

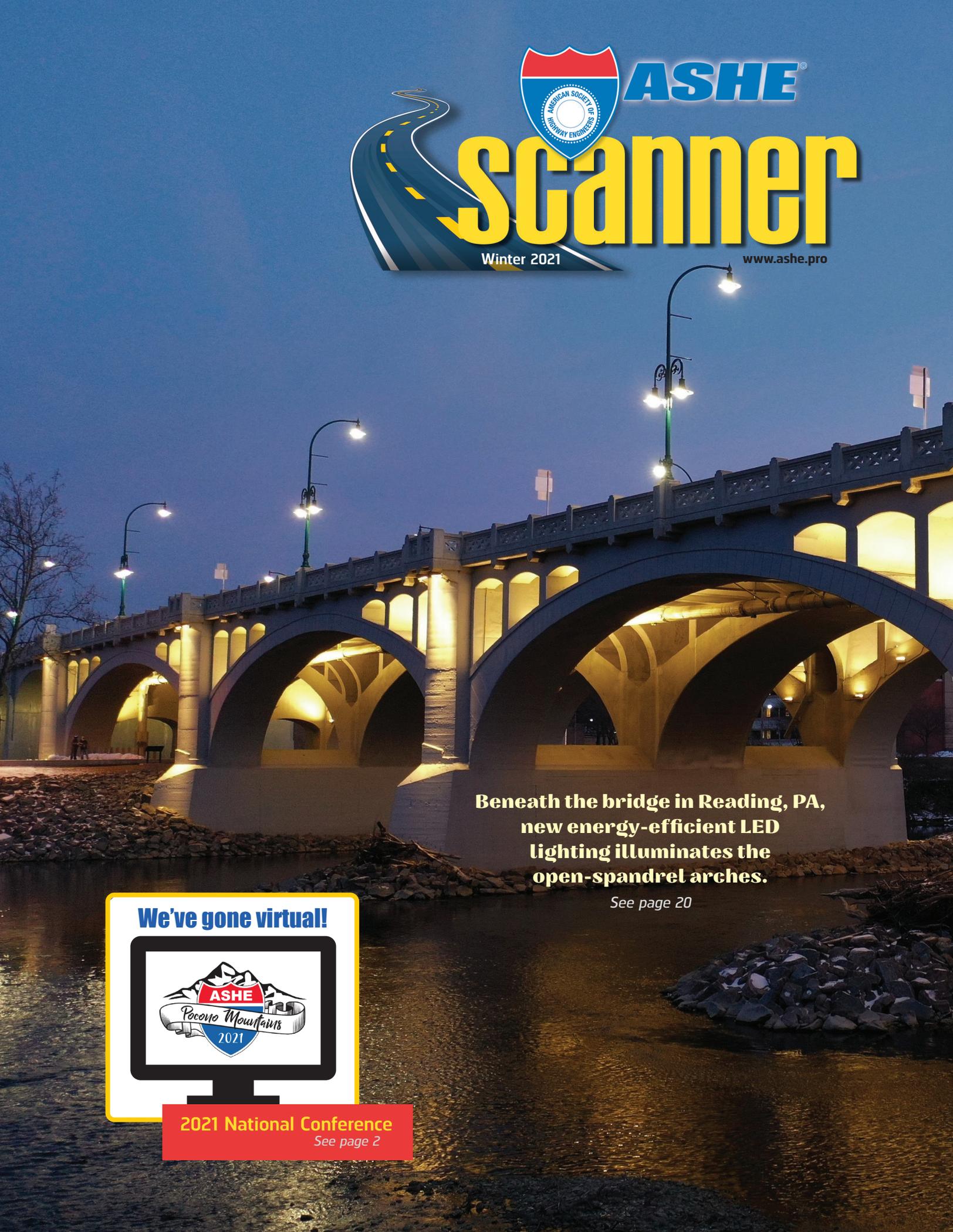


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**Beneath the bridge in Reading, PA,
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lighting illuminates the
open-spandrel arches.**

See page 20

We've gone virtual!



2021 National Conference

See page 2

We've gone virtual!



In lieu of our previously scheduled, in-person event to be held at Kalahari Resort and Convention Center, we will now be hosting a virtual event for the 2021 ASHE National Conference. Additionally, our Sections plan to host an in-person Conference in 2025 at Kalahari Resort. Visit our website, check your inbox and follow us on social media as we announce our new virtual programs and sponsorship opportunities in the coming weeks!

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Tim Matthews, PE
ASHE National President 2020-2021



New Directions

COVID, the election, safety: the one constant in this nation is “change.” This past year has been one we will always remember but will also try to erase from our minds at the same time. Most families are cooped up in their homes surrounded by kids while they try to do their work remotely. Others are out of work trying to find their next meal and keep a roof over their heads. Whatever situation you are in, I encourage you to support one another. We all have different ideals and beliefs about the challenges facing our nation. In the face of these challenges, we must all remember that friendship, kindness and decency toward one another is more important than who you voted for. Do what is best for you and your family and recognize that we are all better as one ASHE family.

How can I help you?

I want to announce a new initiative called “Coffee and Cocktails with the President.” Education, innovation and fellowship are essential to our mission; you’ve heard me say this before. I believe this can be accomplished with any platform, virtual or otherwise. That said, I would like to host a virtual conversation with your Section, either over a coffee or a cocktail, your choice. This setting will offer an open door to your National President and a two-way conversation to see how we can better our organization from the grass roots. As you know, ASHE is nothing without our local Sections. That is where It all happens! I want to hear what is going right and what, if any, struggles you may be having. To make this happen, I will reach out to all the Region Directors to help me set up this initiative. If you have any other ideas, please contact me. I look forward to talking with you soon.

I end with this message as I have done before: continue to stay actively involved in your Sections and share the experiences you have encountered with others to promote growth and diversity as we move into the future. Stay strong, be safe, get a flu shot, wear your mask and I hope to see you all soon. 🇺🇸

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Preserving Past, Honoring Future:
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In July 2019, Fluor-United Asheville, LLC, a Fluor and United Infrastructure Group joint venture, contacted A. Morton Thomas and Associates (AMT) regarding a value engineering opportunity. Fluor-United had won a \$263 million North Carolina Department of Transportation (NCDOT) contract to widen I-26 south of Asheville and wanted to consider revising some construction documents via a value engineering effort. The goals were to simplify construction phasing, accelerate the schedule, reduce costs and improve safety.

The general scope of the project was to widen eight miles of I-26 from a four-lane to an eight-lane section, while maintaining traffic on the interstate that carries over 80,000 vehicles per day. After a kickoff meeting with the joint venture, the assignment was tackled in two phases. The first phase involved preparation of a conceptual design that would be evaluated for fatal flaws, allow the

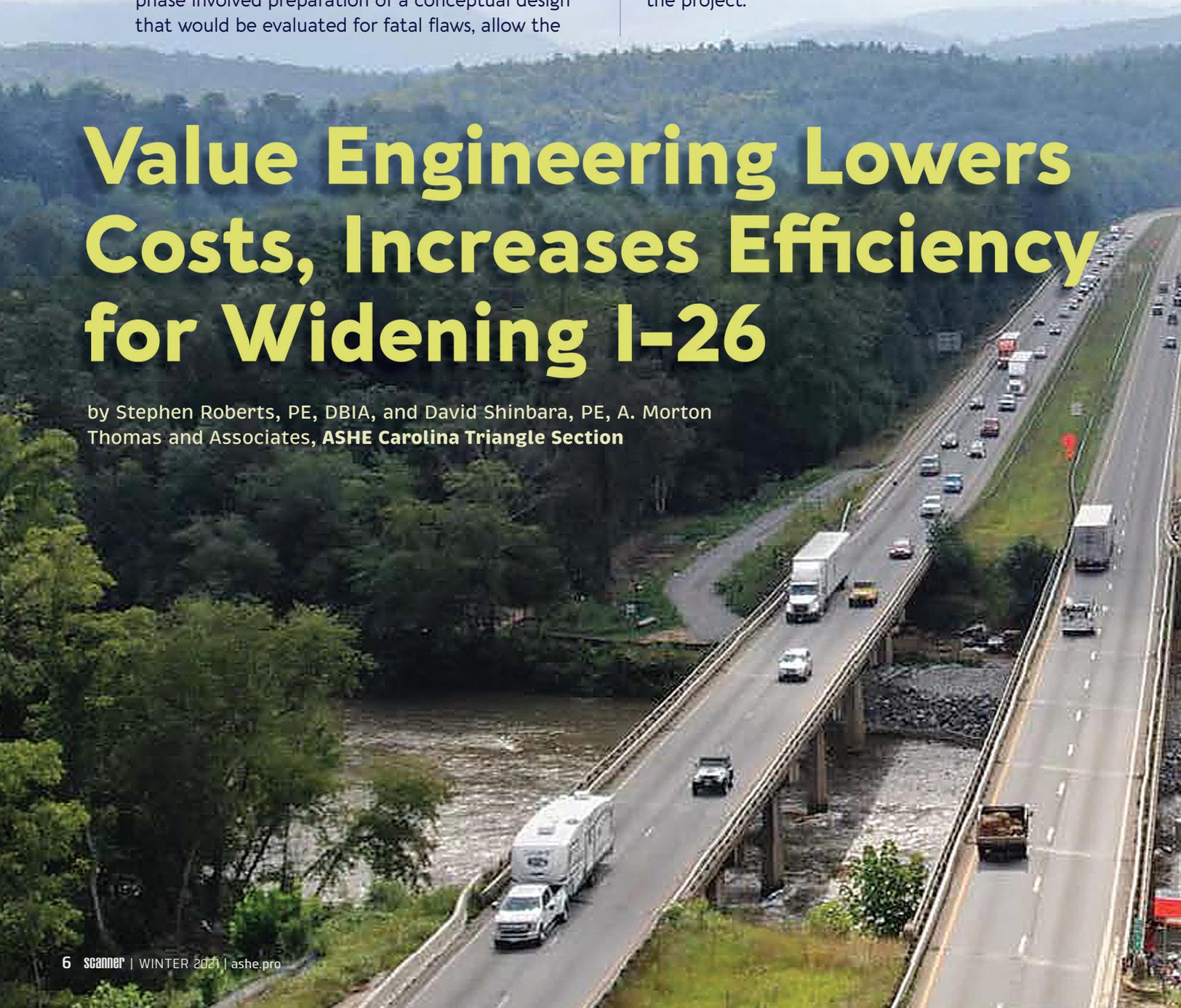
contractor to prepare estimates and get early buy-in from NCDOT. At the completion of phase one, AMT was tasked with developing a new Transportation Management Plan, new temporary bridge design over Biltmore Farms Road and new permanent bridge design over Biltmore Farms Road, including the associated mechanically stabilized earth (MSE) walls.

The project team wrapped up designs, and construction was underway. Key elements to this value engineering proposal included:

- A commitment to collaboration between the joint venture, the design team and NCDOT. This was critical to keep design deliverables moving with the construction schedule and to coordinate tying in to adjacent NCDOT Transportation Improvement Program projects under construction at both ends of the project.

Value Engineering Lowers Costs, Increases Efficiency for Widening I-26

by Stephen Roberts, PE, DBIA, and David Shinbara, PE, A. Morton Thomas and Associates, **ASHE Carolina Triangle Section**



- Simplifying construction phasing to three primary phases: phase one was a temporary widening phase of I-26 eastbound lanes to prepare a four-lane median barrier divided roadway. Phase two shifted traffic onto that pattern while replacing I-26 westbound. Phase three shifted traffic onto newly constructed westbound lanes while replacing I-26 eastbound.

- Identification of areas during phase one temporary widening where, using pavement wedging, the contractor could install portions of the I-26 eastbound ultimate roadway section, including grading, pavement, drainage and retaining walls. This reduced temporary quantities and additional mobilization later in the project.

- Maintaining the previously designed permanent drainage system.

While the scope included design of temporary drainage, the project team worked together to minimize revisions to the permanent drainage system.

- Additional geotechnical investigations. Working closely with the joint venture, AMT's subconsultant S&ME performed borings for the revised bridge over Biltmore Farms Road and prepared MSE wall designs, temporary wire wall designs and temporary pavement designs on an expedited schedule.

Through the combined efforts of NCDOT, the Fluor-United Asheville joint venture and the AMT design team, the overall cost was reduced by more than \$15 million, all while improving schedule efficiency and increasing safety throughout the work zone. 🇺🇸



Grading and permanent bridge construction over Glenn Bridge Road



Construction of temporary bridge over Biltmore Farms Road



Construction of new bridge over the French Broad River



Grading under the existing Blue Ridge Parkway bridge

New Interchange, Roundabout and Bridge R



**I-680/SR 164 New interchange,
I-164/SR 626 roundabout and
bridge replacement project**

Replacement Boost Safety, Ease Congestion

by Brian Hughes, PE, ms consultants, inc., Steve Gealy, PE, ms consultants, inc., and Joshua Conley, PE, Johnson, Mirmiran & Thompson, ASHE Cuyahoga Valley Section

Southern Mahoning County has experienced significant residential and commercial growth, placing high-traffic demands on inadequate local roadways. This has led to an increase in traffic congestion and crashes at the I-680 interchange with Western Reserve Road/SR 164. Concurrently, the portion of I-680 between Western Reserve Road and the Ohio Turnpike was significantly underused, essentially functioning as a long ramp to and from the turnpike toll plaza. This led Eastgate Regional Council of Governments (Eastgate) to explore adding a new interchange at the SR 164 overpass two miles farther south, thereby encouraging more local traffic to use I-680 and relieving congestion at Western Reserve Road.

Study Phase: Alleviate Traffic Congestion, Improve Safety

Eastgate, in cooperation with the Ohio Department of Transportation (ODOT), hired ms consultants, inc. (ms), to study and evaluate traffic congestion and safety problems within the southern I-680 corridor. The study involved:

- Assessing construction of a new interchange at I-680/SR 164 to alleviate traffic demands on Western Reserve Road by encouraging more vehicles to stay on I-680
- Considering parallel routes within the corridor to better use I-680 south of Western Reserve Road
- Identifying alternatives to improve commuter safety

Subsequent to ms's study phase, ODOT continued the Interchange Justification study, including further study of high crash rates at I-164/SR 626. Results of the study revealed that the crash rates could be mitigated by installing a roundabout, widening the SR 164 bridge over the Ohio Turnpike and improving the SR 626 intersection. ODOT retained Johnson, Mirmiran & Thompson (JMT) to design these project elements.

Design Phase

Based on the results of ms's study, the team designed and prepared construction plans for a new I-680/SR 164 interchange, including full-access ramps. Additionally, ms provided:

- Management, oversight and coordination with the Ohio Turnpike and Infrastructure Commission (OTIC) and JMT
- Roadway and traffic plans
- Drainage design and interchange grading

(continued on page 11)



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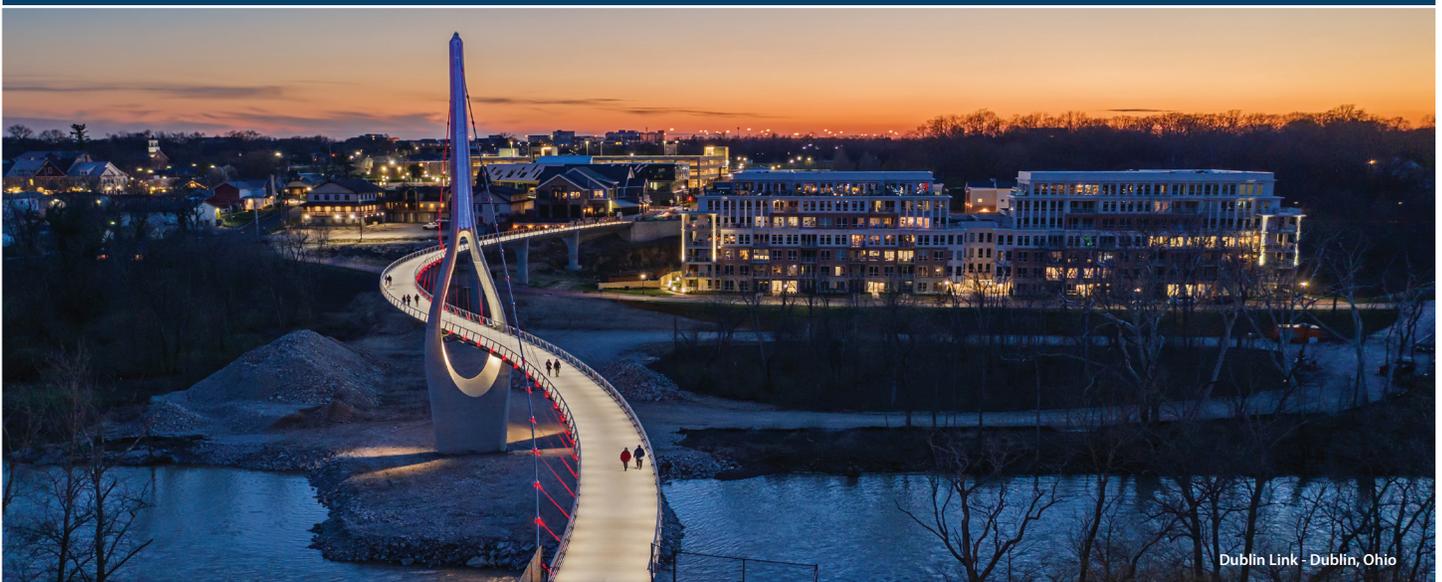
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New Interchange, Roundabout and Bridge Replacement Boost Safety, Ease Congestion

(continued from page 9)

- Best Management Practice design
- Culvert design
- Surveying and right-of-way plans

JMT prepared the adjacent roundabout plans at the I-164/SR 626 intersection and created the plans to replace the turnpike bridge with a wider structure.

Complexities of the New Interchange Design

One challenge of the new interchange design was to accommodate a 70-mph horizontal mainline design speed for the terminal of the new northbound I-680 off-ramp if the OTIC toll plaza, south of the new ramp, was removed. The existing horizontal geometry through the plaza did not accommodate this design speed. In addition, the off-ramp terminal also needed to accommodate the existing conditions. The solution was to develop an independent future northbound I-680 alignment, beginning at the end of the OTIC northbound exit ramp, passing through the toll plaza area and tying to the existing northbound lanes. The northbound lane through the plaza will need reconstruction to match this alignment when the plaza is removed.

Another complexity involved the southbound off-ramp. The ramp was a requirement in order to avoid an existing pond, tie into I-680 at a left-turning, fully superelevated curve-to-spiral transition and parallel the SR 164 terminal of the southbound on-ramp. The ramp could not exceed the allowed maximum curve differential and maximum cross-slope grade-break with mainline I-680. This resulted in the first exit curve being to the left, the same direction as mainline I-680.

A second ramp exit curve to the right was needed to diverge from I-680 and to parallel the southbound on-ramp alignment at the ramps' intersection with SR 164. The tangent superelevation transition length required between the reverse exit curves resulted in moving the southbound exit terminal to the north, directing the ramp alignment into the adjacent pond. Through continual refinements of the exit ramp geometrics, which changed based on the tie-in location along the mainline spiral alignment, the team found a ramp terminal location that permitted the required design geometry. It avoided the pond and properly directed the exit ramp to parallel the southbound on-ramp at the SR 164 terminal.

Roundabout Design

JMT provided design services for a modern roundabout, accommodating the additional lanes required for the new interchange. The SR 164 corridor was a rural, two-lane highway with intersections located on each side of the bridge over the turnpike with degraded traffic sight distance and safety. By implementing a roundabout, safety was increased through:

- Lowered traffic speeds through the corridor via raised splitter islands, chicanes and curbing along the outside travel lanes
- Adequate sight lines on the approaches and within the circulatory portion of the roundabout
- Conflict points reduced from 32 (traditional intersection) to eight

Each element of the roundabout design had a purpose. The red median islands alerted drivers that they were entering a roundabout, slowing them down, and the landscaping prevented distractions of adjacent movements while also filtering surface waters for treatment.

SR 164 Bridge Design

JMT also designed the widening of the existing SR 164 bridge over the Ohio Turnpike, replacing the existing bridge with a wider structure, accommodating additional travel lanes and creating the adequate shoulder width required by current design standards. This provided:

- Much needed sight distance for the SR 626 south intersection
- Adequate clearances for truck maneuvers across the bridge and through the roundabout
- Vertical clearance improvement for vehicular traffic beneath the bridge on the turnpike

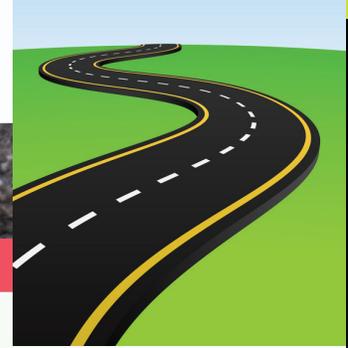
Importance to the Traveling Public

As a result of the addition of the interchange, lanes, roundabout and bridge, traffic congestion has decreased. Traffic can exit at the new interchange, taking substantial volume off the local routes and out of the busy Western Reserve Road corridor.

Most important, the improvements also increased the traveling public's safety and provided an innovative route. Since opening in November 2019, the upgrades have also presented the potential to transform the SR 164 corridor into an economic generator. 

As The Wheel Turns

ASHE Members on the Move!



McInnes Receives Award

Philadelphia, PA—**Sarah McInnes, PE**, was named Geotechnical Engineer of the Year for 2020 by the Philadelphia Section of the American Society of Civil Engineers (ASCE). McInnes, *a longtime member of the Board of Directors of ASHE's Delaware Valley Section*, received the award during an ASCE event conducted virtually on September 24. She is the District Geotechnical Engineer for Pennsylvania Department of Transportation District 6 in King of Prussia, PA. McInnes holds a Bachelor's degree in Civil Engineering from Syracuse University and a Master's degree from Villanova University. She has published several papers and given presentations on geotechnical topics.



Irick Wins National Award

Turnersville, NJ—**Sara Irick, PE, PMP**, received recognition as an Association for Commuter Transportation's 40 Under 40 Professional at the Transportation Demand Management Forum in November. Irick is *a longtime member of ASHE's Southern New Jersey Section* and has served on its Board as Communications Officer. She is a Senior Project Manager for Grant Integrative Facilities Management, with 15 years of diverse engineering and project management experience focusing on commuter transportation. Irick, a published author for industry periodicals, also works to promote STEM (science, technology, engineering and mathematics) in schools, as well as support and mentor female engineers.

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Town Branch Commons: *Linking Lexington's Urban Core with Bluegrass Countryside*

by Mike Sewell, PE, LCI,
Gresham Smith, ASHE
Derby City Section

Protected bike and pedestrian paths will provide more opportunities for recreation when Town Branch Commons is completed.



In the late 1700s, the city of Lexington, KY, was founded along Town Branch Creek. However, after several cholera outbreaks the stream was buried beneath the city's streets and still remains out of sight. Alongside SCAPE Landscape Architecture (SCAPE), Gresham Smith designed Town Branch Commons, a multimodal trail, greenway and park system in downtown Lexington that traces the route of the city's original water source.

The project, led by the Lexington-Fayette Urban County Government,

will create continuous bike and walking paths and a green band through downtown. It will also connect new and existing parks and improve water quality. When complete, the project will serve as the centerpiece of a city-wide park system, linking Lexington's urban core with the Bluegrass countryside while honoring the city's history.

A Complete Streets Design

The new stretches of greenway will accommodate pedestrians and cyclists, providing the missing linkage that



finalizes more than 22 continuous miles of protected bike and pedestrian paths. The project will also improve pedestrian, bicycle and vehicular safety while integrating a complete streets approach, including separated bicycle and pedestrian facilities,

enhanced pedestrian crossings and intersection safety improvements. The corridor vision was developed by SCAPE for the 2013 Town Branch Commons design competition. The final design will honor the original vision, which pays homage to Lexington's history by reinterpreting the city's relationship with the waterway upon which it was founded.

"Complete streets approaches for a historic corridor like Town Branch Commons means a lot of different things to different people," said Mike Sewell, Active Transportation Line Leader at Gresham Smith. "Here, making sure that we provide a safe and comfortable passage for all

users meant that we weaved together state-of-the-art engineering with landscape architecture and storytelling through wayfinding and signage."

From City to Countryside

In addition to the downtown park system, Lexington-Fayette Urban County Government is developing an urban bike network, additions to the city's Legacy Trail and Town Branch Trail system and improvements to the Lexington Transit Center frontage. When complete, the system will connect urban, suburban and rural parts of the city, providing residents who live near the 22-mile corridor with safe, healthy mobility choices.

New trail construction along the Town Branch Commons route began in March 2020. Once completed in 2022, the dedicated bike and pedestrian paths through the heart of downtown will connect to the Legacy Trail and Town Branch Trail, creating a five-and-one-half-mile loop on the north side of downtown that will also provide access to the growing country-wide trails system.

(continued on page 17)



Plans for Town Branch Commons include planting thousands of trees to improve air quality.

Meeting in the Virtual World During the Pandemic

by Khatereh Vaghefi,
PhD, PE, WSP USA, **ASHE
Potomac Section**

For years, the ASHE Potomac Section dinner meetings have brought members and friends together once a month to network and learn from one another. Everyone cherished those evenings away from the office where friendships budded and plans for the future were made. This year brought a wave of changes. We are now confined to meeting in cyberspaces, changing the way we work and network.

We held the first meeting of the 2020-21 season in a virtual space on September 16, and we heard members' voices. Five of our Gold Sponsors sent representatives to tell how their firms were affected during the pandemic and how they were supporting their clients and their employees. The speakers were: *David Hieber, PE*, Johnson, Mirmiran & Thompson, Inc.; *Erin Donovan, PE*, T3 Design Corporation; *Mo Kim, PE*, Rinker Design Associates; *Robert Morris, PE*, WSP USA; and *Young Ho Chang, PE*, ATCS

Most companies already had the infrastructure in place or improved their infrastructure to accommodate employees working from home. At one of the smaller firms, 50 percent of its employees telework while the others have returned to the office, making the best use of the office space while implementing safety measures. At a larger firm, all business travel plans were canceled to reduce the risk of spreading the virus, and all employees were allowed to telework. Only a small percentage returned to the office, implementing strict safety measures as well.

During the first few months of the pandemic, dealing with information technology issues, learning to navigate virtual meetings and communicating the company's status to employees were the biggest



Members of the ASHE Potomac Section met virtually in September to learn how five companies have supported their clients and employees during the pandemic.

challenges for all the firms. Other challenges included providing safety equipment and policies for field staff and providing support to all new hires and interns who started their jobs at the beginning of the summer.

All five firms were able to fulfill their duties and support clients while their staff worked from home. Client meetings were converted to virtual meetings, and staff members came up with creative solutions in digital delivery to accommodate plan reviews on laptops.

Working from home came with challenges for some employees who needed to develop new ways to balance work and life. All firms implemented flexible working hours, organized periodic virtual happy hours and communicated the status of the company on a regular basis.

What does the future look like?

- There are still many unanswered questions, but what we know for sure is that the 2020 crisis changed the way we think of work forever.
- This period of mandatory isolation proved that working remotely may be a solution to relocations, long commute times and lack of competent consultants in certain remote areas. Many industries have already adapted to the new normal. Perhaps having agile office spaces and telework are in the future of our industry too.
- We braved the change; however, we admit that we have missed meeting our members in person during dinner meetings. We hope that this change will not persist for too long in the future. ❤️

Town Branch Commons: *Linking Lexington's Urban Core with Bluegrass Countryside*

(continued from page 15)

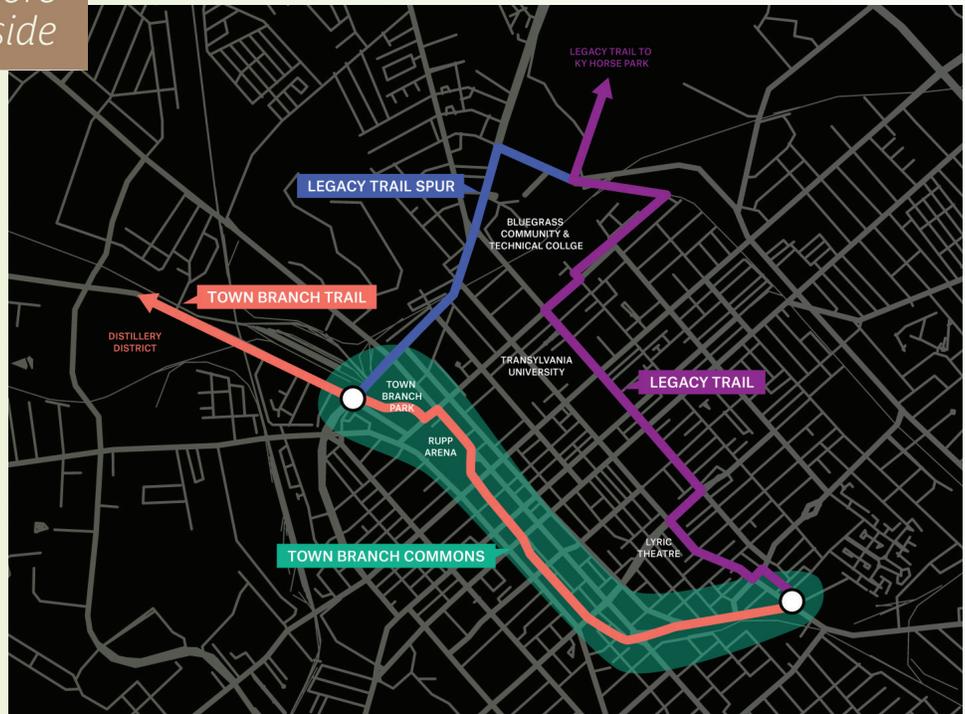
Introducing Environmental Benefits

In addition to improving connectivity and traffic flow, the greenway will also introduce a number of environmental benefits. The project will incorporate green infrastructure throughout downtown using features such as bioswales, pervious paving and educational signage.

The Town Branch Commons project will include planting as many as 2,000 trees, taking a substantial amount of pressure off the stormwater system, improving microclimates and air quality during summers and providing more enjoyable spaces for residents, visitors and wildlife alike.

A Catalyst for Community

The project will also enhance connectivity to existing community assets, as well as serve as a catalyst for new community-driven placemaking opportunities. Town Branch Commons will connect diverse communities and allow for more equitable and healthy transportation choices. Visitors and employees at Rupp Arena will be able to walk or bike there more safely. Those wishing to use public transit and then walk the rest of the way to their destination will be able to connect to the Lextran Transit Center Hub. The Town Branch Commons will also attract employers wishing to relocate their businesses.



Trail construction along Newton Pike, Vine Street and Midland Avenue (highlighted in blue) is underway. Source: <https://www.lexingtonky.gov/trailconstructionupdates>

Celebrating Lexington's History

Town Branch Commons will better connect Lexington's urban core with the surrounding countryside, featuring a series of multimodal improvements that honor Lexington's natural history. Before Town Branch Creek was buried, it was a gathering place for the citizens of Lexington; Town Branch Commons will soon be a gathering place once again. The Town Branch Commons Corridor project is supported by local, state and federal funds, with a new signature park funded through a public-private partnership. 🇺🇸



Groundbreaking for Town Branch Commons in 2018



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Cyclists from ASHE Southern New Jersey Section Take Delaware River Tour

In October, about 20 engineering professionals met outside the offices of the Delaware River Joint Toll Bridge Commission (DRJTBC) in Yardley, PA, for the ASHE Southern New Jersey Section's Delaware River Bicycle Tour. The trip featured views of the Delaware River, a ride along towpaths, a visit to Washington Crossing historic sites plus a view of the \$396 million DRJTBC Scudder Falls Bridge Replacement Project.

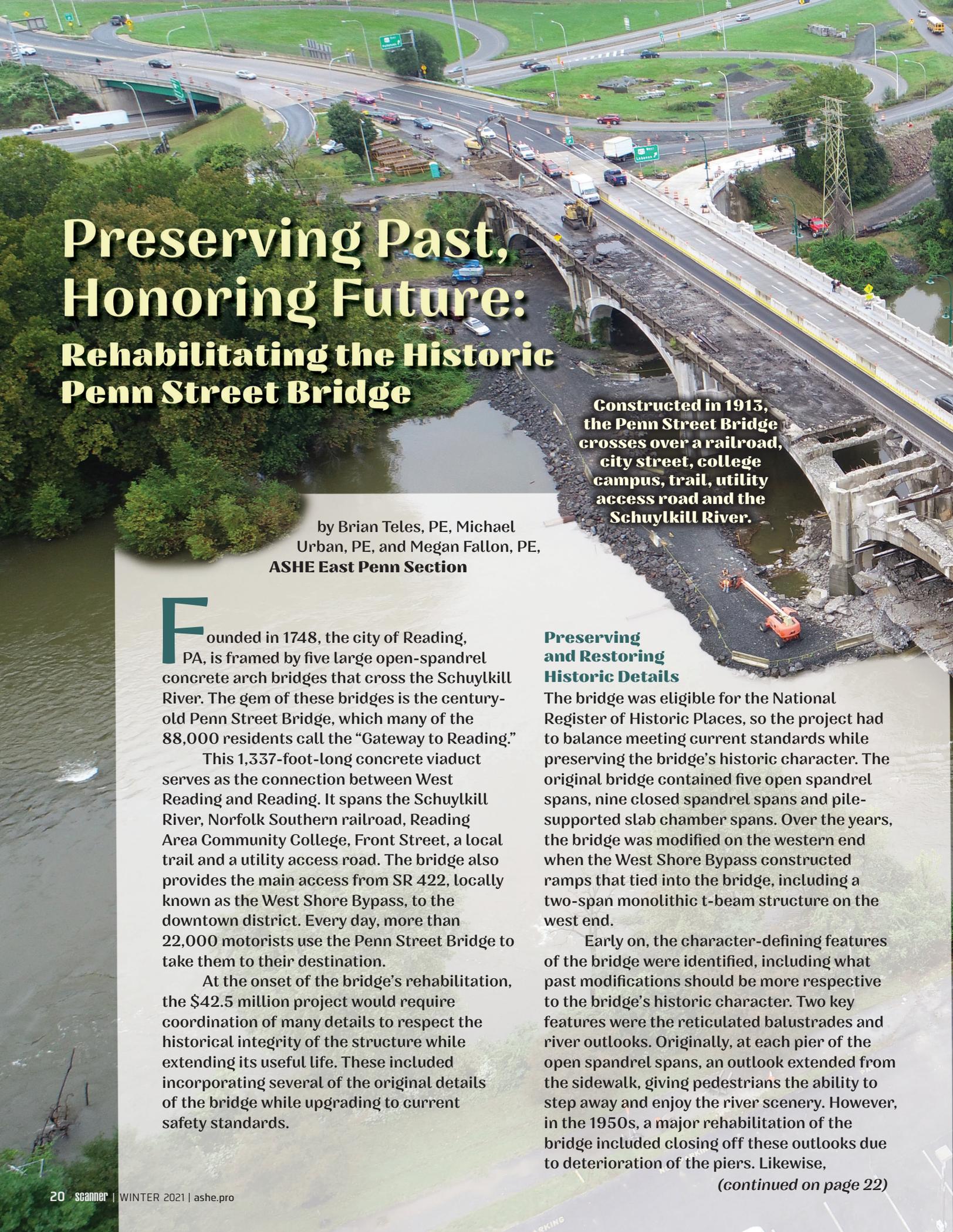
The bridge project is more than half-finished, with the new southbound structure carrying both directions of I-295 over the Delaware River; the new northbound structure is under construction. The tour began with a side trip down River Road (SR 32) for a view of the Pennsylvania abutments, plus the trestle causeways that extend hundreds of feet into the river supporting massive cranes. From the end of the Yardley boat ramp, the cyclists could see the multi-span bridge construction with work extending from both the Pennsylvania and New Jersey sides of the river.



Back at the bridge, the tour continued north along the Delaware & Lehigh (D&L) Canal in Pennsylvania to Washington Crossing. Many historic features from the original canal remain, including sluice gates, locks and the locktender's house, underscoring the contrast between what was considered state-of-the-art transportation in the 1850s and now. After leaving the D&L Canal towpath, the group explored the village in Washington Crossing Historic Park, a site near where George Washington crossed the Delaware River to attack the Hessians in Trenton, turning the tide of the American Revolution.

After lunch, the tour continued down the New Jersey side of the river along the Delaware & Raritan Canal to the Scudder Falls Bridge project on the "Jersey" side. Although the group's tour officially ended at the Scudder Falls project with a shuttle back to the DRJTBC offices, most of the riders continued on to Trenton and crossed back to Pennsylvania on the Calhoun Street Bridge, extending the tour another 9 miles. The Section has planned another bicycle tour for spring 2021. 🇺🇸





Preserving Past, Honoring Future: Rehabilitating the Historic Penn Street Bridge

by Brian Teles, PE, Michael Urban, PE, and Megan Fallon, PE,
ASHE East Penn Section

Founded in 1748, the city of Reading, PA, is framed by five large open-spandrel concrete arch bridges that cross the Schuylkill River. The gem of these bridges is the century-old Penn Street Bridge, which many of the 88,000 residents call the “Gateway to Reading.”

This 1,337-foot-long concrete viaduct serves as the connection between West Reading and Reading. It spans the Schuylkill River, Norfolk Southern railroad, Reading Area Community College, Front Street, a local trail and a utility access road. The bridge also provides the main access from SR 422, locally known as the West Shore Bypass, to the downtown district. Every day, more than 22,000 motorists use the Penn Street Bridge to take them to their destination.

At the onset of the bridge’s rehabilitation, the \$42.5 million project would require coordination of many details to respect the historical integrity of the structure while extending its useful life. These included incorporating several of the original details of the bridge while upgrading to current safety standards.

Constructed in 1913, the Penn Street Bridge crosses over a railroad, city street, college campus, trail, utility access road and the Schuylkill River.

Preserving and Restoring Historic Details

The bridge was eligible for the National Register of Historic Places, so the project had to balance meeting current standards while preserving the bridge’s historic character. The original bridge contained five open spandrel spans, nine closed spandrel spans and pile-supported slab chamber spans. Over the years, the bridge was modified on the western end when the West Shore Bypass constructed ramps that tied into the bridge, including a two-span monolithic t-beam structure on the west end.

Early on, the character-defining features of the bridge were identified, including what past modifications should be more respectful to the bridge’s historic character. Two key features were the reticulated balustrades and river outlooks. Originally, at each pier of the open spandrel spans, an outlook extended from the sidewalk, giving pedestrians the ability to step away and enjoy the river scenery. However, in the 1950s, a major rehabilitation of the bridge included closing off these outlooks due to deterioration of the piers. Likewise,

(continued on page 22)

ASHE East Penn Section 2020 Project of the Year

Penn Street Bridge ranked fifth in *Roads and Bridges Top Bridges List* for 2020

The reticulated balustrades are a combination of precast and cast-in-place elements, allowing original details to be retained.



Called the “Gateway to Reading,” the rehabilitated bridge enhances city livability.

Preserving Past, Honoring Future: Rehabilitating the Historic Penn Street Bridge

(continued from page 20)

renovations in the 1970s replaced the original obelisks, which originally supported gas lamps, with modern light poles and electric lighting.

With consulting party input, it was determined that some of the past character-defining features should be restored into the design of the rehabilitation. The western end of the bridge included a superstructure replacement and barrier replacement that now are respective to the bridge’s history. In addition, although the use of obelisks in the original locations for lighting was not possible, two obelisks were added to the eastern end of the bridge, restoring the bridge’s past features while enhancing the entrance into the city. With the rehabilitation of the piers, the restored outlooks were incorporated into the design. To showcase these, lighting was added beneath the bridge to display the arches. Lights were also embedded at the base of the obelisks to illuminate them as travelers enter the city.

History Versus Modern Needs

Part of extending the life of the bridge included ensuring that the structure met current safety requirements. With the desire to maintain the reticulated balustrades and accommodations for future bike lanes, revisions of the cross section of the bridge included a crashworthy barrier at the curb, protecting a seven-foot-wide sidewalk.

Five-foot-wide shoulders with bicycle-safe grates created a buffer between the sidewalk and traffic, allowing for the creation of future bike lanes. Narrower 11-foot traffic lanes helped to deter vehicles from speeding.

Maintaining Traffic Flow

The project team focused on extending the life of the bridge and ensuring no interruption to critical services during construction. With a freeway interchange on the west end of the bridge and a downtown signaled intersection



A 31,000-square-foot causeway in the Schuylkill River enabled greater construction access while minimizing traffic impacts.

on the east end, maintaining traffic was critical.

The project team completed a traffic impact study early to establish a plan and leave room for construction while allowing traffic to flow in and out of the city. This included reducing the volume crossing



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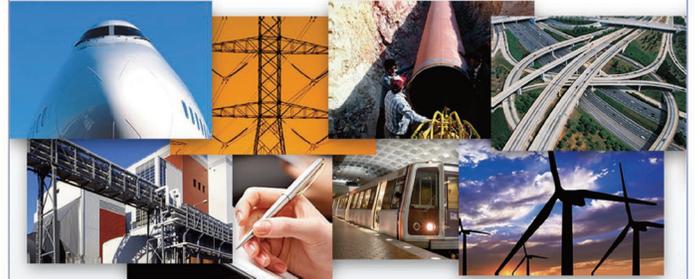
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the bridge into the city by closing one of the interchange off-ramps and ensuring that three of the four lanes remained open to prevent congestion.

With only one of the four lanes made available for construction, there was extensive planning for traffic control and access. To maximize construction access, a 31,000-square-foot causeway in the Schuylkill River allowed heavy equipment to complete work from below the bridge while traffic continued on the bridge above. The main western causeway was accessible from the closed interchange ramp, making it easier for the contractor to move people, materials and equipment. This approach allowed for traffic to flow while pedestrians still had one reduced-width sidewalk for use.

The Gateway Restored

The rehabilitation of the Penn Street Bridge was finished four weeks ahead of schedule and within two percent of the original bid. From the beginning, the project team focused on the details so that the “Gateway to Reading” could be restored, once again becoming the jewel of Reading’s Schuylkill River bridges. 🇺🇸



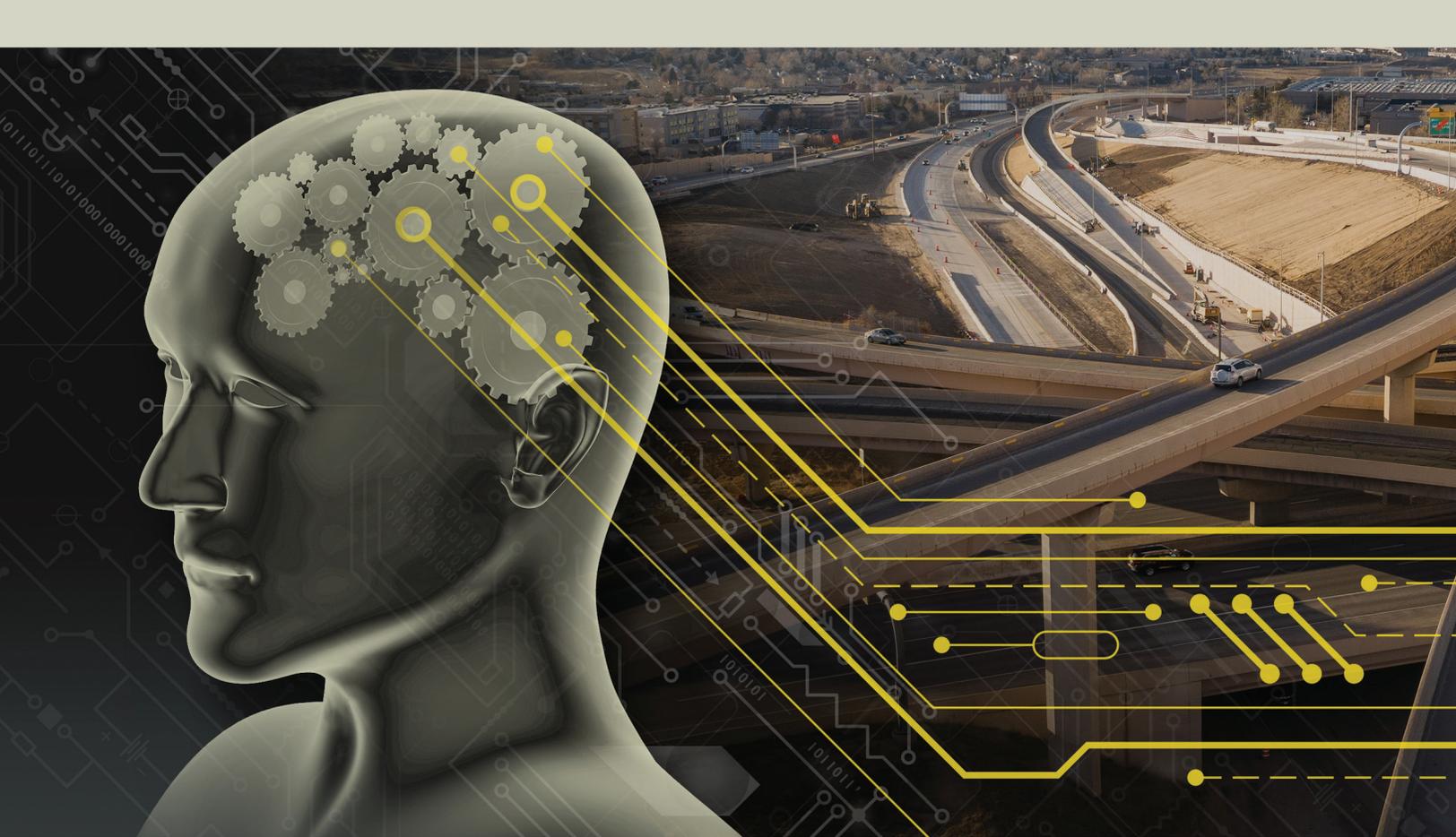
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Leveraging the Latest Adv

Is it possible to collaboratively change the paradigm of infrastructure design? Can our organizations have dozens of employees working on multiple designs, or just one design?

To keep pace with aging infrastructure and growth, the transportation industry needs to continually bring innovative solutions to stakeholders and the general public. Advancement in digital innovations can span the spectrum of planning, design and construction, as well as infrastructure asset operations and maintenance. The standard-of-practice attitude of “this is how we have always done it,” is outdated. Leadership should see that data is the new gold in infrastructure design and construction. To properly implement what is proposed, thought leadership should be at the forefront of trusting subject-matter expertise, and understanding the implementation of their ideas and their presentation. That means letting the advancement in technology make what is done better, more informed and efficient. One example is an “I”-shaped component that has many uses, such as column, girder, beam or diaphragm. The use of the object in a design model is limited only by how one

chooses to see, define and intend its use.

At AECOM, teams of professionals have adopted an integrated approach to best leverage the most current digital technology tools, starting with Light Detection and Ranging (LiDAR) to Building Information Modeling (BIM). Many aspects of the nation’s infrastructure are reaching the end of their as-designed lives. Along with the continued stretch of the construction dollar’s purchase power, the development of systematic processes for determining the most cost-effective infrastructure investment strategy is of utmost importance. The use of BIM for infrastructure is a key focal point in AECOM’s engineering services delivery. This integrated design and delivery methodology enhances programming, conceptualization, design, cost, sequencing simulation, operational certainty and safety through 3D data models of intelligent components. Lessons learned from the vertical construction industry can, and should, be applied to horizontal construction. The adoption of this technology for civil infrastructure is essential.

Asset management, a broad term applicable to this paradigm of infrastructure design, can be defined

DIGITAL INNOVATIONS

WHAT IT TAKES TO BE AN INNOVATOR

by Michael Warren, AIA, CDT, LEED AP, AECOM, ASHE Delaware Valley Section

Advancements in Technology

as a process that guides gaining assets, along with their use and disposal, to make the most of their use and potential throughout their lives. While doing this, asset management also manages and maintains any associated asset costs and risks.

Planning Certainty – 1D and 2D for 3D

BIM is an intelligent 3D model-based process that gives architecture, engineering and construction professionals the insight and tools to plan, design, construct and manage buildings and infrastructure more efficiently. It starts from the first file received from an agency for their intent, and how one follows up with capturing information to inform a model of the desired work-result, to what a company produces to deliver it.

Design Certainty – 3D or digital twin

Three-dimensional technology and software have existed for decades. Introducing newer and more comprehensive technology enhances design certainty, particularly for geometric aspects, on a project whether it be greenfield, brownfield or existing conditions inventory and assessment. For example,

BIM with LiDAR reality capture elevates the life cycle management of the asset from the start. The next phases in this workflow, time/cost certainty and operational certainty, can be evaluated early and intelligently in the decision and analysis process. Geospatially referenced data capture of existing conditions and as-built geometry via LiDAR provide geometric accuracy. It can also produce component data for integration into the data model, or what can be referred to as a digital twin.

Time/Cost Certainty – 4D and 5D

The workflow for design and construction needs to support all stages of the asset management process: condition assessment and data capture, data analysis, deficiency identification and cost estimating. It also encompasses capital investment planning and project prioritization, as well as operating expenses budget modeling. In the past, complex tasks like organizational and operational planning, space optimization and climate change resilience were time consuming. Now, with digital innovations, they can be achieved at a much faster rate with more

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in-depth analysis. Each of these variables can be connected to help inform capital project development and prioritization. Data mining schemes can provide outputs, and relevant parameters can be selected to suit the needs of the owner. Providing the greatest level of interoperability between common data environment platforms for effective project collaboration and delivery is key.

Operational Certainty – 6D and 7D

The benefits of an innovative approach that includes a focus on 1D to 5D data capture from project inception will allow for more informed operational certainty in planning, life cycle costing and budgeting. Advanced information modeling facilitates the study of multiple operations and maintenance options quickly using real-world simulated influences to find the optimum solution. Systems coordination can be accomplished using BIM, providing the ability to produce quantity surveys, takeoffs and cost estimates at any time during the asset's lifecycle. It also helps an owner track, analyze and forecast quantities and costs

more effectively. The digital collaboration of BIM and computer maintenance management system technology leaders, engineers, information technology specialists, systems and asset management analysts, as well as constructors and operators, creates a holistically modeled system. In turn, this can provide for reliable operational certainty of the infrastructure asset over the long term.

Safety Certainty – 8D

LiDAR scanning in conjunction with traditional land surveying overlaid in a federated digital model provides clarity upfront and through the asset life cycle. It also provides safety in capturing the state of the asset and is a planning tool for staff to maintain. Innovative digital approaches for the inventory, planning, design and construction, as well as operations and maintenance, of our infrastructure assets are essential.

AECOM is proud to be a leader in the adoption and use of these technologies along with industry partners and infrastructure owners, keeping the best interests of the traveling public and users in mind. 🇺🇸

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An Initiative Engineered for Safer Rail Crossings: Operation STRIDE

by Ivan Jimenez Urena, EIT, and Norelys Nodal, Gannett Fleming, Inc., ASHE South Florida Section

Highway engineers may sometimes forget that trains were the original mode of urban transportation. Once a large and vital part of the nation's transportation network, intercity passenger rail service has acquired new life in South Florida. With operating speeds of up to 79 mph and planned speeds of 125 mph on the horizon, passenger rail is creating a new power dynamic between drivers and conductors.

This struggle can be easily grasped via a comparison of force. While the legacy of passenger trains may be somewhat forgotten, most drivers are familiar with slow and infrequent freight trains. These behemoths, however, generate tremendous power. An average freight train weighs approximately 4,000 times more than an average automobile. An average two-ton car would have to travel at 120,000 mph to have the same momentum as an average 8,000-ton freight train traveling at 30 mph. While passenger trains are lighter, approximately 540 tons, their faster operating speeds increase the probability of impact with unsuspecting drivers accustomed to slower freight trains.

As part of his promise to ensure that safety is a top priority, Florida Department of Transportation (FDOT) Secretary Kevin J. Thibault announced a new rail safety measure in December 2019. Called Operation STRIDE (Statewide Traffic and Railroad Initiative using Dynamic Envelopes), it comprises a comprehensive strategy of engineering, education and enforcement to prevent fatalities on or

near rail crossings on state roads and state-owned land crossings. This includes innovative engineering countermeasures tested by FDOT in partnership with the Federal Railroad Administration, now undergoing implementation across the state.

In 2014 and 2017, FDOT tested the effectiveness of using enhanced pavement markings to demark the Railroad Dynamic Envelope (RDE) in two pilot projects at rail crossings in South and Central Florida, respectively. The RDE is the clearance necessary for a train, or overhang resulting from any combination of loading, lateral motion or suspension failure, to pass safely (Figure 1). The RDE extends six feet away from the outermost rail edge, and any object within the RDE is at a risk of being struck by a train. Following the installation of the RDE pavement markings, traffic data from the pilot projects indicated that the number of vehicles that stopped on or too close to a rail crossing was reduced by at least 15 percent.

With Secretary Thibault's 2019 press release, subsequent design bulletins and operations memorandums, the tested engineering countermeasures are now required on all state roads, state-owned rails and state-owned properties. Since the beginning of 2020, FDOT has worked on retrofitting existing rail crossings to meet this new standard with anticipated completion by March 2022. The new design, illustrated in Figures 2 and 3, requires 12-inch white preformed thermoplastic pavement markings forming a continuous pattern of 13-foot-wide X's across the entire RDE. On concrete

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Examples of Dynamic Envelope Pavement Markings at Grade Crossings

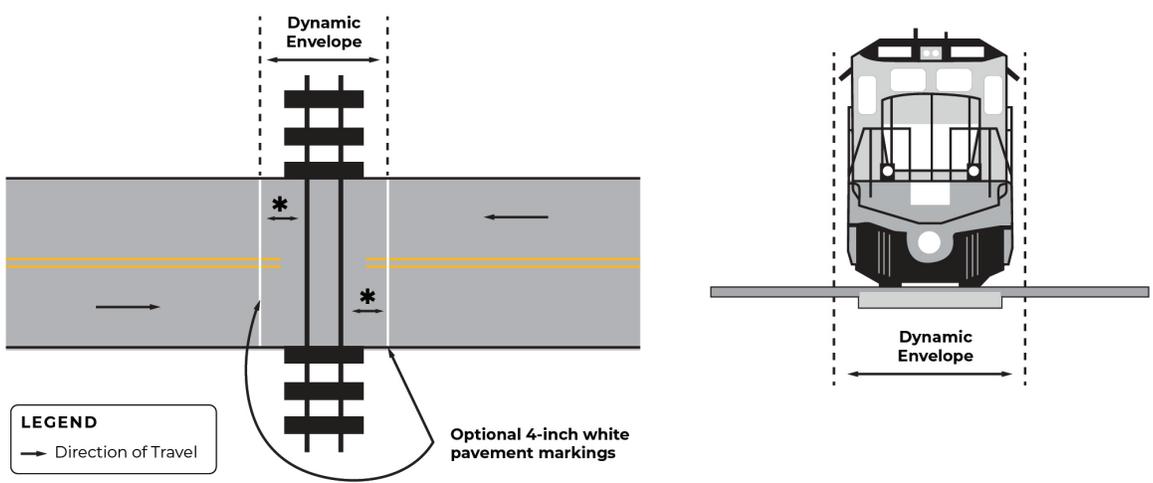


Figure 1

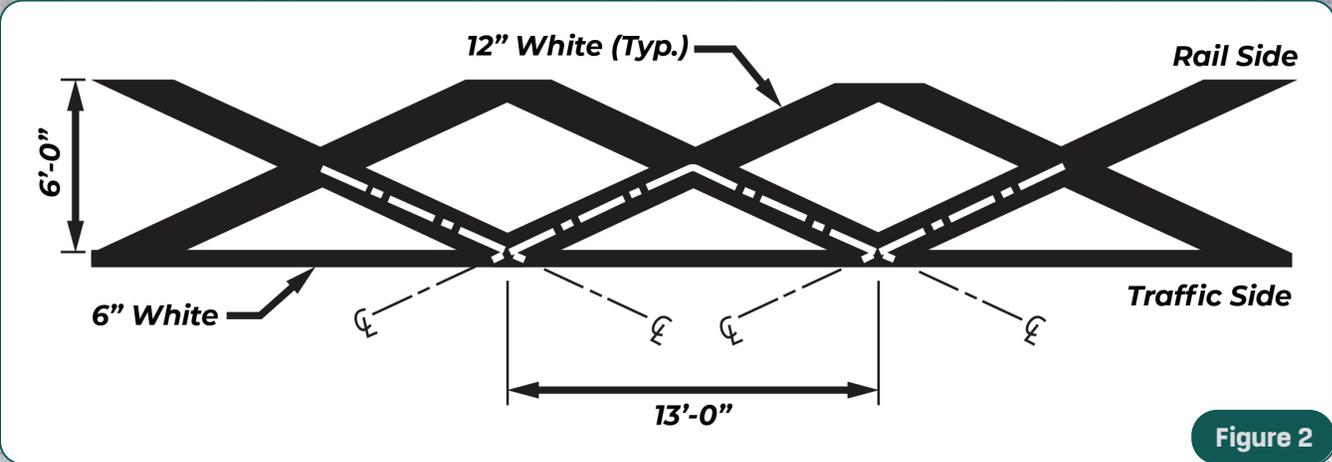


Figure 2



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An Initiative Engineered for Safer Rail Crossings: Operation STRIDE (continued from page 28)

surfaces, the X's include a four-inch-wide black contrast border on both sides of each 12-inch-wide marking. A six-inch white preformed thermoplastic pavement marking delineates the outer edge of the RDE. The new design also requires additional R8-8 signs ("Do Not Stop on Tracks") on all four quadrants of a rail crossing.

It is hoped that these new countermeasures will increase awareness of rail safety for motorists, cyclists, pedestrians and implementors, such as highway engineers. Passenger rail service is a key component in helping communities develop. And to develop safely, it is vital to remember the power and legacy of trains and use extreme caution around train tracks. 🇺🇸

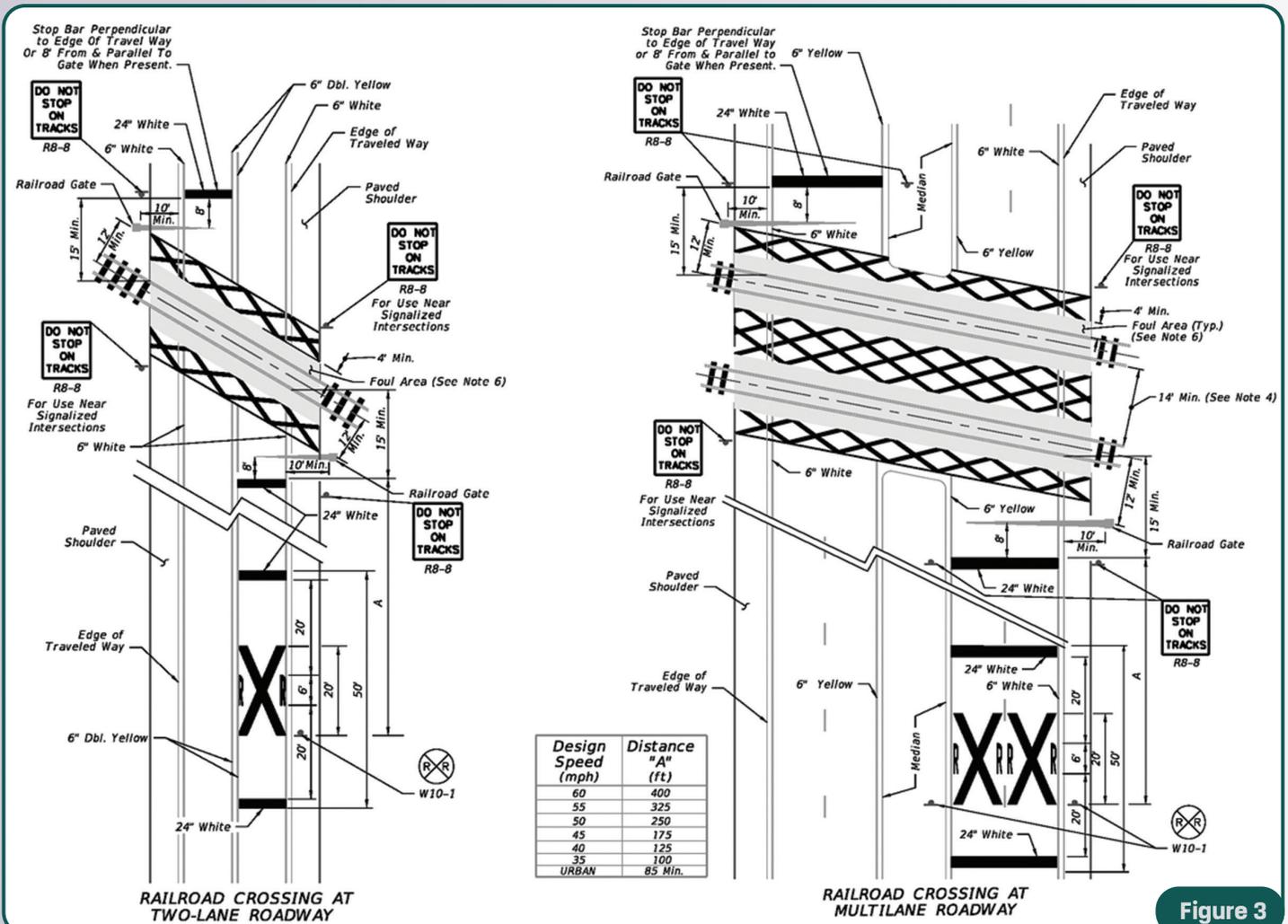


Figure 3



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