



# INNOVATOR

Accelerating Innovation for the American Driving Experience

## *Take a Virtual Drive on a Diverging Diamond Interchange*

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educate drivers *2*



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# STIC Incentive Projects Help States Standardize Innovations



Motorists can take a virtual drive through the new diverging diamond interchange in Santa Fe, New Mexico, before they venture out on the real thing.

The New Mexico Department of Transportation used [State Transportation Innovation Council Incentive](#) funds to create a digital experience via video kiosks and a mobile app that simulates driving through the interchange, under construction at the intersection of I-25 and Cerrillos Road. STIC Incentive is a Federal Highway Administration program that helps the highway community standardize innovative practices.

The [video](#) and [app](#) are part of the New Mexico DOT's campaign to educate drivers on navigating the state's first [diverging diamond interchange](#) before it opens in 2016. The agency chose the innovative design to enhance safety, smooth traffic flow and shorten delays for drivers.

"Driver education is needed because this is a new geometric design and configuration," said Rosanne Rodriguez, New Mexico DOT public information officer. "The app is a user-friendly touch screen application that allows the user to choose a route to and from the DDI. It's a virtual mechanism that drives and talks the user through the interchange. It has been a great tool."

The kiosks were displayed at the Santa Fe Motor Vehicle Division, Santa Fe County offices and the Bureau of Land Management so drivers could learn about the project and try the app. The kiosks were

also exhibited at the New Mexico Transportation Engineering Conference and the New Mexico DOT district office in Santa Fe.

## Ohio Local Public Agency Days

STIC Incentive funds helped the Ohio Department of Transportation create a Local Public Agency Days series to launch its updated [local agency qualification process for administering Federal-Aid Highway Program projects](#). Representatives of about 550 local agencies participated in five regional sessions in 2014.

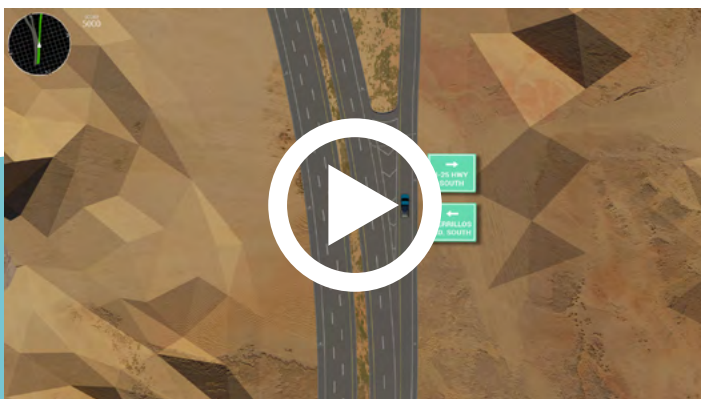
Each session was customized to the needs of the local agencies in the region, highlighting presentations on project delivery innovations and time-saving techniques such as electronic bidding. The presentations complemented the Local Public Agency Days rollout of free [online training](#) on the Ohio DOT's qualification process for local agencies.

## Arizona Innovation Exchange Campaign

The Arizona Council on Transportation Innovation used a STIC incentive award to carry out its Innovation Exchange Campaign, part of the council's effort to build a culture of innovation among the state's public and private transportation partners.

The council organized six panel discussions in 2014 on innovation themes recommended by stakeholders, such as [accelerated bridge construction](#) and [3D modeling](#). The exchanges were held in Phoenix and webcast throughout the state to encourage broad participation.

The council continued the campaign in 2015 and moved it beyond Phoenix, starting with a May exchange in Prescott Valley on using innovation to



Credit: New Mexico Department of Transportation

*Take a virtual driving tour of a diverging diamond interchange.*



*The New Mexico Department of Transportation chose the diverging diamond interchange design to enhance safety and traffic flow.*

Credit: New Mexico DOT/Molzen Corbin

streamline project development and delivery at the state and local levels. An August exchange in Tucson focused on intelligent transportation system and radio frequency identification technologies.

### **Pennsylvania rumble strips compendium**

The Pennsylvania Department of Transportation used STIC incentives to develop a compendium of best practices from various transportation agencies for installing rumble strips on pavements treated with a thin pavement overlay.

The Pennsylvania DOT uses thin overlays as an option for pavement preservation projects because they can extend pavement life at a lower cost than full-depth reclamation. It installs rumble strips—grooved patterns that give drivers an audible warning they’ve strayed from the driving lane—as a cost-effective way to reduce crashes and fatalities.

The best practices guide, *Rumble Strips Installation on Thin Pavement Overlays*, outlines a standardized process for installing three types of rumble

strips—edgeline, centerline and shoulder—with three thin overlay types—hot-mix asphalt, microsurfacing and seal coat.

### **Michigan Geospatial Utility Infrastructure Data Exchange**

The Michigan STIC used FHWA incentives to develop a report on a project—called Geospatial Utility Infrastructure Data Exchange, or GUIDE—to collect 3-D geospatial location data on utilities in Michigan Department of Transportation rights-of-way.

Under the GUIDE project, the Michigan Utility Coordination Committee and three of its member utilities gathered geospatial information during the installation of underground utilities on seven construction projects in 2014. The GUIDE project identified best practices and areas for further refinement before a larger program rollout, according to the [report](#).

“The ability to share spatial information with all stakeholders will help reduce utility conflicts during project design, reduce utility conflicts during construction, reduce overall utility life cycle costs and enhance the safety of the general public,” the report said.



See an overview of New Mexico’s first diverging diamond interchange.

Credit: New Mexico Department of Transportation

# Using Regional Models

## PLANNING ACROSS JURISDICTIONS

Traffic congestion doesn't stop at geographic borders, but transportation planning often does. Planning in jurisdictional silos can overlook regional solutions that yield benefits such as faster project delivery, less traffic congestion and more efficient freight movement.

In the third round of Every Day Counts, the Federal Highway Administration is working with the Federal Transit Administration to encourage transportation stakeholders to think beyond traditional borders and use **regional models of cooperation**.

These models offer a framework and process for transportation departments, metropolitan planning organizations, transit agencies and other groups to improve collaboration across agency boundaries and develop multijurisdictional transportation plans.

"Often there are multiple metropolitan planning organizations for one urbanized area," said Kenneth Petty, director of the FHWA Office of Planning. "The traveling public doesn't necessarily know what these agencies do. All they see are transportation needs, so for the sake of transparency, efficiency and better decision making, we're encouraging them to work together."

*"This is about sharing best practices on techniques that can be implemented by multiple agencies to work together more effectively,"*

*Kenneth Petty  
Director of the FHWA Office of Planning*

The EDC-3 effort focuses on bringing together entities to support common goals on transportation planning topics, such as congestion management, safety, freight, commerce and livability. Not only can using regional models of cooperation improve decision making, it can save time and money through resource sharing and help agencies work together to achieve more than they can on their own.

"This is about sharing best practices on techniques that can be implemented by multiple agencies to work together more effectively," Petty said.



[View Regional Models of Cooperation presentation](#)



*Regional models of collaboration enable transportation stakeholders to plan across jurisdictional boundaries.*

# Models of Cooperation

*TRANSIT ACHIEVES BETTER RESULTS*



## Examples across the country

Connecticut, one of several states that have institutionalized regional models of cooperation, coordinates planning studies through the Connecticut Department of Transportation. The agency is developing a statewide Freight Plan with input from metropolitan planning organizations. It's also creating a travel demand model that will incorporate areas outside the state—including Massachusetts, New York and Rhode Island—and allow better coordination on future studies.

The Alaska Department of Transportation is spearheading an initiative to improve coordination of transportation services among local and tribal governments, transit authorities and federal land management agencies. The agency plans to host a peer exchange to enable transportation stakeholders to discuss regional models of cooperation topics.

The Mississippi Department of Transportation is preparing a Long-Range Transportation Infrastructure Plan concurrently with the state's coastal and regional metropolitan planning organizations. The goal is to coordinate the efforts of the multiple entities to address congestion, safety and commerce.

Transportation and planning organizations in the Charlotte, North Carolina, area are developing a Regional Freight Mobility Plan that will include performance measures. The plan will address traffic congestion, bottlenecks and truck and rail freight mobility. The Centralina Council of Governments is leading the effort.

The Missouri Department of Transportation developed a collaboration website for metropolitan planning organizations, regional planning commissions, FHWA, the Federal Transit Administration and highway agencies in surrounding states. The website includes resources, checklists, notices of proposed rulemaking and performance management reporting examples.

## Tools for Regional Models of Cooperation

View the [EDC Regional Models of Cooperation presentation](#) for an overview of the regional models approach and lessons learned.

View the bimonthly [webinar series](#) on regional models of cooperation in transportation planning for examples of successful collaborative planning on topics such as air quality and congestion management. Register for the safety planning webinar on December 10, 2015, from 1 to 2 p.m. ET.

Read [case studies](#) from across the country on regional models of cooperation.

See the [Transportation Planning Capacity Building website](#) administered by FHWA and the Federal Transit Administration for resources and training on transportation planning.

The EDC-3 Regional Models of Cooperation Innovation Deployment Team offers technical assistance and training, including peer exchanges and workshops. For details, contact [Jody McCullough](#) or [David Harris](#) in the FHWA Office of Planning.



# CONNECTING WITH ULTRA-HIGH PERFORMANCE CONCRETE

GAME-CHANGING MATERIAL ENHANCES CONSTRUCTION WITH BRIDGE COMPONENTS



The need for robust connection systems for prefabricated bridge components is driving interest in ultra-high performance concrete. This steel fiber-reinforced material improves durability and simplifies connection details, fabrication and construction when using prefabricated bridge elements to accelerate construction.

“As the bridge community brings ultra-high performance concrete into our industry, it’s going to challenge our existing practices,” said Benjamin Beerman, Federal Highway Administration senior structural engineer. “It’s a game changer.”

Through Every Day Counts, FHWA is encouraging the transportation community to take a closer look at the advantages **UHPC connections** offer in bridge construction:

- **Accelerated construction**—UHPC can provide durable and simplified details that facilitate the fabrication and construction efforts needed to connect prefabricated bridge elements.
- **Simplified connection details**—The mechanical properties of UHPC allow for the redesign of common connection details in ways that promote both ease and speed of construction.
- **Improved long-term performance**—Field casting of UHPC connections between prefabricated components results in a strong connection that can provide better long-term performance.

“Connections are what we call the Achilles heel of prefabrication,” Beerman said. “UHPC addresses those durability issues at the same time it address some of the fabrication and construction issues that come up.”

Many of the challenges related to UHPC use have receded in recent years. “There is more familiarity with UHPC as a material, and more states are using UHPC connections with prefabricated bridge elements,” Beerman said.

In addition, U.S. production of the steel fiber reinforcement commonly used in UHPC began in 2014. That’s expected to open the door for more highway agencies that are interested in using prefabricated bridge components with UHPC, but were hindered in the past by the Buy America Act.

## UHPC boosts quality on Oregon bridge

The Oregon Department of Transportation used the **accelerated bridge construction** technique of combining prefabricated elements with UHPC connections on its 2012 project to replace the Burnt River Bridge near Huntington. The agency chose the innovations to enhance construction quality, improve work zone safety and reduce construction time and traffic congestion on the project, which received an FHWA **Highways for LIFE demonstration project** grant.

Crews installed deck panels—fabricated off-site—on precast concrete girders. They used UHPC for the shear pockets and deck joints, which eliminated the need for post-tensioning the deck panels.

Because of the project’s success, the Oregon DOT plans to use ABC techniques of precast bridge decks and UHPC on future projects. An FHWA **report** explains project details.

## States add UHPC to toolkits

Other highway agencies using UHPC connections on bridge projects include the Delaware Department of Transportation, which poured UHPC in joints between prestressed box beams on its first UHPC project, a bridge over the Pocomoke River.

The Iowa Department of Transportation has used UHPC connections on several projects, including a Highways for LIFE project to replace a bridge on U.S. 6 over Keg Creek. It’s applying the technology



Steel fibers reinforce UHPC, which offers simple, durable connection details for prefabricated bridge elements.



Above: Crews place UHPC in the transverse joints on Oregon's Burnt River Bridge project.

Left: Using precast deck panels and UHPC closures on the Burnt River Bridge is expected to save maintenance and rehabilitation costs during the 75-year life of the bridge.

on a bridge replacement on Iowa 92 over Little Silver Creek, an **Accelerated Innovation Deployment Demonstration** project.

The New York State Department of Transportation collaborated with industry and FHWA to develop and test field-cast UHPC joints for precast concrete bridge decks. The department accelerated construction on several projects by field casting UHPC joints for precast deck and superstructure systems.

The Pennsylvania Department of Transportation incorporated UHPC into its publications and standards, and it is now considered a tool in the agency toolbox. Pennsylvania DOT districts and local agencies can use UHPC on projects on their own, without the need for guidance from the Central Office.

## LEARN ABOUT UHPC CONNECTIONS

View the EDC **Ultra-High Performance Concrete Connections presentation** for an overview of UHPC in bridge construction.

Read the FHWA TechNote on **Design and Construction of Field-Cast UHPC Connections** for guidance on deploying UHPC connections.

Watch the **UHPC for Precast Bridge Decks and Connections webinar** for an introduction to the **Design Guide for Precast UHPC Waffle Deck Panel System, Including Connections** and details on bridge projects in New York and Iowa.

For information and technical assistance on using UHPC connections, contact **Jamal Elkaissi** and **Mark Leonard**, structural engineers at the FHWA Resource Center.



View **Ultra-High Performance Concrete Connections presentation**

## WANTED: New Ideas for Innovation Implementation



The Federal Highway Administration would like your input on the next group of innovative technologies and processes to deploy through the Every Day Counts initiative.

Check the EDC website in December for information on submitting ideas for innovations you think should be included in EDC's fourth round. The open period for offering suggestions will run through January 2016.

Every two years, FHWA works with transportation departments, local governments, industry groups and other stakeholders to identify a new set of innovative technologies and practices that merit widespread deployment through EDC. FHWA will collaborate with

stakeholders to implement the EDC-4 innovations in 2017 and 2018.

For EDC-4, FHWA will seek suggestions on market-ready innovations that have transformative potential and national benefits. The focus is on innovations that accelerate project delivery, enhance the safety and durability of roads and bridges, cut traffic congestion and improve environmental sustainability. The innovations cannot be proprietary and should be proven to work, mainly through successful demonstration projects.

For information, contact **Scott Wolf**, senior advisor in the FHWA Center for Accelerating Innovation.

# Adaptive Signal Control Technology Spreads Nationwide



Poorly timed traffic signals can cause delays that cost travelers and businesses time and money. Adaptive signal control technology adjusts the timing of green lights to accommodate changing traffic patterns, ease congestion and reduce fuel consumption.

The Federal Highway Administration promoted **ASCT** during the first round of Every Day Counts in 2011 and 2012, sparking interest in the technology that continues to grow.

After ASCT was introduced in the United States in 1990, many technology demonstrations and field tests documented its benefits. But 20 years later—when ASCT was named an EDC-1 innovation—ASCT was active on less than 1 percent of the nation's traffic signals.

By the end of EDC-1 in 2012, 44 agencies were in various stages of implementing ASCT. Today, more than 100 agencies across the country use ASCT. Agencies in Florida, Pennsylvania and Rhode Island are using **Accelerated Innovation Deployment Demonstration** awards for ASCT projects.

“The key to accelerating the implementation of ASCT during the EDC initiative was actively promoting the benefits of the technology in the context of a systematic process to align operational objectives and needs with system requirements,” said Eddie Curtis, traffic management specialist at FHWA's Resource Center.

FHWA's **Model Systems Engineering Documents for Adaptive Signal Control Technology** proved to be an effective resource for addressing barriers to ASCT deployment as well as uncertainty about benefits and costs, Curtis said.

## Savings in Colorado

The Colorado Department of Transportation and the city of Greeley partnered to install an **ASCT system on Greeley's 10th Street corridor**. The goal of the 2012 project was to improve signal timing and travel times along the corridor, also known as U.S. 34 Business. The result was travel time decreases of 9 to 11 percent through each light in the corridor and a 13 percent increase in average travel speed.

*Adaptive signal control continuously updates signal timing to keep traffic moving smoothly.*



## Installing ASCT also produced savings:

- Motorists save \$3,789 a day in reduced delay and fuel consumption, an annual savings of \$1.3 million.
- A benefit-cost analysis shows that the system paid for itself in about eight months.
- The Colorado DOT, city of Greeley and road users will save more than \$9.2 million over the first 20 years the system is in operation.

## Lessons learned in Virginia

The Virginia Department of Transportation launched a pilot project in 2011 to install ASCT on 13 corridors around the state. The ASCT system selected uses enhanced detection along a corridor to adjust signal timing to meet observed demand in real time.

A **study** detailed lessons the Virginia DOT learned from the pilot project:

- ASCT reduced total intersection crashes by 17 percent. Safety effects tend to be more pronounced at sites with mainline average daily traffic of more than 30,000 vehicles, which suggests that ASCT has the largest safety effect at sites that are congested.
- ASCT generally improves mainline operations if the corridor is not over capacity, does not have geometric characteristics that impair traffic flow or does not already operate at a good level of service.

- Side street delays generally increase when ASCT is deployed to improve mainline performance, although there is usually a net reduction in overall corridor delay.

## Benefits in Los Angeles

The Los Angeles Department of Transportation has the largest ASCT system in the nation, said Curtis. The city synchronizes all of its traffic signals to improve traffic flow, while the adaptive part of the system automatically changes timing in response to travel volumes and patterns.

An evaluation compared the city's ASCT system to the Urban Traffic Control System Los Angeles had been using as its central traffic control system:

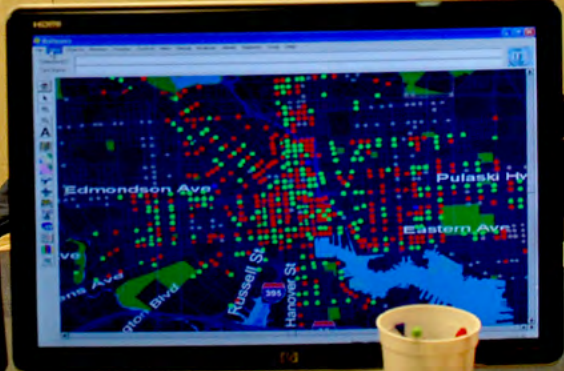
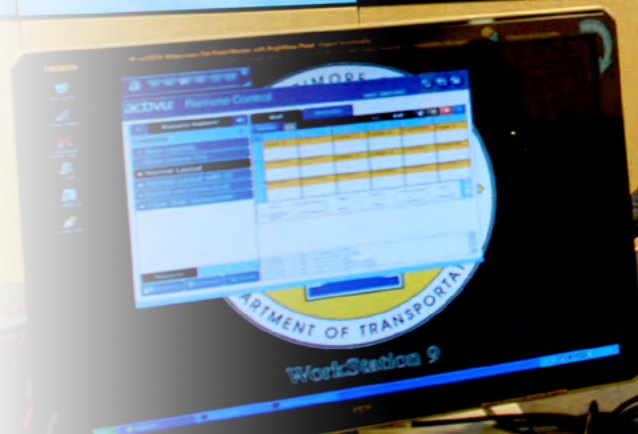
- ASCT reduced travel time by 12.7 percent, average stops by 31 percent and average delays by 21.4 percent.
- Improvements in delay were more significant during the evening peak hours than at other times, but travel time and average stops were improved for all time periods.

To learn more about ASCT, contact **Eddie Curtis**.

*State and local agencies across the country are using adaptive signal control technology to manage traffic on key corridors*



Credit: Kevin Lee, Kittelson and Associates



The Federal Highway Administration's **Accelerated Innovation Deployment Demonstration** program continues to award grants as incentives for transportation agencies to use new technologies and practices to save time, money and lives.

The awards will be used to deploy innovations for road projects in Arizona, Delaware, Florida, Michigan, Minnesota, Rhode Island and the Pueblo of Acoma.

"This country's transportation needs continue to grow, and we need to adapt our infrastructure accordingly by accelerating the use of new technologies and approaches," said FHWA Administrator Gregory Nadeau.

Since its launch in February 2014, the AID Demonstration program has provided nearly \$34 million for 45 awards to help federal, state, local and tribal agencies speed up their use of innovative traffic, safety and construction practices.

Among recent recipients of AID Demonstration awards are the Arizona Department of Transportation and Mohave County, which will design a **geosynthetic reinforced soil-integrated bridge system** project on Oatman Highway spanning the Sacramento Wash to provide a low-tech, low-cost solution to flooding issues.

The Delaware Department of Transportation will build a **diverging diamond interchange** at Delaware Routes 1 and 72 near Bear. The state chose the innovative design, which can be built more quickly and at lower cost than other interchange types, to improve traffic operations and safety in the area. The diverging diamond interchange is one of the innovative intersection and interchange geometrics promoted through FHWA's Every Day Counts initiative.

The Florida Department of Transportation and Manatee County will use an AID Demonstration award to install **adaptive signal control technology** at 20 intersections on a 9-mile stretch of State Road 70. This emerging strategic intermodal system highway

corridor is also an evacuation route from the county's barrier islands.

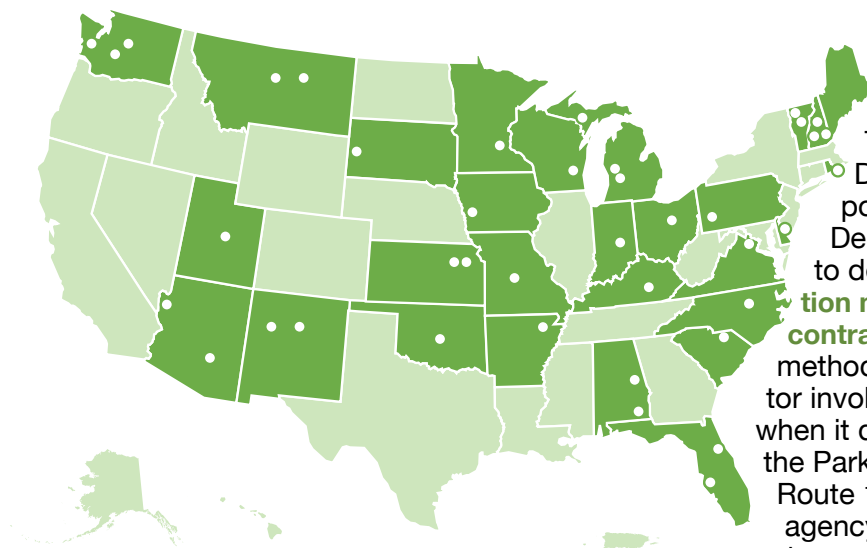
The Michigan Department of Transportation will build a diverging diamond interchange at I-96 and Cascade Road near Grand Rapids. The project will also use FHWA **Congestion Mitigation and Air Quality Improvement** funding because it will reduce traffic congestion and improve operational capacity.

The Minnesota Department of Transportation and city of St. James will use AID Demonstration funds to build the state's first two interconnected **mini-roundabouts** on Minnesota State Highway 4. The mini-roundabouts, at the intersections of 1st Avenue South with Armstrong Boulevard and 1st Avenue South with 7th Street South, are another example of intersection and interchange geometrics promoted under Every Day Counts to improve safety and mobility.

The Rhode Island Department of Transportation will use an AID Demonstration award to deploy the **construction manager/general contractor** project delivery method and early contractor involvement technique when it designs and replaces the Park Avenue Bridge on Route 12 in Cranston. The agency anticipates that the innovative processes will accelerate project delivery while mitigating risks.

An AID Demonstration grant will enable the Pueblo of Acoma tribal government in New Mexico to use the construction manager/general contractor project delivery method to complete several projects, including road construction, earthwork, retaining walls, accelerated bridge construction, interchange construction and rock excavation.

The AID Demonstration program provides incentives of up to \$1 million for projects to use proven innovations for any aspect of highway transportation, including planning, financing, environment, design, construction, materials, pavements, structures and operations. For information, contact **Ewa Flom**, program coordinator in the FHWA Center for Accelerating Innovation.



*AID Demonstration grant project locations*

## Colorado project first to use programmatic tool

The Fish Creek Public Infrastructure Repair project is the first to use Colorado's **programmatic environmental assessment** for post-disaster repair, which provides a streamlined assessment approach using a checklist. The Federal Highway Administration and Federal Emergency Management Agency are collaborating on the 1.7-mile project, which includes road and shoulder work and repair of public access roads and a multiuse trail. FHWA and FEMA developed the programmatic tool in response to flooding that caused damage along the state's Front Range.

## Florida builds largest diverging diamond interchange

The Florida Department of Transportation broke ground in September on its first and the nation's largest **diverging diamond interchange**. The interchange, at I-75 and University Parkway in Sarasota, will help ease congestion and reduce crashes on one of the area's busiest roads. The two-year project includes widening of University Parkway and new auxiliary lanes, bridges, lighting, traffic signals, noise barrier walls, sidewalks, bike lanes and pedestrian walkways.



Credit: Florida DOT

## National STIC network grows to 49

Transportation leaders in Puerto Rico and the U.S. Virgin Islands signed charters establishing **State Transportation Innovation Councils**, bringing the number of STICs to 49. The Puerto Rico STIC's mission is "to facilitate the rapid implementation of technology, tactics and techniques among transportation program delivery professionals," according to its charter. The U.S. Virgin Islands STIC will "foster a collaborative culture for rapid implementation of meaningful innovations to efficiently deliver to the public a modern, high-quality highway system."

## Washington, D.C., bridge opens early

The District Department of Transportation announced the early opening of the 16th Street Bridge over Military Road in Washington, D.C. The replacement of the 57-year-old rigid-frame bridge was completed using **ultra-high performance concrete connections** and **accelerated bridge construction** technologies to reduce the impact of the project on road users and residents. As a result, the project was completed six months ahead of schedule.

## West Virginia project refines bridge repair process

The Federal Lands Highway **Coordinated Technology Implementation Program** funds innovative projects that help federal land management agencies and tribes boost efficiency, enhance the environment, reduce maintenance and increase road safety on their road systems. One 2015 project uses carbon fiber-reinforced polymer to repair the Opekiska Whiteday Creek Bridge in West Virginia. The project goal is to refine the repair process to make it a widespread solution for concrete bridges in poor condition.



See overview of Florida's first diverging diamond interchange.

## EVENTS

**3D Engineered Models for Highway Structures Webinar**, November 10, 2015, 1:30 to 3 p.m. ET

► [Register here](#)

**American Road & Transportation Builders Association Dr. J. Don Brock TransOvation Workshop**, Join the discussion on State Transportation Innovation Councils.

November 16–18, 2015, St. Paul, Minnesota

► [Register here](#)

**National Accelerated Bridge Construction Conference**, December 7–8, 2015, Miami, Florida

► [Register here](#)

**Regional Models of Cooperation in Safety Planning Webinar**, December 10, 2015, 1 to 2 p.m. ET

► [Register here](#)

**Transportation Research Board Annual Meeting**, January 10–14, 2016, Washington, D.C. Visit the Every Day Counts exhibit.

► [Register here](#)

**Association of Asphalt Paving Technologists**, March 12–16, 2016, Indianapolis, Indiana Join FHWA sessions on asphalt paving innovations.

► [Information here](#)

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# INNOVATOR

*INNOVATOR*, published by the FHWA Center for Accelerating Innovation, advances the implementation of innovative technologies and accelerated project delivery methods in highway transportation.

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