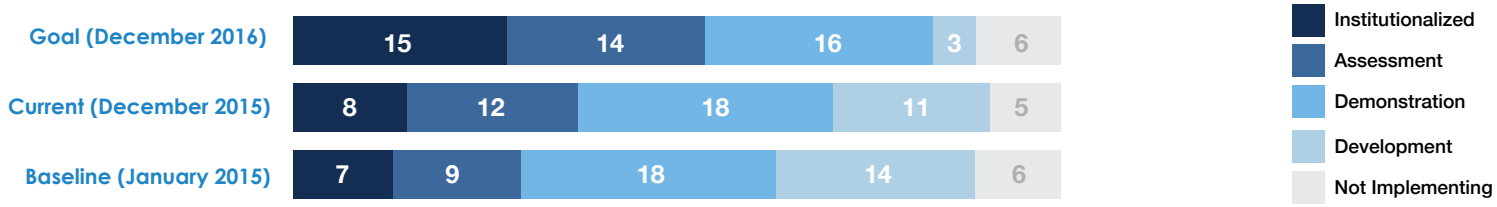


Number of States in Various Implementation Stages



Highlights: Geosynthetic Reinforced Soil-Integrated Bridge System

Arizona

The **Arizona** DOT received funds from the STIC Incentive program to develop GRS-IBS specifications. The specifications will enable the agency to incorporate GRS-IBS structures into its bridge inventory where appropriate.

Colorado

An October 2015 showcase in Aurora enabled transportation professionals to observe GRS-IBS construction on a bridge replacement project on I-70 over Smith Road and the Union Pacific Railroad. The **Colorado** DOT project—the nation's first to use GRS-IBS technology on a three-span highway bridge—involved removing the superstructures and replacing them with wider, 60-foot structures. The showcase included a workshop with presentations on GRS-IBS technology and case studies.

Federal Lands Highway

The Dennehotso Bridge over Laguna Creek in Apache County, Arizona, opened in summer 2015. Crews on the **Federal Lands Highway** project used GRS-IBS technology to replace the bridge, which is on a route that serves as a local access road for the Dennehotso Navajo Chapter. The new bridge will enable the narrow stream channel to be widened, resulting in fewer flooding events.

Indiana

The **Indiana** DOT, Local Technical Assistance Program and FHWA are collaborating to promote the use of GRS-IBS technology in the state. Demonstrations and instructional activities include time-lapse videos of construction of Indiana's first GRS-IBS abutments in Hamilton County, **Bridge 301 East Abutment** and **Bridge 301 West Abutment**. Hamilton County—one of four Indiana counties that participated in a GRS-IBS peer exchange sponsored by FHWA—plans to build four more GRS-IBS bridges in the next few years. Other counties have expressed interest in using the technology.

Louisiana

Representatives of the **Louisiana** Department of Transportation and Development and local parishes observed GRS-IBS construction in Vermilion Parish at a September 2015 showcase. The first bridge is completed on the project to replace the **Maree Michel and Creek Bridges** on Louisiana Highway 91, and the second is under construction. Showcase participants heard presentations by GRS-IBS experts, and several parish officials expressed interest in using GRS-IBS on future projects.

Highlights: Geosynthetic Reinforced Soil-Integrated Bridge System

Maine

The **Maine** DOT used maintenance staff instead of a contractor to build its third GRS-IBS, saving about $100,000 on construction costs. The agency reports that using GRS-IBS technology to build the 8-foot span took less time than expected, which reduced road closure time. Ease of construction was also a benefit.

The Maine Audubon Society is promoting GRS-IBS through its Stream Smart Program as a positive environmental option for stream crossings. A Maine Audubon **video** uses a culvert replacement project in Bremen as an example. The Maine DOT chose GRS-IBS for the project to provide a wider passage for fish than the original culvert. The reduced construction time needed for GRS-IBS compared to a traditional bridge minimized stream disturbance and the impact on protected resources in the area.

Oregon

The **Oregon** DOT updated its **Geotechnical Design Manual** in September 2015 with the addition of GRS-IBS design guidance.

Pennsylvania

GRS-IBS technology is fully implemented in Pennsylvania. It has been incorporated into the **Pennsylvania** DOT's publications and standards and is considered a tool in its construction toolbox. Pennsylvania DOT districts and local agencies are installing GRS bridges on their own, without added guidance from the Central Office.

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 Puerto Rico Highways and Transportation Authority included a chapter on GRS-IBS abutments in its Bridge and Structures Design Manual. The authority's GRS-IBS specification is under review.

Washington, D.C.

The **District** DOT's first GRS-IBS project replaced the 27th Street Bridge over Broad Branch during summer 2015. Using GRS-IBS technology rather than traditional methods to construct the 40-foot substructure saved the agency about $200,000.

Improving Collaboration and Quality Environmental Documentation

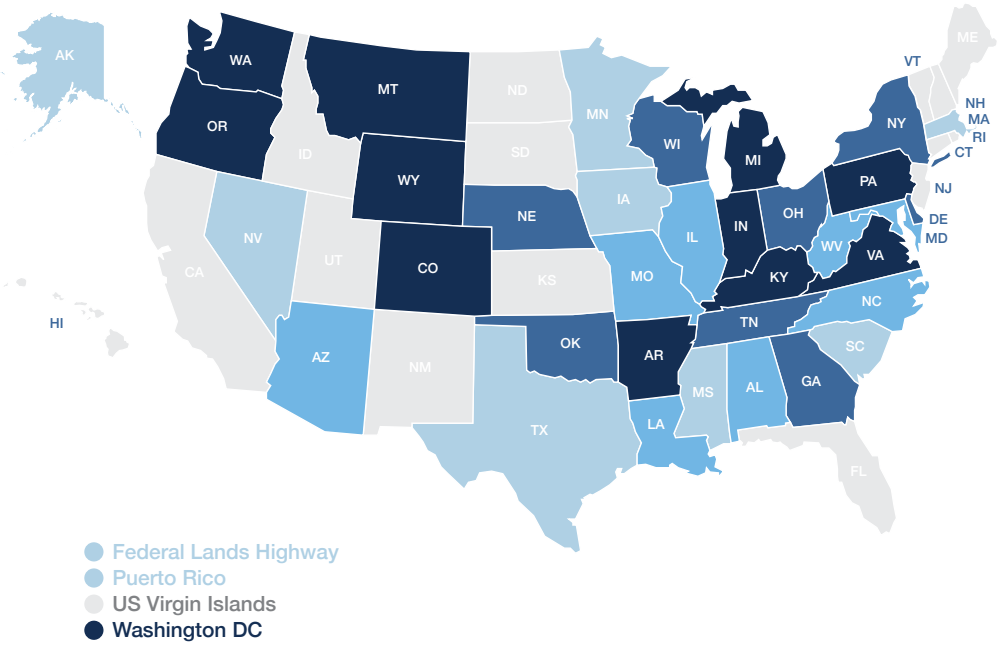
Shortening the time needed for National Environmental Policy Act approval for construction projects is a core need of the transportation community. Through the improving collaboration and quality environmental documentation effort, EDC-3 supports tools to foster collaborative, timely and transparent 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, or IQED, effort that started in EDC-2 promotes best practices for simplifying and expediting the development of environmental documents. EDC-3 also incorporates eNEPA, an online workflow tool FHWA created for projects that require an environmental impact statement or environmental assessment. For EDC-3 progress reporting, the implementation stages for eNEPA are based on deployment of eNEPA or any other form of electronic documentation/collaboration system. An equivalent documentation/collaboration system is defined as an electronic document sharing system which facilitates collaboration among 2 or more agencies.

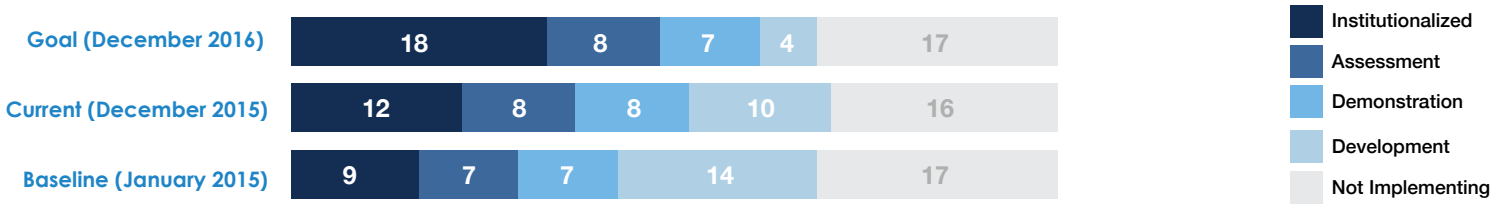
IQED

Strategies to implement quality environmental documentation are now a mainstream practice in 11 states and Washington, D.C. Sixteen states have piloted the use of IQED principles on NEPA documents or preparing for full deployment of IQED.

Current (December 2015)



Number of States in Various Implementation Stages



eNEPA

Conducting NEPA review processes electronically is now a standard practice in two states. Eight states are demonstrating and assessing eNEPA.

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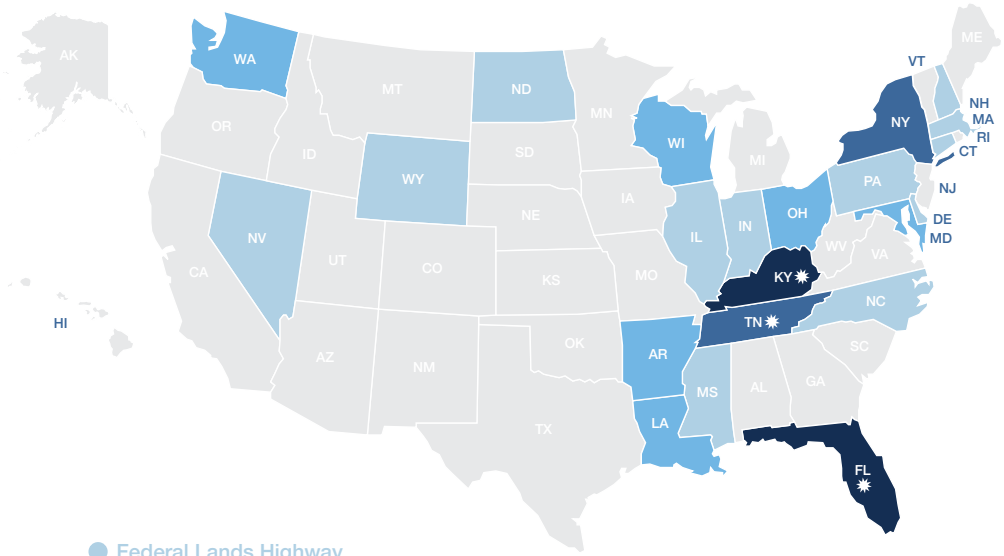
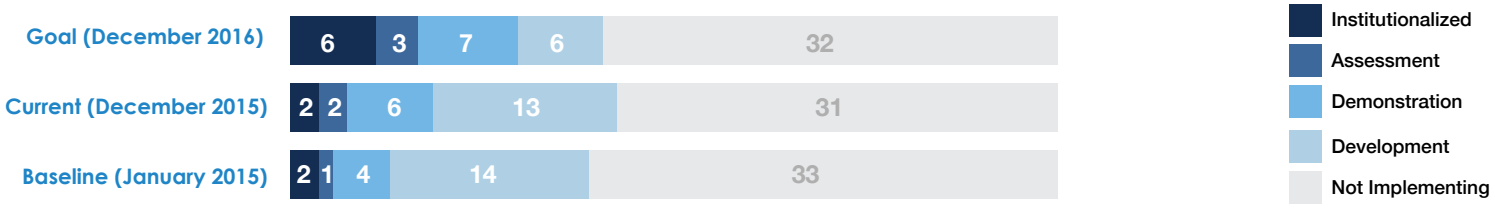


✷ Using an eNEPA equivalent form of electronic documentation/collaboration system

Number of States in Various Implementation Stages



Highlights: Improving Collaboration and Quality Environmental Documentation

Arkansas

The **Arkansas** State Highway and Transportation Department is using a simplified environmental assessment format on noncontroversial projects and projects with minor impacts. The department reports that the simplified format takes less time to complete than standard-format environmental assessments and produces documents that are more understandable to the public. It is evaluating the use of eNEPA on two projects, including one that involves multiple agency reviews.

Federal Lands Highway

Federal Lands Highway applied IQED principles when it crafted the environmental assessment for improvements on Raphune Hill Road and Route 381 in the U.S. Virgin Islands. It kept the document brief—32 pages without appendices—while ensuring legal sufficiency. It incorporated visualizations in the document design to help tell the project story.

Illinois

The **Illinois** DOT created a training course that included an overview of NEPA and the core principles of developing quality environmental documents. This training was held five times in 2015. The Illinois DOT is collaborating with FHWA to update the environmental policy chapters of the Bureau of Design and Environment Manual to include IQED principles and processes.

Louisiana

The **Louisiana** Department of Transportation and Development requires staff and consultants to apply IQED principles when developing NEPA documents for new construction projects. The agency uses AASHTO's **Preparing High-Quality NEPA Documents for Transportation Projects** as a reference for document preparers. The Louisiana agency plans to use the eNEPA tool to develop an environmental assessment and a supplemental environmental impact statement on the U.S. 90 and I-49 South projects.

Massachusetts

The **Massachusetts** DOT developed a guidance document on **Improving the Quality of Environmental Documentation** that it posted on its website and distributed to the American Council of Engineering Companies of Massachusetts.

Mississippi

The **Mississippi** DOT is finalizing an Environmental Policy Manual and a training course for local agencies on Section 106 of the National Historic Preservation Act. Both efforts focus on preparing quality environmental documents that are accessible to readers.

The agency's environmental collaboration website provides a mechanism for coordination with other agencies on document reviews and project development. The Mississippi DOT used eNEPA during the environmental impact statement development process for a bridge replacement project with an adjoining state.

Highlights: Improving Collaboration and Quality Environmental Documentation

North Carolina

The **North Carolina** DOT used IQED principles when it developed a draft environmental impact statement for the Complete 540 project to extend the Triangle Expressway in the Raleigh area. The state's Kinston Bypass project to make improvements on the U.S. 70 corridor is serving as a geographic information system 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.

Pennsylvania

The **Pennsylvania** DOT institutionalized IQED for environmental assessments and environmental impact statements. It updated chapters 4 and 5 of its **Design Manual Part 1B** to incorporate IQED principles, including those outlined in AASHTO's Preparing High-Quality NEPA Documents for Transportation Projects.

West Virginia

The **West Virginia** DOT used IQED principles to prepare environmental assessment and finding of no significant impact documents for the PFC Abraham G. Sams Memorial Bridge project. Building on its success, the agency used the same format to develop reader-friendly documents for the Thurmond Bridge rehabilitation project.

Wisconsin

The **Wisconsin** DOT added IQED principles to the environmental chapters of its Facilities Development Manual. IQED principles are also part of environmental training sessions for staff in the agency's five regions.

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 encourages agencies and railroads to identify issues and negotiate agreements to expedite development of highway projects involving railroad rights-of-way. It uses a model agreement library, tools and training developed under the SHRP 2 R16 project, which enables agencies and railroads to identify sources of conflict and develop memorandums of understanding for project and program needs.

Nine states have institutionalized the use of tools and practices to improve DOT and railroad coordination. Another six states and Washington, D.C., are piloting the innovation or preparing for full deployment.

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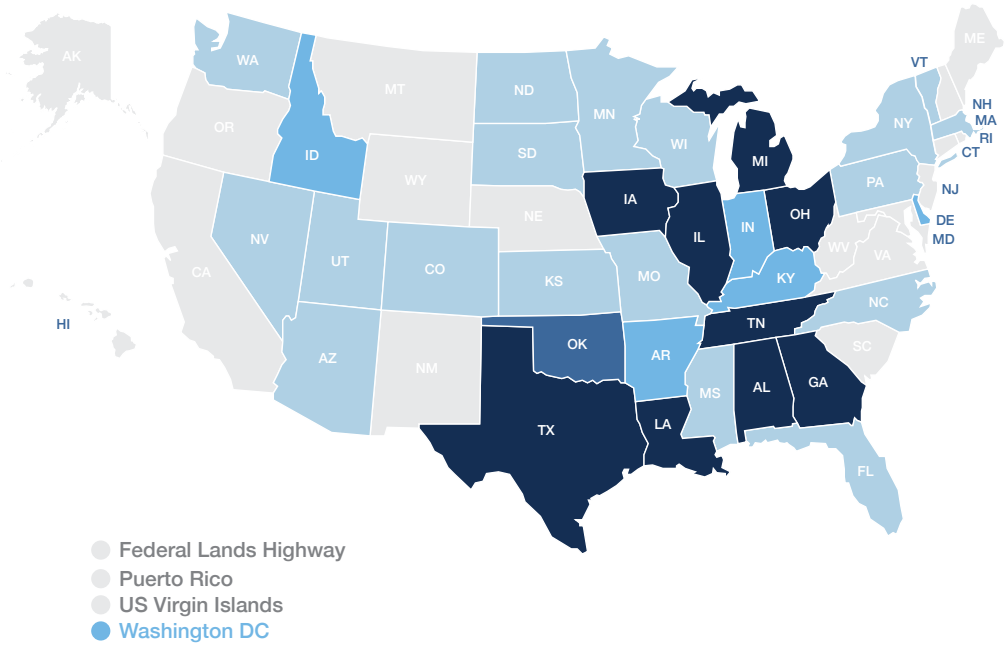

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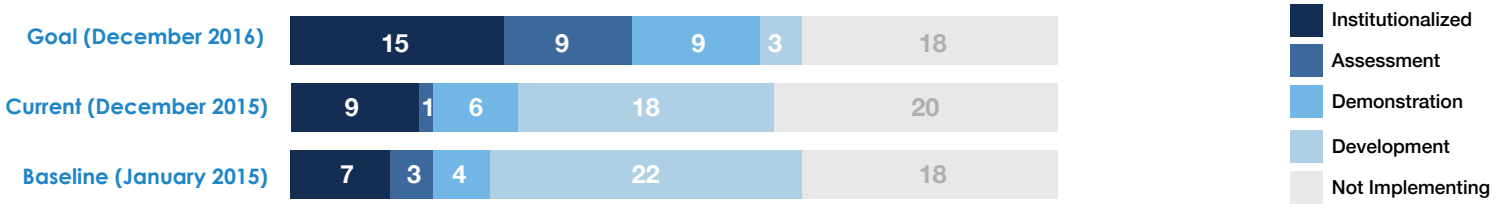


Highlights: Improving DOT and Railroad Coordination

Alabama

Alabama DOT staff meet regularly with county engineers, railroad representatives and FHWA staff to coordinate on railroad-related issues, such as the railroad agreement and invoicing process. The Alabama DOT collaborated with railroad officials to write new railroad crossing guidance, published in November 2015, for developing Federal-Aid Highway Program projects that involve railroad property.

Arizona

Coordination with railroad partners enabled the **Arizona** DOT to complete a recent project in record time. The agency's next step is to make project coordination with railroads a normal operating procedure. The Arizona DOT is working with Union Pacific Railroad and BNSF Railway to develop a joint definition of 100 percent plans for railroad approval and achieving quality railroad agreements.

Arkansas

The **Arkansas** State Highway and Transportation Department is working with Union Pacific Railroad to develop flow charts for various processes on or near railroad property, such as maintenance activities and grade separation construction projects.

Colorado

The **Colorado** DOT completed a memorandum of understanding and draft master agreement with BNSF Railway. The department's master agreement amendment No. 1 with Union Pacific Railroad is complete and in use. The Colorado DOT is working on a flow chart of railroad processes with time lines.

Delaware

The **Delaware** DOT is using SHRP 2 funds to develop master agreements with each of the seven railroad companies it works with to streamline the process for construction projects. The agency signed a maintenance agreement with Norfolk Southern Railway for railroad crossings in the pavement rehabilitation program. It is updating its record master agreement with CSX.

Idaho

The **Idaho** Transportation Department collaborated with railroad stakeholders on a project to create master agreements with the primary railroad companies operating in the state. The Idaho Transportation Department and BNSF Railway agreed to keep their existing agreement. The department approved and Union Pacific Railroad is reviewing a draft master agreement for the two organizations. Secondary railroads in the state agreed to follow the agreement approved by the department and Union Pacific Railroad.

Iowa

The **Iowa** DOT developed an online road worker safety training program that inspection staff on railroad-related projects now use. The agency developed standard specifications for work on or near Union Pacific Railroad, Canadian Northern Railway and Canadian Pacific Railway property. The Iowa DOT is finalizing specifications for work involving BNSF Railway property and developing specifications for short-line railroads in the state.

Michigan

The **Michigan** DOT has master agreements with most of the railroads that operate in the state. The agreements cover the selection, design, construction, funding and administration of railroad-highway grade crossing improvement projects.

Highlights: Improving DOT and Railroad Coordination

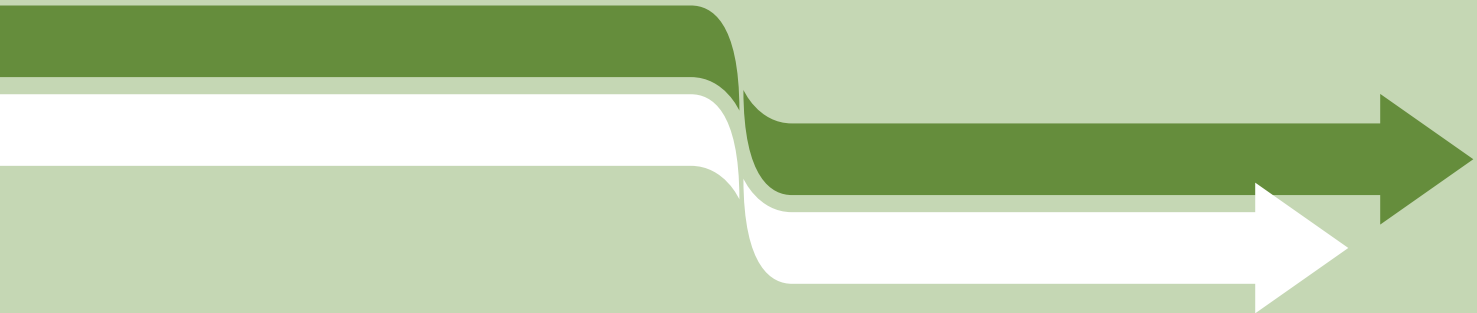
Tennessee

The **Tennessee** DOT 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 in project development processes. For example, the Tennessee DOT worked with Norfolk Southern to streamline the process for resurfacing projects, which reduced the time it takes for railroad approvals.

Tennessee DOT 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. The department 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. It includes railroad special provisions in every construction contract with railroad involvement.

Texas

The **Texas** DOT 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 has dropped from more than 12 weeks to three or four. For maintenance agreements, which represent two-thirds of state projects involving railroads, turnaround time for a fully executed agreement now averages less than a month.



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 is continuing 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 decision-making 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 17 states. Another five states are making progress on their efforts to establish stakeholder partnering groups of local, state and federal representatives.

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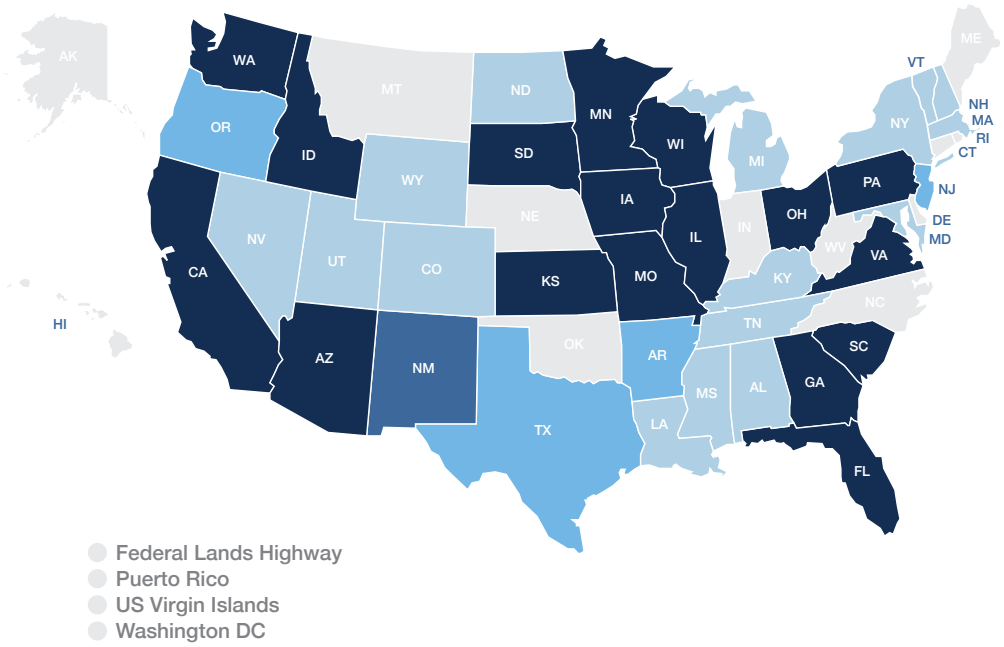

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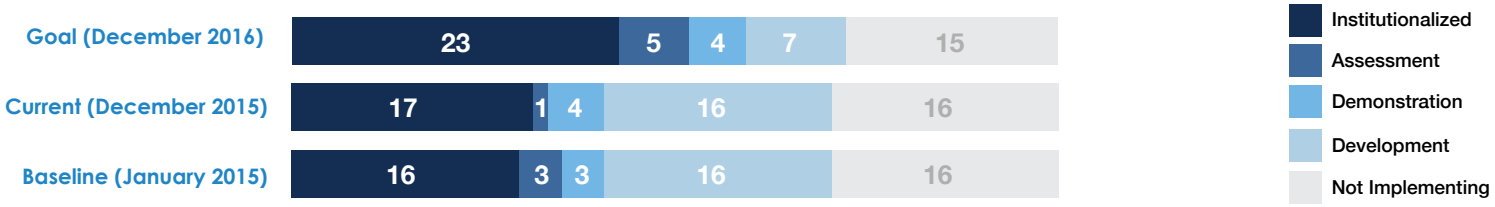

Highlights: Locally Administered Federal-Aid Projects: Stakeholder Partnering

Maryland

The **Maryland** State Highway Administration completed a draft of a local public agency manual that it plans to publish in 2016. The agency is moving forward on plans to establish a local agency council in 2016 to improve delivery and oversight of local projects under the Federal-Aid Highway Program.

New Hampshire

The **New Hampshire** DOT is developing a plan and charter to establish a local agency stakeholder partnering group in 2016. The purpose of the group, which will have about a dozen members, will be to foster better understanding of local agency processes and programs, enhance communication among stakeholders and identify areas for improvement. Department staff participated in the December 2015 EDC Exchange on Stakeholder Partnering to learn about the challenges and successes of other state DOTs in forming stakeholder partnering groups.

New Mexico

The **New Mexico** DOT is finalizing revisions of its Tribal/Local Public Agency Handbook. The agency completed three training sessions for local and tribal governments on local project implementation in 2015 and plans to conduct additional sessions in 2016.

Ohio

The Ohio Local Public Agency Advisory Group meets twice a year to discuss topics such as the project development process, local agency funding, construction administration and right-of-way issues. Members represent the **Ohio** DOT, Local Technical Assistance Program Center, FHWA, municipal planning organizations, cities, counties, associations and the contracting community. In addition to improving communication between local agencies and the Ohio DOT, the group has used the expertise of its members to guide policy and program initiatives. The group helped gain statewide acceptance of and compliance with the Ohio DOT's local public agency qualification process and developed documents to streamline local project planning.

South Dakota

The Transportation Advisory Council—the **South Dakota** DOT'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.

Texas

The Local Government Project Procedures Update Advisory Committee provides user community input on the **Texas** DOT's local agency program and helps develop new and improved tools for agencies to use. The advisory group was instrumental in the development of an online toolkit the Texas DOT released in summer 2015 to help local governments navigate the complexities of locally administered Federal-Aid Highway Program projects. The toolkit includes three new resources on local transportation project development—a policy manual, a management guide and a best practices workbook. The state's local government project procedures training curriculum was updated to incorporate the new tools.

Virginia

The **Virginia** DOT's fourth annual Local Programs Workshop in fall 2015 enabled participants from local and state agencies and private industry to exchange information and ideas. The workshop provided an overview of local programs and training on program management and project development. Virginia DOT staff discussed the department's stakeholder partnering effort, which includes several groups associated with local programs, in a presentation at the **EDC Exchange for Local Agencies** in December 2015.

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 is promoting 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 17 states. Metropolitan planning organizations, state transportation departments and other stakeholders in seven states and Federal Lands Highway are at the demonstration stage on the innovation.

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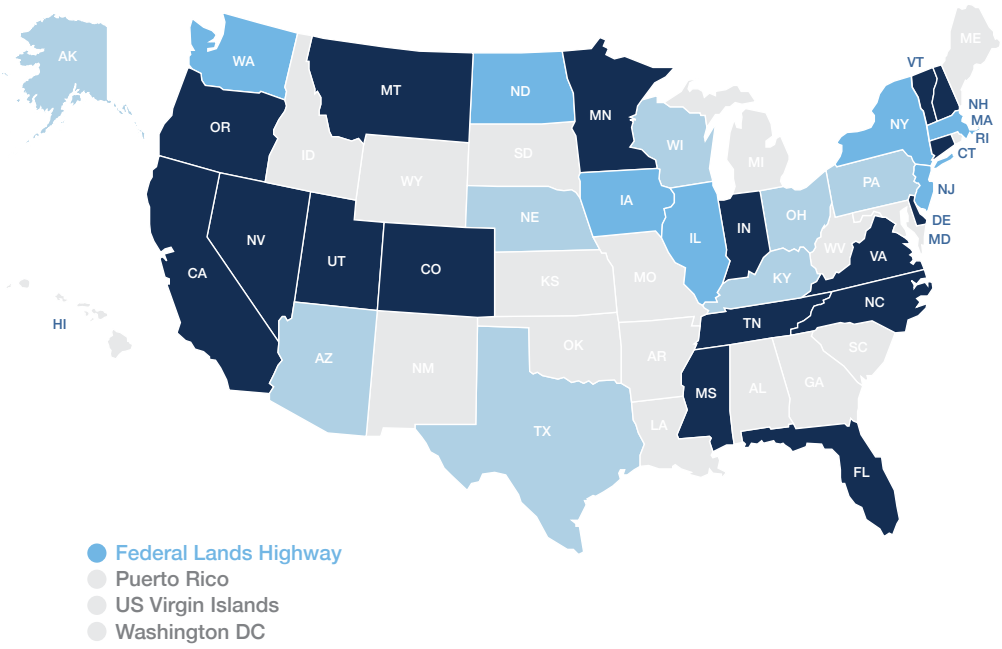

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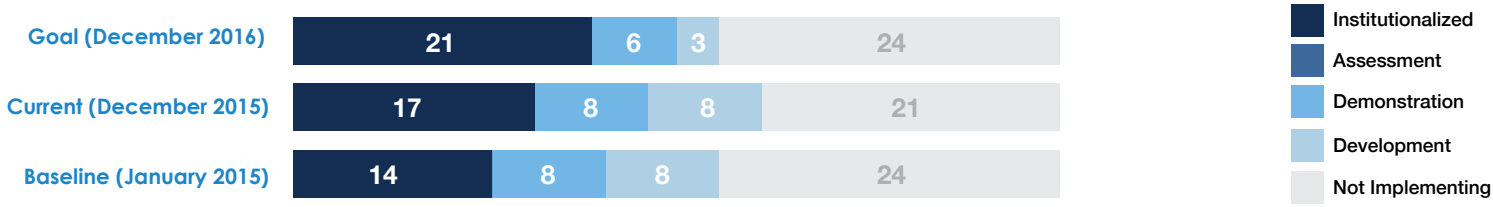
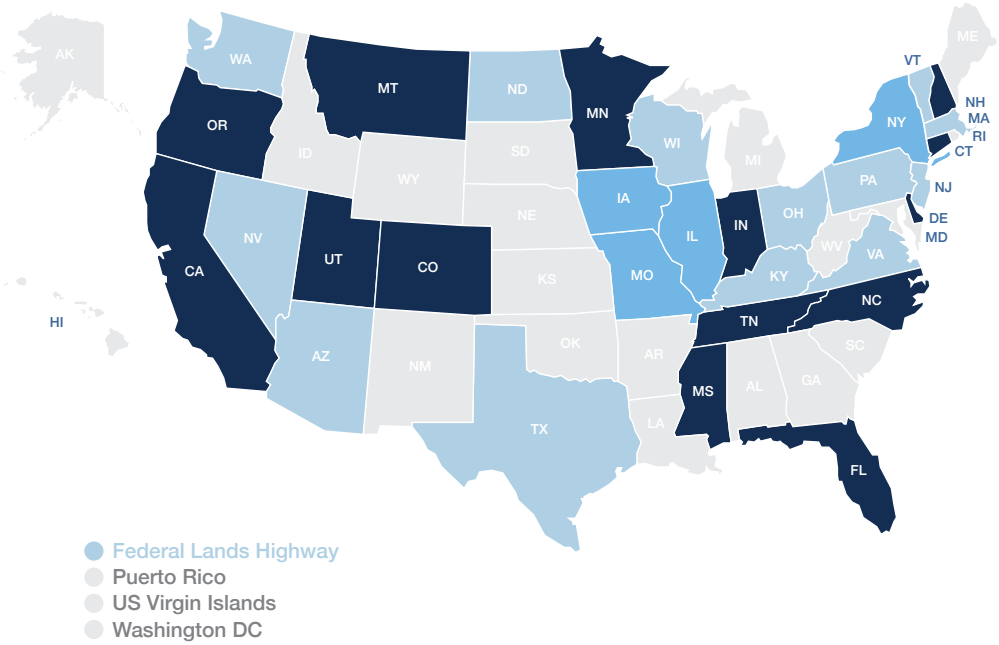


Data Models and Tools

Metropolitan planning organizations, state transportation departments and other stakeholders in 14 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 2015)



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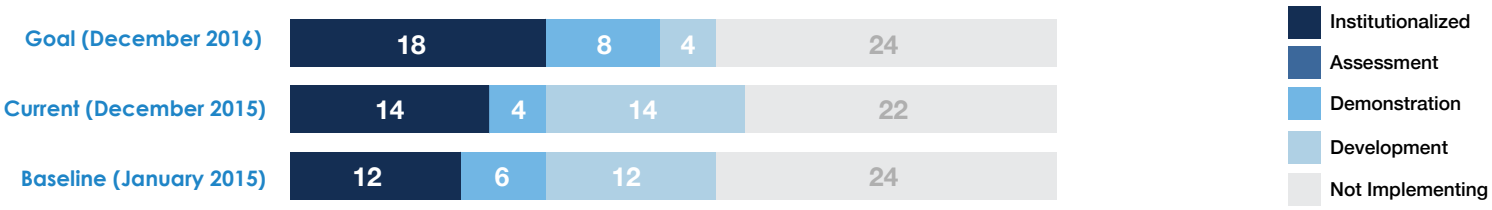

Highlights: Regional Models of Cooperation

Arizona

Several efforts are underway as a result of the Freight Transportation Framework Study that examined freight and multimodal opportunities in the Arizona Sun Corridor. The **Arizona** DOT, for example, is cooperating with stakeholders on an Arizona State Freight Plan, and the Maricopa Association of Governments is developing a regional freight plan.

The Maricopa Association of Governments, Sun Corridor Metropolitan Planning Organization, Arizona DOT and Arizona Department of Environmental Quality are developing a memorandum of understanding on responsibilities and processes for transportation planning in Pinal County. The agreement will enhance coordination of planning activities, modeling and air quality conformity in the county.

The Transportation and Trade Corridor Alliance is developing a statewide foreign direct investment strategy to assess the state's assets and identify approaches to enhance investment. This includes identifying transportation infrastructure projects that have potential as public-private partnerships.

Connecticut

Connecticut has institutionalized regional models of cooperation by coordinating studies and planning activities through the **Connecticut** DOT. The agency runs air quality conformity determinations for metropolitan planning agencies' long-range plans. It is developing a statewide freight plan that includes input from metropolitan planning organizations.

The Connecticut DOT provides travel demand modeling for statewide and regional corridor analysis. It is working on a model that will include areas outside the state—including Massachusetts, New York and Rhode Island—and enable better coordination on future studies.

Delaware

The 2015 Mid-Atlantic Regional Planning Roundtable Conference in Wilmington was a joint effort of the Wilmington Area Planning Council, Baltimore, Maryland, Metropolitan Council and Philadelphia, Pennsylvania, area Delaware Valley Regional Planning Commission. The conference enabled participants to review progress on projects involving multiagency collaboration, such as the new Delmarva Freight Plan. The Mid-Atlantic Roundtable has fostered communication and coordination on regional transportation issues since 2005.

Florida

The **Florida** DOT is coordinating with metropolitan planning organizations to develop transportation-related performance measures and data collection processes. A Statewide Multimodal Mobility Performance Measures Team is spearheading the effort, which focuses on Fixing America's Surface Transportation Act and Moving Ahead for Progress in the 21st Century Act requirements for performance measures. The Florida DOT plans to conduct a pilot study with four metropolitan planning organizations to consider a unified approach to supplying bridge, pavement, safety and mobility performance data.

Iowa

The **Iowa** DOT is collaborating with metropolitan planning organizations in Iowa City and Cedar Rapids on a commuter transportation study of transit options between the two cities. The team is looking at a variety of transit options and developing cost estimates for each.

Mississippi

The **Mississippi** DOT is completing a long-range transportation plan concurrently with the state's coastal and regional metropolitan planning organizations. Working together enables the organizations to coordinate efforts to address traffic congestion, safety and commerce. The Mississippi DOT is incorporating the State Freight Plan developed by planning organizations and freight stakeholders into its long-range plan.

Highlights: Regional Models of Cooperation

Nebraska

The Omaha region's Metropolitan Area Planning Association is conducting a travel improvement study. The study's first phase involved gathering data from 17 local jurisdictions, Omaha Metro Transit, the **Nebraska** Department of Roads and the Iowa DOT. The second phase is a scenario-planning exercise to develop a multimodal jurisdictional approach to achieving transportation goals.

Nevada

The **Nevada** DOT, metropolitan planning organizations and FHWA are coordinating their long- range plan updates to ensure that their financial forecasting and project classification methods are similar. That enables the organizations to better compare and measure multimodal project costs and benefits on a regional level.

Nevada's Performance Measures Working Group—which includes transportation agencies and metropolitan planning organizations—finalized a list of measures that will be used to monitor statewide transportation system performance. The Nevada DOT and Washoe County Regional Transportation Committee are coordinating on planning studies for I-80 and the North Valleys area. The effort includes sharing data and information on potential improvements and creating a unified approach to public outreach.

New Hampshire

The **New Hampshire** DOT and four metropolitan planning organizations are working through a Performance-Based Planning Work Group to establish common performance measures and objectives. The group received a SHRP 2 Implementation Assistance Program grant to use the **PlanWorks** tool to assess the scope of performance-based planning among the state's transportation stakeholders.

The state's metropolitan planning organizations worked with the New Hampshire DOT to execute planning and programming agreements that document a collaborative approach to ensure cross-border urbanized area and transportation management area cooperation. The agreements are designed to ensure that the appropriate communities are included in metropolitan planning processes.

Highlights: Regional Models of Cooperation

New Jersey

New Jersey's Complete Team brings together transportation planners and operators to facilitate regional planning, investment decision making and efficient operations. The team includes the **New Jersey** DOT, metropolitan planning organizations, FHWA, Federal Transit Administration, NJ Transit, Port Authority of New York and New Jersey and New Jersey Turnpike Authority. The team shares best practices and discusses coordination opportunities on topics such as connected vehicles, congestion management and system performance evaluation.

The Central Jersey Transportation Forum is focusing on regional awareness of transportation funding challenges and is looking at alternatives to program funding shortfalls. The forum is also informing stakeholders about transportation planning best practices, part of its effort to assist municipalities with local planning strategies and encourage support of the Route 1 Regional Growth Strategy.

The Bicycle and Pedestrian Advisory Council includes metropolitan planning organizations. Accomplishments the council has contributed to include New Jersey's "Stop and Stay Stopped" pedestrian safety law, a comprehensive review of bike laws and a **New Jersey Bicycling Manual** on safe bicycling.

North Dakota

North Dakota's three metropolitan planning organizations are working through the Upper Great Plains Transportation Institute to collaborate on traffic models for their organizations. The two bistate organizations—the Fargo-Moorhead Metropolitan Council of Governments and the Grand Forks-East Grand Forks Metropolitan Planning Organization—coordinate on planning and programming efforts in North Dakota and Minnesota.

Ohio

Ohio agencies summarized how they use regional models of cooperation to coordinate transportation planning in an **online compendium**. The summary features 11 examples of collaborative, multijurisdictional planning processes and tools used in the state. They include the Connecting Communities initiative to improve coordination between land use and transportation and the Mid-Ohio Regional Planning Commission's DataSource tool to create maps, charts and other visualizations.

Utah

Utah transportation agencies and metropolitan planning organizations published their third **Unified Transportation Plan**, which identifies road, transit, bike and pedestrian infrastructure needs in the state from 2015 to 2040. The **Utah** DOT, Utah Transit Authority and metropolitan planning organizations developed the financial, demographic and growth assumptions used in the plan and agreed on performance measures to gauge success. They also created a mobile application that enables the public and other stakeholders to access information on projects.

Virginia

The **Virginia** Department of Rail and Public Transportation and Virginia DOT cooperated on the development of multimodal design guidelines, which the Virginia DOT has incorporated into its design manuals. As a result of this effort, alternative development and roadway designs are being considered across the state to encourage the use of multiple modes of transportation.

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 is encouraging 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 for 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 has attracted widespread interest across the country. They are a standard practice in 11 states and Washington, D.C. Another 30 states are installing road diets and developing processes for identifying potential sites for roadway reconfiguration.

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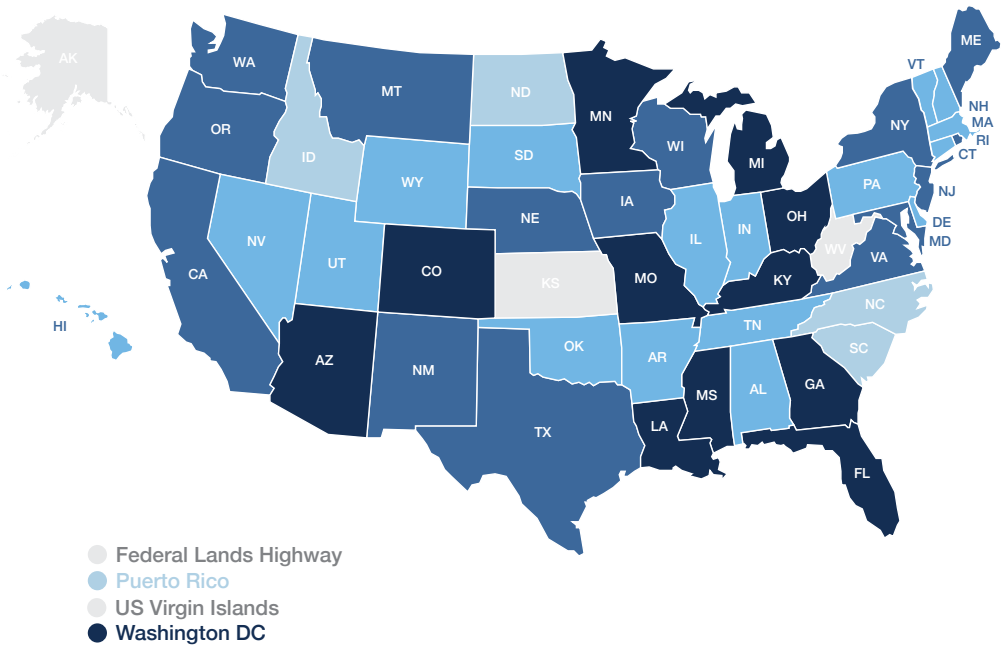

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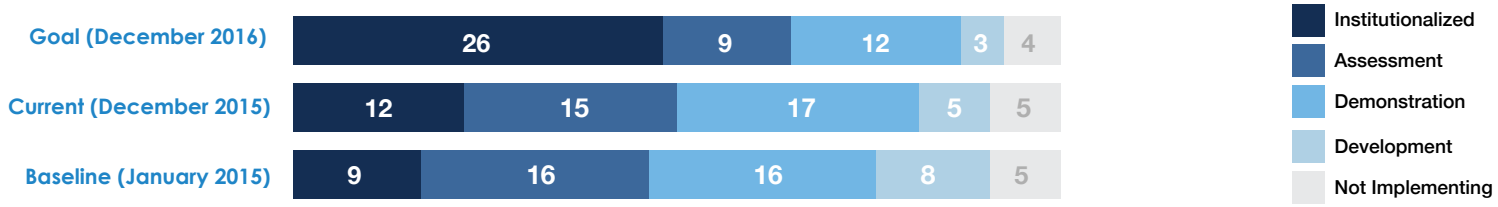


Highlights: Road Diets (Roadway Reconfiguration)

Arizona

Road diets are institutionalized in Phoenix, which implemented a Comprehensive Bicycle Master Plan and complete streets ordinance. Both efforts rely on road diets to improve safety and add bike and pedestrian facilities. The city completed baseline measurements on conditions for instituting road diets and drafts of a complete streets policy and design details document. It also developed a list of performance measures on which to judge progress over time.

Connecticut

The **Connecticut** DOT awarded its first road diet project, located on U.S. 44 between U.S. 5 and Mary Street in East Hartford. The project, which adds bicycle lanes, is designed to enhance the safety of pedestrians and cyclists. The project area was identified as a good candidate for a road diet after a review of crash data found six crashes involving bicycles and eight involving pedestrians in the past three years.

The city of Waterbury is designing a road diet for Freight Street as part of its Waterbury Active Transportation and Economic Resurgence Project, which received a TIGER grant from the U.S. Department of Transportation. The city of New Britain is implementing a streetscaping plan that includes road diets to make the city more pedestrian and bicyclist friendly.

Indiana

Road diets are part of the **Indiana** DOT's Common Paths approach to roadway planning, design and decision making that balances the needs of various travel modes to ensure safe, efficient and accessible transportation for all users. The agency introduced the road diet concept in fall 2015 during Common Paths workshops for designers, engineers, planners and decision makers at the state and local levels.

Iowa

The **Iowa** DOT approved funds for an effort to expand the use of road diets in the state. The funds will be used to update the agency's road diet guidance, develop training and create a public awareness campaign.

Maine

The **Maine** DOT routinely considers road diets to enhance safety and mobility based on site analysis and is developing guidelines for road diet projects. The agency temporarily reconfigured a section of Route 202 in Manchester using road diet concepts so that it could test the effectiveness of the configuration. The road was reconfigured from two eastbound lanes and one westbound lane to one eastbound lane, one westbound lane and a center left-turn lane.

Maryland

The **Maryland** State Highway Administration has two road diet projects under construction. The agency is adding bicycle lanes on Maryland Route 170 from MD 648 to MD 762 and on U.S. 1 from U.S. 1 Alternate to the Baltimore city line. The agency plans feasibility studies to select additional road diet projects using criteria such as average annual average daily traffic of more than 20,000 vehicles, a road width of 48 or more feet, and proximity to transit facilities and bicycle destination points.

Massachusetts

The **Massachusetts** DOT is combining STIC Incentive and state funds on a project to develop guidance on road diets. The project includes evaluating best practices for road diet projects, reviewing road diet locations in Massachusetts to determine the effectiveness of the projects, developing a road diet policy, and conducting training for and outreach to municipalities and other stakeholders.

Michigan

The **Michigan** DOT developed a checklist for road diet projects to assure smooth administrative procedures and established a crash reduction factor for use in justifying Highway Safety Improvement Program funding. The agency has used road diets totaling 54.1 miles on 60 state corridors and 88.3 miles on 94 local corridors.

Highlights: Road Diets (Roadway Reconfiguration)

Missouri

A Kansas City study identified 46 undivided four-lane streets that could benefit from installation of a road diet. Recently completed Strategic Highway Safety Plans for St. Charles and Franklin Counties include road diet strategies. A number of road diet projects have been completed in Columbia, Kansas City and Springfield.

Nebraska

The **Nebraska** Department of Roads has three road diet projects in development, two in Omaha and one in Grand Island. The department is considering other potential locations for road diets.

New Jersey

The **New Jersey** DOT promotes implementation of road diets to address high pedestrian crash rates in the state. Installing road diets is a recommended strategy in the Comprehensive Strategic Highway Safety Plan and Pedestrian Safety Action Plan. The agency is developing a checklist to use when analyzing a highway segment to determine the feasibility of installing a road diet.

The New Jersey DOT identified two projects incorporating road diets that will be funded under the state's Highway Safety Improvement Program. Its evaluation of a completed road diet on Route 45 found positive results. In addition to implementing road diets on state roads, the New Jersey DOT is working with metropolitan planning organizations to identify potential projects on local and county roads.

Ohio

The **Ohio** Local Technical Assistance Program launched a new training module on road diets. The module "Introduction and Why Consider a Road Diet?" is available on the **Ohio LTAP Center eLearning website**. The free course covers why road diets are an effective safety improvement for roads, which road users can benefit from road diets and how to analyze the impact of road diets.

Tennessee

The **Tennessee** DOT developed a road diet best practices memo that includes proposed statewide criteria and a flow chart for reviewing and approving road diets requested by local governments. The department is updating its design manual to meet new multimodal access policy requirements and introduce road diet evaluation and deployment strategies. An evaluation of crash data on existing state highway road diets found decreases in the number and severity of crashes.

Virginia

The **Virginia** DOT's "Road Diets in Reston" project won a 2015 National Roadway Safety Award from the Roadway Safety Foundation and FHWA. The Reston road diets were designed to improve safety by reducing the number of lanes on 2-mile segments of Lawyers Road and Soapstone Drive that each carry 10,000 vehicles a day and were prone to speeding. After project completion, crashes decreased 69 percent on Lawyers Road and 67 percent on Soapstone Drive.

Smarter Work Zones

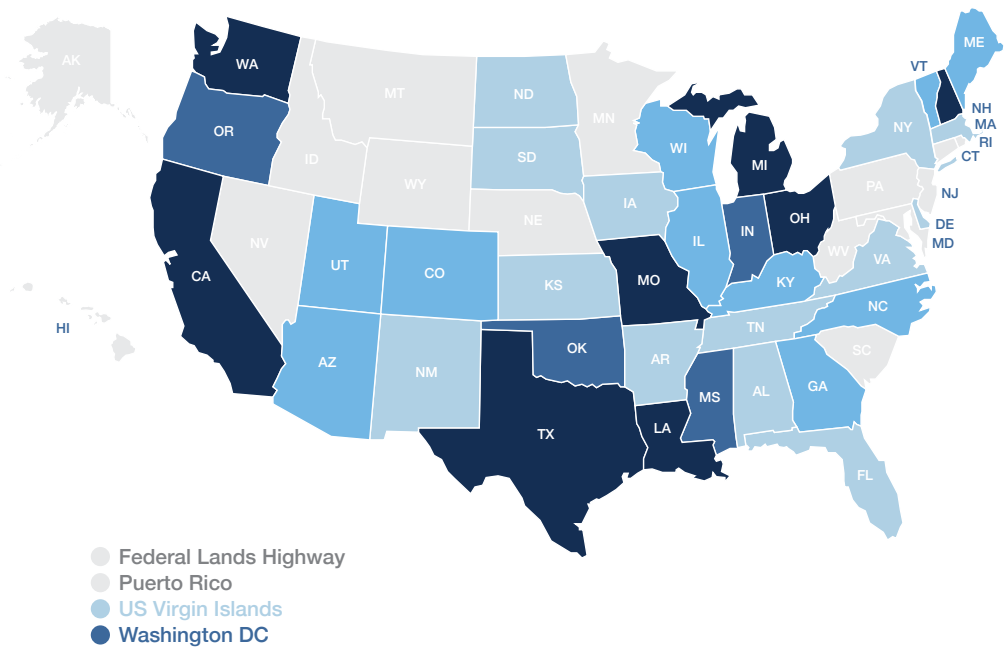
The EDC-3 effort on **smarter work zones** encourages the adoption of two efficient work zone strategies: project coordination and technology applications. Project coordination involves construction planning that minimizes the impact of work zones and generates time and cost savings. Cities and regions 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 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.

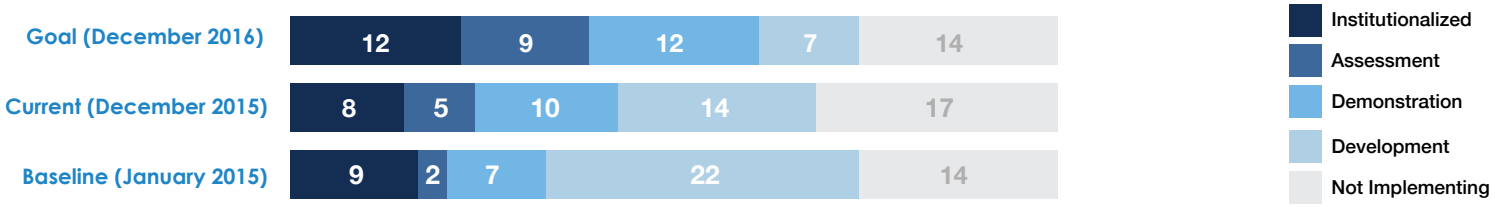
Project Coordination

Fourteen states and Washington, D.C., incorporated project coordination strategies or work zone software tools into planning, design, operating and maintenance processes during the first six months of EDC-3. Eight states have made it a standard practice to use project coordination to reduce work zone impacts.

Current (December 2015)

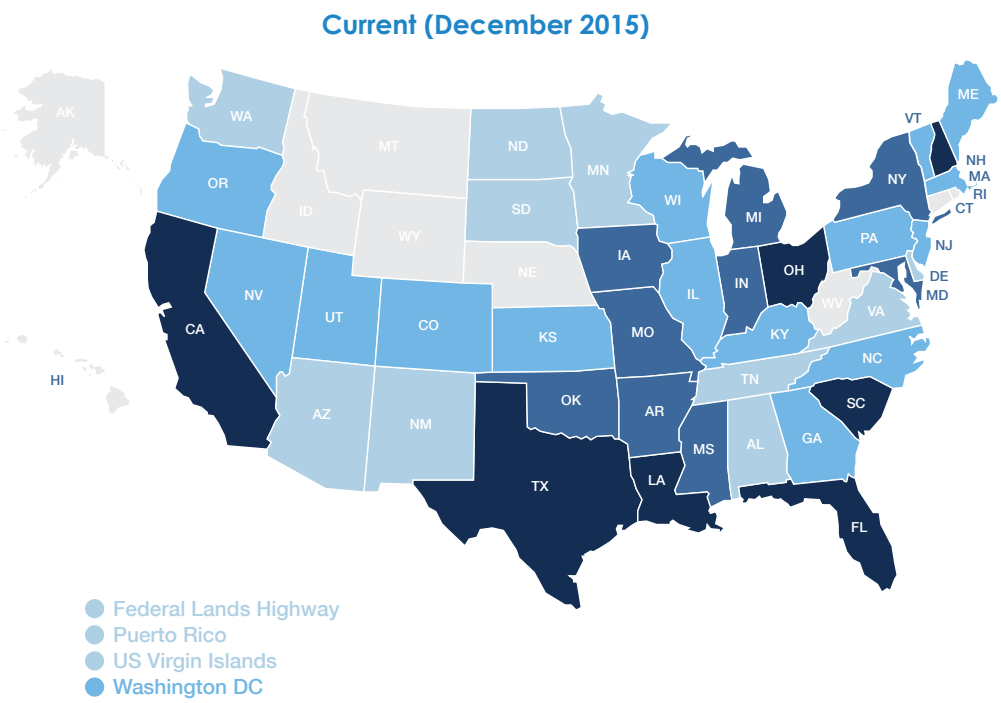


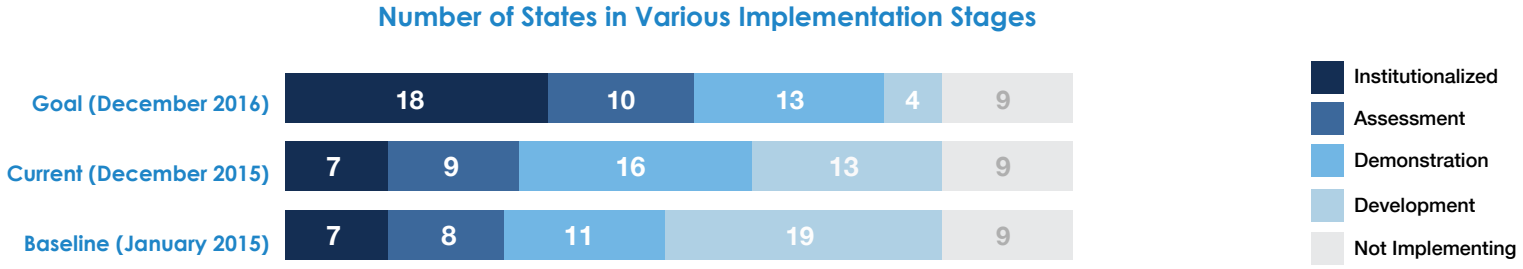
Number of States in Various Implementation Stages



Technology Applications

Twenty-four states and Washington, D.C., are incorporating technology applications into work zone planning, design, operating and maintenance practices. Six states have made using technology tools and strategies to manage work zone impacts a mainstream practice.





Highlights: Smarter Work Zones

Alabama

The **Alabama** DOT received STIC Incentive funds to implement queue warning systems on construction projects. The agency is conducting an inventory of its project coordination practices, drafting guidelines for operations and developing construction plans that incorporate project coordination.

Arizona

The **Arizona** DOT partnered with the cities of Mesa and Glendale on a project to implement an automated process for integrating road project data into the Regional Archived Data System. The project benefits the traveling public and media by providing advance road closure and lane restriction information from multiple agencies in one place. The Maricopa County DOT will lead the expansion of automated data integration to three more local agencies. The Arizona and Maricopa County DOTs are coordinating to make a consolidated list of local agency construction projects available on the **az511.gov travel information website**.

Arkansas

The **Arkansas** State Highway and Transportation Department is reviewing the automated work zone information system in place on controlled-access highways and is developing a statewide automated work zone information system for implementation in 2016. The purpose of the system is to provide queue detection and public information to reduce work zone crashes.

Delaware

The **Delaware** DOT is using project coordination techniques to minimize the impact of work zones on the I-95 Viaduct and Brandywine River Bridge projects. The agency developed a specification for a queue management system for the I-95/State Route 141 project, scheduled for construction in 2016. It routinely uses permanent and portable ITS systems to manage traffic in work zones.

Illinois

The **Illinois** DOT has awarded three on-call contracts for ITS deployment in work zones and plans to award another. The systems have been used on emergency, maintenance, bridge inspection and construction projects. Lessons learned on the projects will be incorporated into future contracts.

The department deploys smart traffic monitoring systems on projects with the use of project-specific special provisions. The development of a statewide smart traffic monitoring system specification is underway based on lessons learned from completed projects. The department is also conducting a research project to develop guidance for the optimal deployment of smart traffic monitoring system devices and looking at establishing policies for using ITS systems in work zones.

Iowa

The **Iowa** DOT is deploying ITS technology and intelligent work zones in its Traffic Critical Projects initiative, which includes projects that can quickly or repeatedly lead to traffic delays. The agency used speed feedback trailers for the first time in summer 2015. It also began using a web-based tracking tool to monitor intelligent work zone performance in real time. The Iowa DOT is collaborating with the Memphis Urban Area Metropolitan Planning Organization, Missouri DOT and Tennessee DOT on a SHRP 2-funded project to expand the uses of **WISE: Work Zone Impacts and Strategies Estimator software**.

Maine

The **Maine** DOT deployed changeable message signs on a project in Ogunquit in fall 2015. The agency plans to use smarter work zone technology on projects in Bar Harbor and Belgrade in 2017. The Maine DOT installed and is evaluating WISE: Work Zone Impacts and Strategies Estimator software, a SHRP 2 product to help planners and engineers reduce work zone impacts.

Highlights: Smarter Work Zones

Massachusetts

The **Massachusetts** DOT conducted surveys to gather information on project coordination practices internally, at municipalities and at utility companies. It is developing a report on best practices and recommendations for a statewide effort to enhance project coordination and collaboration through an improved scheduling and project location process. The agency demonstrated the new Massachusetts Project Planning System, a SHRP 2 product to improve how the agency coordinates projects.

The Massachusetts DOT drafted documents defining businesses practices for designing and deploying portable ITS in work zones. The documents include a work zone ITS matrix, real-time traffic monitoring design standards, scoring criteria for feasibility of work zone ITS and smart work zone standard operating procedures. The agency will hold a spring 2016 workshop for designers and contractors on planning, designing, deploying, testing and monitoring a smarter work zone system.

Minnesota

The **Minnesota** DOT will use a downstream speed notification system on an I-94 pavement project scheduled for 2016. The Minnesota received STIC Incentive funds to develop procedures for this smart work zone application. The goal is to make it easier to deploy on urban freeway work zones in the future.

Missouri

The **Missouri** DOT implemented policy guidance and procedures for work zone strategies that include several tools: A questionnaire helps planners develop a work zone transportation management plan that mitigates issues that could impact safety and mobility. A work zone impact analysis spreadsheet enables planners to estimate queues and delays and determine smart work zone approaches to address them. A transportation management strategy matrix helps planners choose strategies to ensure safe and efficient traffic movement in work zones.

New Jersey

The **New Jersey** DOT plans to evaluate a queue warning system on a 10-mile stretch of I-295 as it approaches the I-295/I-76/Route 42 Direct Connection project in Camden County. The system, designed to reduce the number and severity of rear-end crashes, uses traffic sensors to detect stopped or slow traffic and triggers a warning message on portable changeable message signs.

The New Jersey DOT drafted a work zone ITS technical memorandum documenting the agency's work zone deployment practices and areas for process improvement. The agency revised its Operations Bulletin for Real-Time Work Zone Traffic Systems to include smarter work zone deployment.

Utah

The **Utah** DOT completed a concept of operations for using variable speed limit systems in work zones. It is acquiring additional variable speed limit trailers and other hardware so that it can use variable speed limits to enhance work zone safety on two projects in 2016.

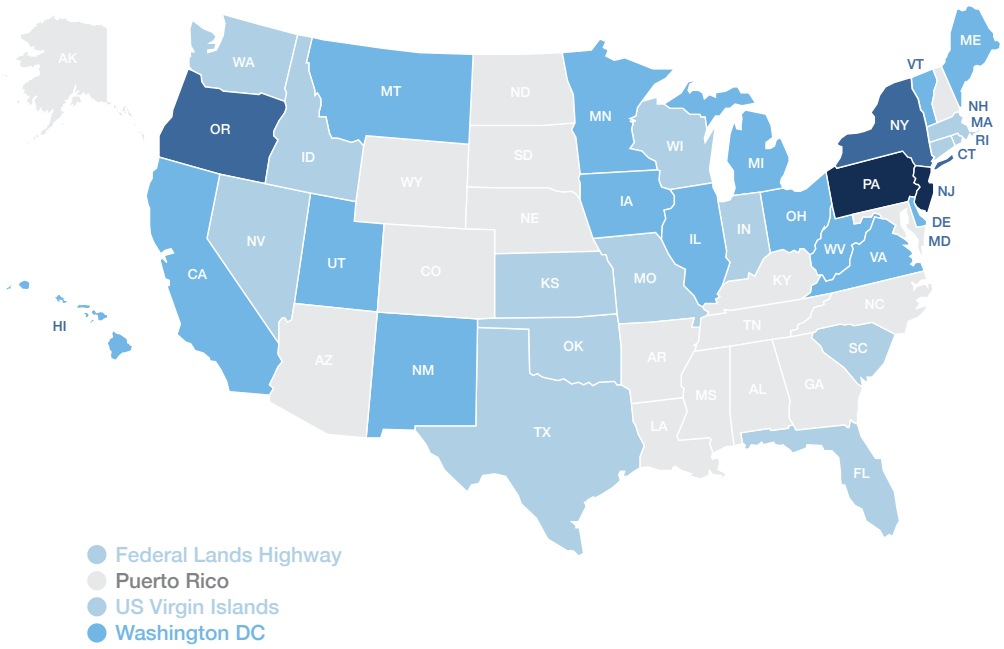
Ultra-High Performance Concrete Connections for Prefabricated Bridge Elements

Ultra-high performance concrete is a steel fiber-reinforced material that improves durability and simplifies connection details, fabrication and construction when using prefabricated bridge elements. The availability UHPC is expected to increase the routine use of prefabricated bridge elements to accelerate bridge construction.

The EDC-3 effort focuses 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.

Seventeen states and Washington, D.C., are using UHPC connections on bridge construction projects or making plans to institutionalize use of the technology. Pennsylvania and New Jersey have made UHPC connections a standard practice on bridge projects that use prefabricated elements.

Current (December 2015)



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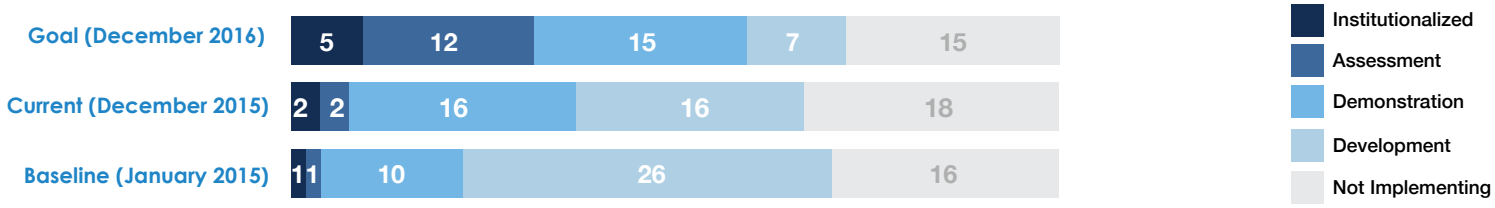

Highlights: Ultra-High Performance Concrete Connections

California

The **California** DOT identified two multispan structures for accelerated bridge construction pilot projects using UHPC to connect precast columns to precast bent caps. The projects, scheduled for 2016 construction, will help the agency develop more effective design details and guidance to quickly and uniformly implement accelerated bridge construction while mitigating project risk.

Delaware

The **Delaware** DOT completed its first UHPC project in 2015, a bridge on Daisy Road over the Pocomoke River. Crews used UHPC in joints between prestressed box beams. The agency will use UHPC to connect precast deck panels on two projects, one on I-95 over Route 7 in 2016 and one on Route 141 over U.S. 13 in 2017.

Florida

The **Florida** DOT completed a research project on alternatives to steel grid bridge decks that investigated the potential use of UHPC as a lightweight solid deck alternative. It is planning additional UHPC research, including projects to study slab beam bridges with UHPC joint connections and evaluate the use of UHPC on maintenance activities, such as joint repair, concrete piles and precast slab beam panel connections.

Illinois

The **Illinois** DOT completed its first UHPC application as a part of the Peoria Street Bridge project in Chicago. Crews used UHPC in the joints between the full-depth deck panels in spring 2015, and stakeholders discussed lessons learned at an October 2015 meeting. A second project with a full-depth deck panel bridge using UHPC is in the development stage for 2016 construction on a local road over I-57 in southern Illinois. Another project is under design that would use UHPC for the shear keys of an adjacent box beam structure in Northbrook.

Iowa

The **Iowa** DOT constructed its second prefabricated bridge project using UHPC connections, the Iowa 92 over Little Silver Creek project in Pottawattamie County. During a full road closure in fall 2015, crews demolished the existing bridge and moved the superstructure modules into place. They connected the modules with narrow longitudinal joints filled with UHPC and joined the superstructure system to the substructure with UHPC transverse closure pours.

The Hawkeye Bridge reconstruction project near Fairbank was the first in the United States to incorporate a UHPC mix design developed in South Korea. The Buchanan County Secondary Roads Office used the UHPC mix design in the pi girders of the bridge.

Maine

The **Maine** DOT will use full-depth precast concrete deck panels with UHPC connections when it replaces the Western Avenue Bridge in Fairfield in 2016. It will incorporate experience gained on the project to develop standard designs, details and specifications for full-depth precast concrete deck panels with UHPC connections.

Highlights: Ultra-High Performance Concrete Connections

Massachusetts

The **Massachusetts** DOT plans to use UHPC closure pours on three bridge projects: Route 85 over the Assabet River in Hudson, I-90 over the Charles River in Newton and Rochester Road over the Weweantic River in Carver-Middleborough. The agency is developing UHPC standard details for inclusion in its Bridge Manual, as well as material, design and construction specifications for UHPC.

Michigan

The **Michigan** DOT plans to use nonproprietary UHPC for the first time when it replaces a bridge on U.S. 23 over the Little Black River in 2016. With the completion of research at the University of Michigan on nonproprietary UHPC and Lawrence Technological University on deck bulb T-beam bridge systems with UHPC connections, the Michigan DOT plans to identify more projects for this technology.

Montana

The **Montana** DOT completed an accelerated bridge construction project near Windham using UHPC for grout pockets, closure pours and joints on a precast concrete deck system. The agency is conducting a research project on "Feasibility of Nonproprietary UHPC for Use in Highway Bridges in Montana."

New Jersey

After trying it on several demonstration projects, the **New Jersey** DOT has adopted the routine use of UHPC on closure pours. The agency used UHPC on deck replacements on the Pulaski Skyway rehabilitation project and the Route 46 over Musconetcong River Bridge project.

New Mexico

The **New Mexico** DOT considers UHPC connections whenever it uses prefabricated bridge elements and systems on a project. The agency plans to use UHPC on a bridge replacement project on New Mexico 186 over an irrigation canal near Las Cruces in summer 2016.

New York

The contractor on a **New York** State DOT project to replace the I-87 bridges over Albany-Shaker Road selected the precast deck option with UHPC joints instead of the cast-in-place deck option. Using a precast deck enabled the contractor to reduce construction time and finish the project in one season. The New York State DOT is planning a bridge project that includes joint replacement with UHPC in New York City and a project that eliminates transverse joints with UHPC link slabs on Long Island.

Pennsylvania

The **Pennsylvania** DOT developed a standard special provision for UHPC and incorporated it into its Engineering and Construction Management System for inclusion in contracts using UHPC. The standard special provision allows for standardization of material requirements and allows use of premixed UHPC or submission of a mix design, eliminating the need to obtain proprietary product approval for products.

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