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Summer 2015
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Huge Traffic Upsurge Means Full Speed Ahead for Roadwork

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New Rapid Transit Station Will Enhance Safety, Convenience in Thriving Cleveland Neighborhood

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PROJECT OF THE YEAR WINNER Over $10 Million

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Robert A. Hochevar, PE
ASHE National President 2015-2016

New Directions

I am honored and excited to be your 57th National President of the American Society of Highway Engineers. I would not be in this prestigious position without the accomplishments and support provided by the many ASHE Officers, Directors and members whom I have been associated with and all those who have come before me. The gavel was passed to me at the conclusion of our National Conference in Baltimore by President Sam Mody. I am humbled to be given the responsibility to lead this great Society forward on the heels of such an outstanding President. Sam's efforts and leadership have been tremendous while he served as our National President through all his many travels, presentations, meetings, recognitions and initiatives during his tenure. From the entire ASHE organization, we thank you, Sam!

This is an exciting time to be part of ASHE with so much happening. There are many new initiatives underway as a result of the leadership and vision of Sam Mody and other Past Presidents. Larry Ridlen, National First Vice President, and I have been part of these initiatives, and we look forward to carrying them through. So my message this year is a hearty *Let's Keep the Momentum Going!*

Several of the initiatives that the National Board and National Committees will be carrying through or finalizing this year include:

- Implement the newly formed Finance subcommittee strategies and goals under the Budget/Audit Committee.
- Update the National Constitution to comply with the recently updated National By-Laws and other governing documents.
- Continue to express the ASHE membership's position concerning the necessity of an adequately funded transportation system on all levels of government.
- Utilize the newly created public relations materials, such as display banners, brochures, flyers, videos and social media updates, to get the message out concerning the benefits of being an ASHE member.
- Chartering of the Dallas-Fort Worth, TX, Section and continued efforts to charter new Sections in areas of Denver, CO; Hartford, CT; and Beaumont, TX.
- Foster relationships with our partnering societies International Erosion Control Association, National Association of County Engineers, National Association of Women in Construction and Society for Marketing Professional Services and other affiliate organizations on the local, regional and national levels.
- Utilize the newly created ASHE Cloud site for data storage by our local, Regional and National Officers, Directors and Committee Members.
- Update our National website to be more user-friendly and beneficial as an informational forum and resource for our members, potential members and others. This includes updating and relocating the Operations Manual documents on the website in an easy-to-find and use format.
- Provide a digital *scanner* that will be fully interactive with features including a customized toolbar, auto-linking urls and email addresses, page thumbnails, search capabilities and media insertions such as video, audio, slide shows and animation.
- Provide additional guidance and support for Sections to establish Student Chapters.
- Continue to strengthen the Regions by providing additional authority and purpose.

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In This Issue

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From the Editor's Laptop

I have saved the *scanner* from 2001 up to today. Why I didn't save it from 1987 (when I joined ASHE) to 2001 is a mystery, although some of you are probably asking why save more than a couple of years' worth?

The 2001 – 1 issue, as it was labeled, had one color—orange—that was used on the cover banner and the titles for the technical articles. Robert Peda was the managing editor, all photos were black and white and the issue was 22 pages long. ASHE had a membership of 5,136, and the National Conference was being held in Seven Springs, PA.

Fast forward to 2006 and ASHE dropped the issue number by quarter and went to the winter to fall designation. With the summer issue, the organization exceeded 6,000 members (6,008), the banner changed to a new forward-looking, out-of-the-box design and the use of the first color photo appeared on the feature story on the cover. I joined ASHE National as the Region 2 Director, and my first committee assignment was Drew Bitners' *scanner* committee. The only time that I have not been a part of this committee was from June 2010 to July 2011 when I was President.

Spring 2007 started the integration of full color to the *scanner*. This was a major commitment by the Board to bring the magazine up to the same level as the other industry literature and was championed by the managing editor, Drew Bitner. Over the next two issues, many companies started to submit their advertising in color. With the 2007 fall issue, I took over as the managing editor of the *scanner*.

Now jump seven years to the spring 2014 issue. A tough decision was made to change our publisher from Wanner Associates to TNT Graphics' Tammy Farrell, who had been our graphic artist for many years. She gave the magazine a fantastic new look and has been great to work with.

The summer issue of 2015 will be my last issue as the managing editor, and it has been a wonderful experience. Tammy will now become the publisher and the managing editor, and I know she will continue to enhance your magazine and will make us all very proud. All of you, as members and officers in Sections/Regions, will support her in her effort to deliver a quality industry magazine that continues to sell our organization to the many areas of the country where ASHE does not exist.

Thank you and God bless you,

John Hetrick P.E.

John

NYSDOT Embraces Centrifugally

Trenchless Sewer Rehabilitation Process Becoming a Standard in New York

by Angus W. Stocking, LS,
ASHE Albany Section

Cast Concrete Pipe:

After trial projects, and letting several projects under emergency contracts, the New York State Department of Transportation (NYSDOT) now appears to view centrifugally cast concrete pipe (CCCP) as a mature and cost-effective solution for large-diameter sewer repair. A recent storm sewer rehabilitation project near Groton, New York, is a good example of this. The project was awarded to Arold Construction Company, Inc., via an emergency bid process, and Vice-President Ryan Arold saw that as something of a vindication: "We were the first in this area to see the potential of the CentriPipe spincasting process, and it's nice to see the quality of the solution being recognized."

Before rehabilitation, the sewer was in bad shape, but not actually collapsing. "This was 195 feet of 42-inch diameter corrugated metal pipe (CMP), and it was about 40 years old," said Arold Superintendent Nathan Baldwin. "It had actually held up pretty well, given its age, but the invert was rotted out, there were large voids visible under the pipe and, in places, the metal was folding up into the sewer. So the pipe hadn't collapsed, but it was about to fail, and rehabilitation was certainly needed."

CentriPipe, from AP/M Permaform, is the oldest and most thoroughly researched CCCP solution. Basically, it relies on a precisely controlled spincaster that is inserted into a pipe and withdrawn by winch, depositing thin layers of high-strength cementitious grout according to engineered specifications. The process creates a brand new, structurally sound concrete pipe that adheres tightly to the original substrate, so that flow capacity is minimally affected and annular flows are restricted.

Compared to cured-in-place pipe (CIPP) and other trenchless solutions, staging areas for CCCP are small, which proved to be an advantage on this project. "The downstream end of this sewer had an eight-and-a-half-foot fall to a trout stream, so we couldn't work from that end," Baldwin explained. That left a catch basin, roughly in the middle of the 195-foot stretch being rehabilitated, about 12 by 15 feet in area. The catch basin floor was three feet below the sewer inlets and outlets, so an important part of preparation was the construction of a small raised winch platform in the basin, anchored with lag bolts.

Work began with sewer preparation, which entailed cleaning and tar removal. Then holes in the invert were patched and voids were filled with concrete, and a new invert was poured with PL-12,000, a self-consolidating mortar made by AP/M Permaform. A solid, flat invert is essential, because it allows smooth withdrawal of the spincaster and even layers of new pipe. The project's general contractor took care of dewatering, accomplished with pumps (during a rainy week) and an upstream weir. Silt fencing was placed as needed to avoid contamination of the trout stream; this was minimal, as CCCP is a clean process with little overspray.

With the pipe and site prepped, concrete casting could begin. Arold used PL-8000, another high-strength mortar that sticks well to most substrates, even when damp, including CMP. For this project, two half-inch-plus layers were applied. "Because we were between two runs in the catch basin, we did the upstream run first, about 80 feet, then spun the winch around and did the downstream run, about 110 feet," Baldwin said. "We were able to do both runs in a day fairly easily."

PL-8000 cures quickly and adheres well to itself, so application of successive layers can usually begin the following morning. But this particular project did come with a surprise: "We discovered that the upstream treatment plant uses this sewer to release effluent most weeks, at a rate of 150 gpm," Baldwin said. "And no one had let them know we'd be working in the area!" This wasn't a dangerous situation—upstream noise gave plenty of warning, and the spincaster hadn't yet been inserted—but it was an unexpected "flash flood" that overwhelmed pumps and took most of a morning to work around. Still, the second layers went on the same day, and the project wasn't appreciably delayed. Total time on site was about a week.

A Quality Solution

Quality control on CCCP projects is straightforward. In some cases, small gauges or pins are attached to sewer walls to measure the thickness of individual layers and final thickness. But in this case, the CMP was uniformly round, and Arold could verify layer thickness with before and after interior measurements with a tape. Material tracking is also useful; PL-8000 is stored in bags and mixed on site, and the number of bags used can be translated to total volume of material applied as a second check of layer thickness. And layer thickness and adhesion are also tracked during application by the spincaster operator, who uses radio or hand signals to

control winch withdrawal speed. NYSDOT inspectors were also present for most of the project, performing visual inspections.

It's important to note that this method of sewer rehabilitation creates a new pipe within the old sewer, a new pipe that doesn't depend on the original substrate for support and is structurally sound in itself. So even in cases where the original sewer is failing structurally, CCCP can be used in thin layers with no additional material. And where special conditions exist, admixtures can be used; for example, where old concrete sewers have failed due to microbiologically induced corrosion (MIC), the new concrete can be mixed with ConShield from AP/M Permaform, an antimicrobial agent that permanently inhibits the microorganisms that create hydrogen sulfide.

Perhaps best of all, CCCP is a cost-effective solution for large diameter pipe. Several projects have shown conclusively that CCCP costs less per foot than cured-in-place pipe (CIPP) or sliplining. For example, after completing three major CCCP projects, Cary Gaffney, Hilton Head Island Storm Water Administrator, wrote in a 2013 article; "At larger pipe diameters—about 30 inches and up—CCCP is highly cost effective compared with CIPP and requires far less staging area."

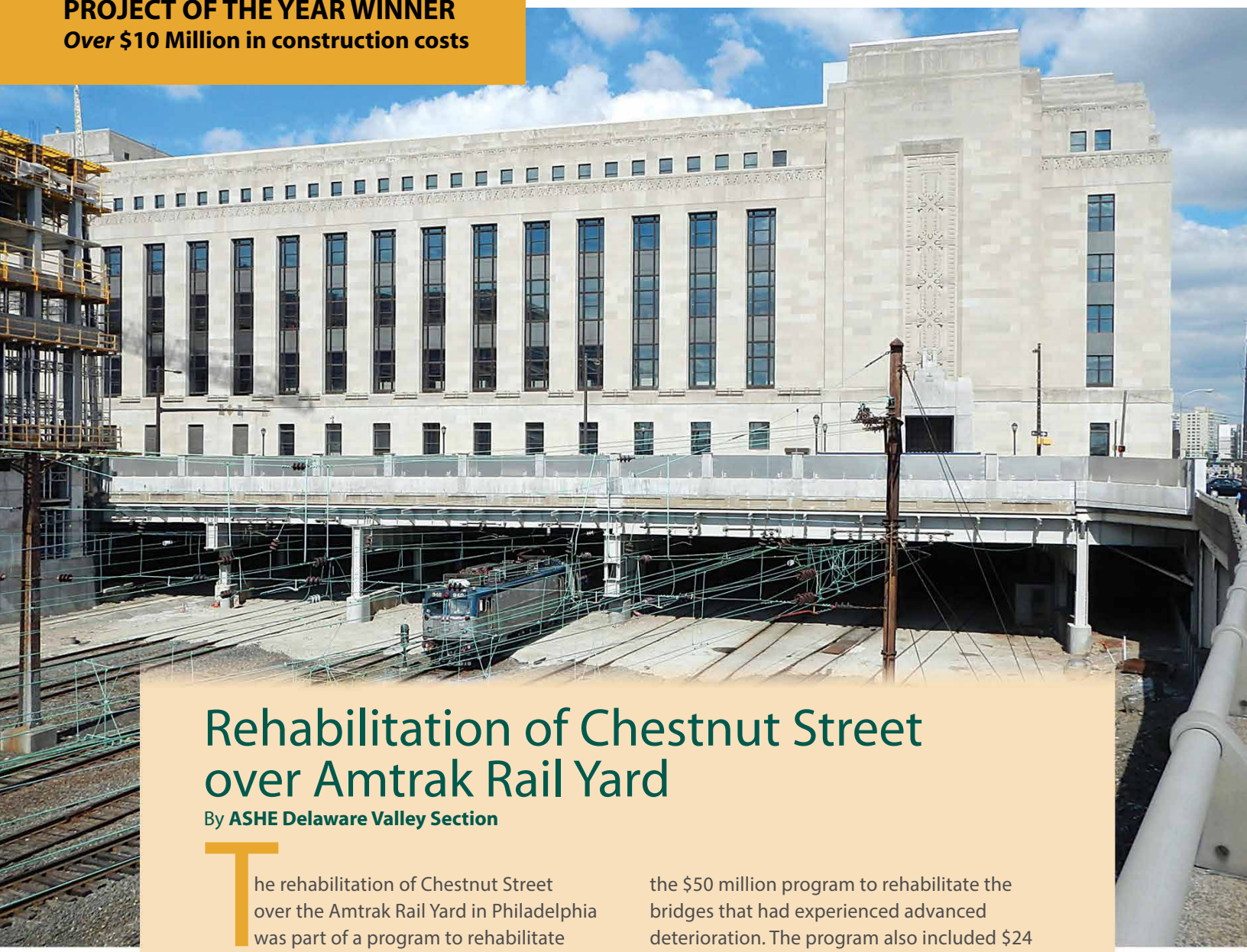
Highlighting another advantage of CCCP, compared to other trenchless sewer rehabilitation methods, Gaffney also wrote, "Minimizing interference with island traffic is an important consideration when a priority is keeping roads and golf courses open." He added that CCCP's short timelines and modest staging area requirements meant that traffic is rarely disrupted, even on relatively big projects passing under major roads. And winter projects in New York and Saskatchewan have shown that the process can be successfully used in very low temperatures—as low as -45°F in Saskatchewan.

Simply put, CCCP has proven to be a practical, structurally sound and long-lasting repair method that is cost effective and easy on traffic, with only minor impact on flow capacity. In nearly all situations where large-diameter sewer needs to be permanently repaired or replaced, this innovative trenchless rehabilitation method should be considered.

Angus W. Stocking, LS, *is a licensed land surveyor who has been writing about infrastructure since 2002. Arold Construction Company, Inc., has affiliated members in the ASHE Albany Section.*

Disclaimer: ASHE, American Society of Highway Engineers, does not promote, nor in any way endorse, any specific product or manufacturer.

PROJECT OF THE YEAR WINNER
***Over* $10 Million in construction costs**



Rehabilitation of Chestnut Street over Amtrak Rail Yard

By **ASHE Delaware Valley Section**

The rehabilitation of Chestnut Street over the Amtrak Rail Yard in Philadelphia was part of a program to rehabilitate a decades-old network of bridges that had experienced numerous section losses, as much as 100 percent in critical locations, in the area surrounding the city's 30th Street Station. The project stakeholders—Pennsylvania Department of Transportation (PennDOT), owner; Alfred Benesch & Company, Inc., (Benesch), design consultant; and Buckley & Company, Inc., and Cornell & Company (joint venture construction contractor)—were able to work in partnership to develop a final product that satisfied the project goals while helping to revitalize an area of the city undergoing private development concurrently.

This project is located one block south of the third-busiest Amtrak rail hub in the nation, Philadelphia's 30th Street Station. Chestnut Street is part of a network of elevated roadways that connects the University District to Center City Philadelphia. PennDOT recently completed the $50 million program to rehabilitate the bridges that had experienced advanced deterioration. The program also included $24 million of rehabilitation to the eight spans of the Chestnut Street structure over Amtrak. The scope of this bridge rehabilitation involved performing field measurements to create as-built structure plans, assessing deterioration and repairing steel members to an NBIS condition rating of 6 (satisfactory) or higher, ensuring that the structure will be able to support the roadway for another 20 to 30 years.

The project was of significant regional interest considering the Amtrak volumes, regional rail (New Jersey Transit) usage and the 140,000 ADT that utilize the Schuylkill Expressway in this city of 1.5 million residents. At street level, Chestnut Street Bridge is heavily used by pedestrians, bicyclists and vehicular traffic (19,000 ADT) as a major connector from University City to Center City Philadelphia. Chestnut Street is also in the midst of its own renaissance with the redevelopment

of the adjacent U.S. Post Office Building into the regional headquarters for the I.R.S., along with the construction of a multi-story residential tower (evo at Cira Centre South) ongoing during the bridge rehabilitation.

Chestnut Street consists of three through lanes and one bike lane traveling eastbound, with wide sidewalks within the project limits. After the 2008 NBIS inspection cycle, the structure was posted for 15 tons, with the requirement that buses use the center two lanes when traveling over the structure, due to advanced deterioration of the primary structural members. The existing structure consists of 11 spans of built-up riveted structural steel girders, floor beams and columns for a total structure length of 621 feet, which spans over 30th Street Lower, Amtrak and the Schuylkill Expressway (I-76). However, due to the ownership ambiguity, and the difficulty of access to the structure over Amtrak's network of tracks heading into 30th Street Station, no major rehabilitation had ever been performed on this structure since its original construction in the 1930's.

The design phase of the project involved the rehabilitation of the elevated structures on Chestnut Street from 30th street to 23rd Street. Benesch accelerated the design schedule to only 18 months for inspection, design of rehabilitation plans and preparation of bid documents to be included with repairs that PennDOT already had under design for the bridges surrounding 30th Street Station. The design consultant worked closely with the developer of the I.R.S. site and high-rise evo at Cira Centre South building (Brandywine Realty Trust), the City of Philadelphia Streets Department and Schuylkill River Development Corporation to satisfy stakeholder requests for maintaining security to the government facility, lighting upgrades at street level and architectural treatments added to the top of deck/sidewalk rehabilitation.

The project award was issued to the contractor, a joint venture—Buckley & Company, Inc., and Cornell & Company—in November 2010 for $24,821,868 for the Chestnut Street portion of the project. The contractor's bid was based on the Amtrak work plan (included in the bid package) based on the number of long-term and short-term outages agreed upon during design between PennDOT and Amtrak. After award, as part of the contractor's right-of-entry permit process with Amtrak, they were responsible to negotiate the actual Amtrak work plan that would be used for the overall contract time. The project was completed in September 2014 with net change orders of -$988,429 resulting in a reduction in final construction cost of $23,833,439.

"Green" Construction

Since the advanced deterioration of this structure was due largely to lack of maintenance, several measures were taken in the design of rehabilitation plans to minimize future maintenance.

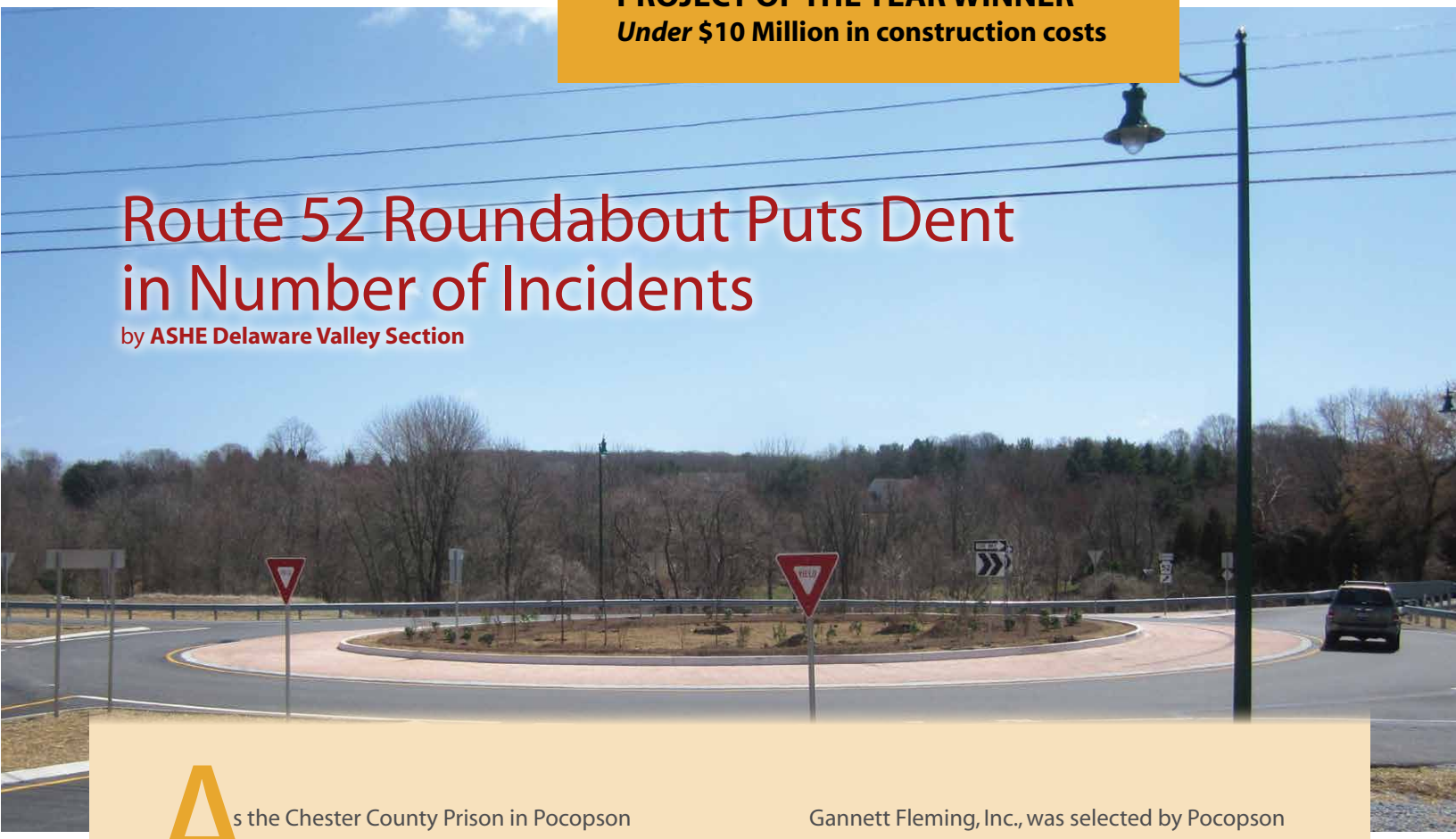
Replacement of Sidewalk Fill – The existing bridge sidewalk consisted of "floating sidewalk" on gravel fill. After years of deterioration of the existing drainage troughs and clogging of small drain pipes under the sidewalk fill, the sidewalks began to hold water like a bathtub. The water eventually found its way through the structural deck at expansion and fixed joint locations. The proposed design removed the floating sidewalk and fill and replaced it with full-depth concrete sidewalk. All expansion and fixed joints were replaced, and membrane waterproofing was installed on the roadway with a new asphalt overlay on top.

Deck Drainage – Scuppers were added to the bridge to remove the amount of water on the top of deck faster than the existing condition. All new downspouting and span piping were installed. Non-metallic downspouting was specified due to the location over the electrified train tracks. To minimize clogging, 12 downspouts were utilized.

Zone Painting – After the top of deck was made watertight, all piers and columns were blast cleaned, repaired and then primed and painted to protect the all-steel structures. Also included in the zone painting were all stringer ends within five feet of joint locations. The new paint system will help to protect and minimize deterioration of the steel structure.

This project successfully attained the project goals of rehabilitating a vital transportation link to extend its service life another 20 to 30 years, and it exemplified the importance of working with adjacent stakeholders (private and public) to make the road network a part of the renaissance of a city district.

PROJECT OF THE YEAR WINNER
***Under* $10 Million in construction costs**



Route 52 Roundabout Puts Dent in Number of Incidents

by **ASHE Delaware Valley Section**

As the Chester County Prison in Pocopson Township, PA, expanded and added a juvenile detention center, traffic through the Chester County community increased steadily, raising safety and traffic operations concerns at the unique existing intersection of Lenape Road/Pennsylvania Route 52 (SR 0052), Lenape-Unionville Road (SR 3052) and Wawaset Road (SR 3052).

Limitations at the old intersection led to several crashes, including rear ends, head-ons and sideswipes. The surrounding terrain created inadequate sight distances at all four legs of the intersection. The SR 0052 roadway approaches to the intersection did not meet current design criteria for horizontal and vertical sight distance. There were no turning lanes or full shoulder areas at this intersection.

The township, in cooperation with the Pennsylvania Department of Transportation, Chester County Planning Commission, the Delaware Valley Regional Planning Commission and the Federal Highway Administration (FHWA), decided to use an increasingly popular solution for the intersection: a roundabout.

According to FHWA, roundabouts produce a 35 percent reduction in crashes, with 76 percent fewer injuries and 90 percent fewer fatalities, compared to other types of intersections. The FHWA also claims that roundabouts reduce congestion by being efficient during both peak hours and other times.

Gannett Fleming, Inc., was selected by Pocopson Township to be the design consultant. In coordination with the Township and PennDOT, Gannett shepherded the project through all phases of design, including environmental clearance and right-of-way acquisition. Road-Con, Inc., was the successful contractor and constructed the project over a 12-month period. Final construction costs were $2.5 million.

To fit the site's limitations, the project team designed a single-lane, roundabout intersection configuration, which does not require exclusive turning lanes, nor would the roadways require major geometric changes to achieve adequate sight distance.

With SR 0052 under detour, PennDOT took the opportunity to perform additional maintenance activities on the existing arch bridge over Pocopson Creek. The existing bridge barriers and a portion of the concrete arch spandrel walls were removed and replaced. A new full-width moment slab with vertical wall barriers and toe walls was constructed. Membrane waterproofing was installed over the moment slab, which was repaved with a bituminous overlay.

An Emphasis on Safety

The nature of transportation design and construction commands a culture of safety to ensure that employees are safe regardless of their location or job function—whether a staff member is stationed at a field jobsite or working in an office environment.

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The Engineering Profession: Learning—and Teaching—for a Lifetime

by Jeremy Kubac, PE, Associate, Gresham, Smith and Partners; President, **ASHE Derby City Section**

"When I was a young engineer, no one helped me along. I had to figure it out on my own. Why should I go out of my way to teach someone else what I worked so hard to learn?" Who hasn't heard this or possibly made a similar statement? It seems there was a time when knowledge was something to be guarded, not just because it seemed unfair to have to give up such a hard-won prize, but it also represented job security. If one sees oneself as an engineering free agent of sorts, it makes perfect sense in the short term to take this isolationist approach. Trial-by-fire can yield learning opportunities and set an expectation of performance; however, one must ask, "What are the long-term effects of alienating young engineering staff for perceived personal gain?"

From the perspective of a transportation engineer, this is an especially relevant question. Transportation projects tend to be lengthy in nature compared to those of other disciplines. It is not uncommon for a single highway project to last well over a decade, from design through construction. With that in mind, design team continuity is vital to a successful project. While it is impossible to ensure that every member of the design team will remain through the life of a project, creating an environment based on respect and teamwork will create professional bonds that last. A critical element of this environment is the free flow of knowledge.

Most people can think of at least one teacher who made a difference in their life. While the teacher is typically in a school setting, he or she might just as easily be in a professional setting. The nature of the engineering profession necessitates lifelong learning. Practicing engineers, when given the opportunity to manage young engineers, are in a position to affect the career trajectory of these young engineers. Although it may be tempting to "make them work for it," why not put that hard-earned knowledge on a platter for them to take? The benefits to the young engineer are obvious: quickly learning new skills, becoming more productive and becoming a more versatile team member. But what's in it for the teacher? Not everyone can be sold on the emotional rewards of teaching or gratitude from the student, so there must be something more tangible. Does a rising tide really raise all ships? When an engineer can let go and trust his or her younger staff to take on more tasks, it in turn provides an opportunity for the engineer to take on new tasks, whether through the lens of management or a more specialized area of practice. One rough idea for a new modeling or design process can be filtered through the talent of several young engineers to become better than originally envisioned.

If the prospect of becoming a better engineer by teaching young engineers is not enough to sell the concept, then we must dig a little deeper. Not all young engineers who begin their careers on your team will stay. They will likely end up working for a competitor, a client or a reviewing agency. When negotiating a teaming arrangement, chasing a project or seeking plan approval, do you want to be remembered as the miser of the office who refused to part with his or her knowledge without a price, or the teacher who valued the camaraderie of the team? The nature of your relationship with former colleagues can either haunt or help you.

Take the time to build a team of motivated individuals. Teach the young ones and encourage the more experienced to teach as well. In time, the young will return the favor.

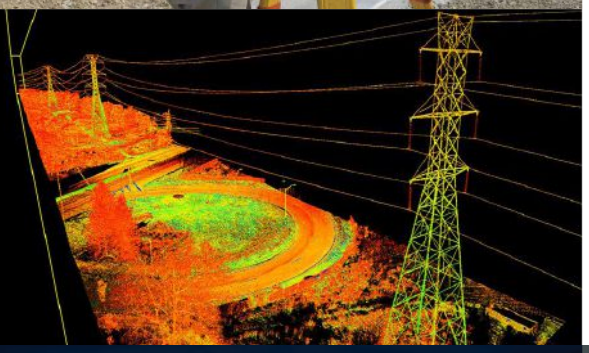
New Directions *(continued from page 3)*

The National Officers, Directors and Committee members have the experience and enthusiasm to implement these initiatives and others while adhering to the mission and values of ASHE. As always, suggestions, feedback and much-needed support from each of you, the members, are critical to the success of these individuals and the betterment of ASHE.

By the time you read this issue of the *scanner*, I am hopeful that the long-term Federal Transportation Bill has passed. The ASHE membership supports this landmark legislation, recognizing how vitally important it is to providing the assurance that Federal funding is committed so that the planning and implementation of transportation projects can move forward. This funding will also promote additional funding from state and local public agencies, metropolitan planning organizations, private industry and others to leverage the much-needed dollars to keep our nation's transportation system safe, reliable and functioning at a high level to meet the demands of today and tomorrow. This funding will provide projects for all segments of the highway/transportation industry, including planning, design and construction.

I want to congratulate and thank the entire Conference Committee, composed of the Chesapeake Section and Mid-Atlantic Region, who hosted an outstanding National Conference at Baltimore's Inner Harbor. There was always someone nearby to answer questions and provide whatever was needed by Conference attendees. The location on the Inner Harbor was spectacular! There was an abundance of activities, including technical sessions, meetings, tours and time to spend with family and industry associates. Hopefully, many friendships were strengthened and new ones made, because that is truly what an ASHE National Conference is all about. I am already looking forward to the 2016 National Conference in Pittsburgh!

I look forward to attending many Section and Region meetings, presentations and social events in the upcoming year. I hope to make this organization better as a result of my presidency, as those before me have done. Please let me know how I can be of service to you, the members, to advance this great Society and *Let's Keep the Momentum Going!*



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A *Salute* to the Founders of ASHE!

Four individuals who were original Charter members of the American Society of Highway Engineers in 1958, are still active in the organization. They are **John V. Rignani, Albert J. Bedard, Jr., Gweneth E. Wolf Englebreth** and **Donald J. Redlich.**

These visionaries sought to create an organization for people interested in the advancement of the highway industry after the National System of Interstate and Defense Highway Act of 1956 was put into place. When they met in Harrisburg, PA, the group decided that the Society would be composed of engineers and technicians from the State Department of Highways, consulting engineers, highway contractors and material and equipment suppliers.

Even just the name "American Society of Highway Engineers" indicated a grand vision. Rather than being known as a group operating on a smaller scale, such as "Harrisburg Highway Engineers" or even "Pennsylvania Highway Engineers," the Society was established to eventually encompass a much larger base than just the group's Harrisburg roots.

Finally, a Charter showing 105 names was obtained, and an official headquarters was established in Harrisburg. The ASHE National Board and entire membership thank John, Albert, Gweneth and Donald for their vision, leadership, dedication—and for paving the way for ASHE to grow to over 6,500 members.

PROJECT OF THE YEAR WINNER
***Under* $10 Million in construction costs**

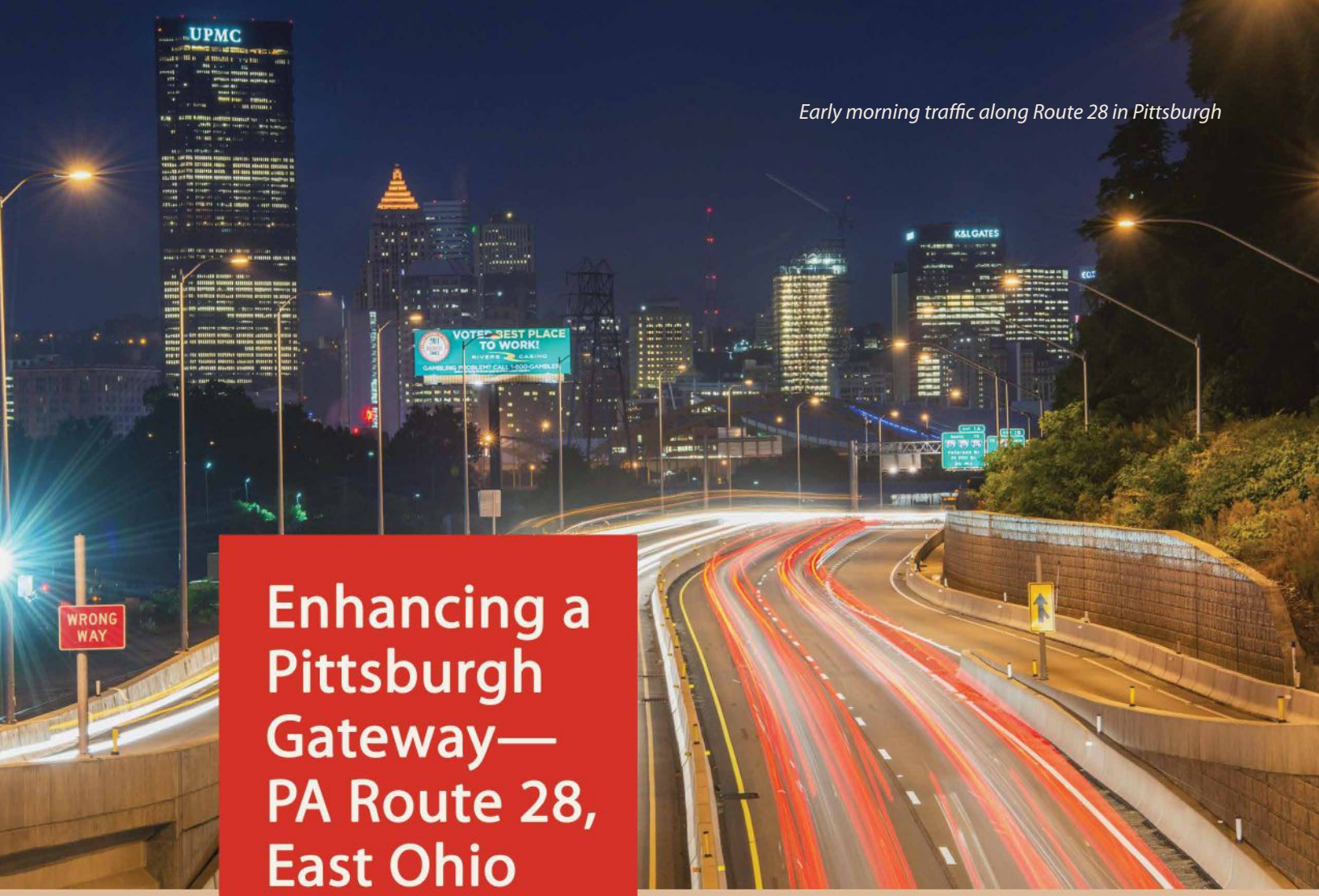
Route 52 Roundabout Puts Dent in Number of Incidents

(continued from page 13)

As is the case with any PennDOT project, safety, both for project employees and the traveling public, was treated as the most important aspect of the SR 0052 roundabout. The entire project team followed the latest guidelines for alignment, grades, signing, pavement marking and other roundabout specifications.

Additionally, instead of utilizing a staged construction approach, detours were implemented because of the complexities with grading, drainage and utility relocations. Staged construction would have significantly increased construction duration and would have put construction workers and the traveling public at greater risk of accidents or injuries. The contractor followed the stringent safety plan, which prevented any accidents from occurring on this project.

As the first Department roundabout project to be constructed in southeast PA, this design has improved safety by reducing speeds and crossing conflict points for turning movements. It sets the bar for signing, safety and maintenance responsibilities for future roundabout projects that will be let and constructed by the District in the region.



Early morning traffic along Route 28 in Pittsburgh

Enhancing a Pittsburgh Gateway—PA Route 28, East Ohio Street Corridor

by Cheryl Moon-Sirianni, PE, Pennsylvania Department of Transportation, District 11-0, and Greg Cerminara, PE, Michael Baker International, **ASHE Southwest Penn Section**

Through careful planning, stakeholder coordination and innovative design and construction techniques, the Pennsylvania Department of Transportation's (PennDOT) upgrade of PA Route 28 (East Ohio Street) between Millvale and Chestnut Street in Pittsburgh has been completed. This two-mile segment of road has been notorious for its congestion reports on the local news channels. With help from the Federal Highway Administration, the City of Pittsburgh, the Borough of Millvale and the many stakeholders involved, PennDOT invested $181 million toward making this section of PA Route 28 a top-notch transportation system. The corridor has been a valuable asset for travelers in the Pittsburgh community since the early 1800s. At one time, this major gateway supported a wooden plank road, a canal, a Belgian block street, streetcar traffic, railroads, trails and the paved state road. Now, through the combination of five construction contracts, the much-needed capacity, safety and geometric improvements have been provided.

The firms assisting PennDOT with successfully delivering this project are Michael Baker International, with assistance from The Markosky Engineering Group, Pittsburgh Engineering Consultants, Monaloh Basin Engineers, Cardno Inc. and Ackenheil Engineers providing design and construction consultation services; CDR Maguire, with assistance from SAI Consulting Engineers, performing the construction management and construction inspection; and Power Contracting, Brayman Construction Corporation, Trumbull Corporation and Carmen Paliotta Contracting as the lead contractors.

PA Route 28 for many years has been a unique roadway as a major arterial and gateway into the City of Pittsburgh, while also serving as the local access for the smaller communities that it intersects. This particular section of PA Route 28 is constrained by the steep Troy Hill slope, Norfolk Southern and CSX railroad tracks and the Allegheny River, with many other demanding features that have potentially led to this segment being the last to be upgraded.

The project grade-separated this section of PA Route 28, providing the long-awaited limited access link between northeast Pittsburgh and the Pittsburgh International Airport. It was critical to use flexible design standards responsive to the urban context of the corridor. These standards addressed various functional requirements, such as connectivity of the North Shore Trail, streetscapes and aesthetics and public/open space. Innovative techniques were incorporated through the design of a tight single point urban interchange at 31st Street and construction of a Florida-T interchange at 40th Street. A Florida-T interchange provides left-side deceleration and acceleration lanes for vehicles exiting and entering PA Route 28 leading to and from an intersection with a side street. This configuration allows PA Route 28 motorists who are continuing past 40th Street to do so uninterrupted. Both of these unconventional interchanges integrate additional local roadways feeding vehicles into the system, which further complicated the design and construction.

PennDOT, Allegheny County Sanitary Authority (ALCOSAN) and the Pittsburgh Water & Sewer Authority (PWSA) partnered on this project to perform stream removal from the local sanitary system. As a result, ALCOSAN was able to completely close two combined sewer overflow diversions. Over 120,000 gallons per minute of stream flow were removed from entering the ALCOSAN combined storm sewer network during a 10-year design storm event. Of this total project flow, approximately 54,000 gallons per minute of flow were from the northern project limits, where a deep debris basin was constructed to help collect and control flow, debris and sediment from the steep surrounding hillsides. The overall resulting peak flows to the Allegheny River were reduced due to this basin and the reduction of impervious area created by the project. These were major factors leading toward this project becoming sustainable.

Considerable steps were taken toward improving the safety of not only motorists, but pedestrians and bicyclists along the PA Route 28 corridor, while considering the arterial's urban context. Improved connectivity was accommodated with the addition of new sidewalks, trails, traffic signal controls, curb ramps and roadway channelization through several busy intersections. features allowed the surrounding communities, many are separated by Allegheny River, better linked. The project also accommodated a missing link in the City of Pittsburgh riverfront "Three Rivers Heritage Trail." Alignment, location, type, design and aesthetics of the trail came from close communication with the City of Pittsburgh, the Friends of the Riverfront, Norfolk Southern Railroad and the Washington's Landing residents (an adjacent community on Herr's Island). A half-mile-long bridge structure that parallels the railroad tracks was ultimately selected for the trail, in place of retaining wall concepts. This bridge is a key part of the continuous trail system that extends up the Allegheny River, and links the City of Pittsburgh to the Borough of Millvale and beyond, improving trail access for people of all ages and abilities.


Trail Bridge

This section of East Ohio Street was one of the earliest Croatian enclaves in the country. Understanding the rich culture of this community, PennDOT worked closely with Preserve Croatian Heritage Foundation, Preservation Pittsburgh, Troy Hill Citizens and other area stakeholders throughout the planning, design and construction stages of the Route 28 roadway improvement project in order to document, preserve and promote the area's cultural legacy for future generations of Pittsburghers.

With the removal of numerous buildings along this corridor, an additional wall to retain the adjacent hillside was needed along the southern project limits. This retaining wall presented an ideal "canvas" to incorporate public artwork. PennDOT sought the assistance of the Greater Pittsburgh Arts Council in selecting an artist with the most appropriate experience for this transportation project. The inclusion of artwork

(continued on page 32)

Western North Dakota oil rigs

Huge Traffic Upsurge Means *Full Speed* Ahead for Roadwork

by Steve Windish, Ulteig – Bismarck, **ASHE Central Dacotah Section**

On western North Dakota roadways a few years ago, it was possible to not see another vehicle for miles when out for a drive. Then came new oil extraction technologies and rising oil prices. Now, many of those same roadways carry construction and drilling rig equipment, oil transports and support vehicles around the clock, putting a heavy strain on the road infrastructure. With that change has come a huge increase in the need to expand and maintain these roads, in a very short space of time.

"There has been very little expansion of the highway system in the past two decades, with the requirements now changing due to truck loads," said Steve Windish, a technical manager in Ulteig's civil engineering area. "The roads must now be designed for loading that we have only been seeing on the interstates in the eastern part of the state."

Rapid growth brings challenges

North Dakotans often call them the oil-producing counties, or just refer to the area as "The Bakken," the name of the oil formation several thousand feet under the surface. But by any name, it's a boom area for growth and development, forcing changes in how the area handles the traffic generated by that development.

US 2 north of Williston

In the past two years, the North Dakota Department of Transportation (NDDOT) has been constructing a four-lane undivided roadway between Watford City and Williston. Also, there have been truck reliever routes studied, with construction beginning in 2013 around Williston, Alexander, Watford City, Dickinson, New Town and Killdeer.

The primary logistics problem many of these western communities are learning about are what cities in the eastern part of the state have had to deal with for years: land use planning and zoning. Windish says the area has come a long way in a short while in dealing with these changes. He also points to changes in road construction approaches.

"A large amount of funding has gone to upgrading the existing system," he said, "with many projects being bid out changing to concrete paving and/or concrete overlays. Many of the roadways have been or will be upgraded to concrete surface."

While changes in the types of the road surface offer a challenge in the region, there is a shortage in another area that is more noticeable. Windish said the people factor is a concern.

"The biggest issue is having qualified contractors to complete the construction, and qualified engineers to perform the planning, design and construction services," he stressed. "The North Dakota Department of Transportation staffing is set by the legislature, and new full-time employees, or FTEs, require legislative action."

Funding grows for roads

To help keep up with the growth and the need for higher-capacity roads, North Dakota's government has increased transportation spending nearly $600 million from the 2011-2013 biennium, for a 2013-2015 NDDOT budget

of $2.257 billion. Of that, $1.5 billion is directed at the oil-producing counties (Table 1). A recommended budget for the 2015-2017 is currently sitting at $2.152 billion. Of that, $1.5 billion is again directed at the oil producing counties (Table 2).

Table 1: North Dakota DOT budget, 2013-2015 biennium

State region	Funding (millions)
West (oil-producing counties)	$1,510.3
Central and East*	$747
Total funding	$2,257

Source: North Dakota Office of Management and Budget
*Includes federal funding, state/local match

Table 2: North Dakota DOT proposed budget, 2015-2017 biennium

State region	Funding (millions)
West (oil-producing counties)	$1,486
Central and East*	$666
Total funding	$2,152

Source: North Dakota Department of Transportation
*Includes federal funding, state/local match

Determining project needs in past biennia has been based on studies from the Upper Great Plains Transportation Institute. Using those studies, the state legislature has worked with the NDDOT to determine spending for road projects.

ND Hwy 1804 earthwork

US 2 Westbound north of Williston

ND Hwy 1804

Future needs

With ongoing growth still in the mix, along with construction needed to keep up with that growth, the question is what the future holds once the initial spurt of roadway development slows.

"Right now, with the drop in oil prices and somewhat less drilling activity, we're likely to have some much-needed time to catch up with infrastructure needs," Windish said. "That means completing the expansion of the major routes in western North Dakota, and then putting a strong maintenance program in place to keep those roads in good condition for when the cycle of drilling and production strengthens again."

US 2 Eastbound at N Jct US 85

As The Wheel *Turns*

ASHE Members on the Move!

Dewberry Announces the Promotion of Anthony Fulco

Fairfax, VA—Dewberry, a privately held professional services firm, is proud to announce the promotion of **Anthony Fulco, PE,** to Associate Vice President. As Manager of the Highway Engineering Department in the firm's Bloomfield, NJ, office, he spearheads some of the region's most complex transportation projects.

Fulco has a Bachelor's degree in Civil Engineering from the University of Delaware, is a member of the American Society of Highway Engineers and the Professional Engineers in Construction and is a licensed professional engineer in New Jersey, Connecticut, Massachusetts, New York and Pennsylvania.

Dewberry Welcomes Transportation Engineering Expertise of Katherine Dewkett

Fairfax, VA—Dewberry has hired **Katherine Dewkett, PE,** as a Senior Transportation Project Manager in the firm's New York City office. In her new role, she will be responsible for managing a variety of transportation projects throughout New York.

Dewkett received her Bachelor's and Master's degrees in Civil Engineering from the University of Massachusetts at Amherst and Rensselaer Polytechnic Institute, respectively. She is a member of the American Society of Civil Engineers, the American Society of Highway Engineers and is a past president of the American Council of Engineering Companies of New York, where she currently serves as the chair of the County Highway Superintendents Committee.

Established in 1956, *Dewberry* is headquartered in Fairfax, VA, with more than 40 locations and 2,000+ professionals nationwide. To learn more, visit www.dewberry.com.

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Pick Up and Move:

Relocating State Road 794 in Clark County, Ohio

by American Structurepoint, Inc.,
ASHE Central Ohio Section

After 9/11, military bases across the country were faced with tougher security standards. The Springfield Air National Guard Base in Clark County, Ohio, found itself in the middle of these new regulations. It was required to move the former State Road 794 away from the base due to force protection requirements by the Department of Homeland Security. Because of this project's level of complexity and innovation, it received the title of "2013 Project of the Year" by the American Society of Highway Engineers (ASHE) Central Ohio Section. The recognition was awarded to the Clark County Engineer's Office and American Structurepoint, based on the project's overall benefit to community, complexity and innovation in design.

On November 19, 2013, the Ohio Department of Transportation (ODOT) transferred jurisdictional authority of State Route 794 between SR 68 and SR 72 to Clark County. State Route 794 was renamed County Road 794 – W. Blee Road. This resulted from a joint effort between the Ohio National Guard, ODOT, Clark County Engineer's Office, City of Springfield and State of Ohio Congressmen. Together, they were tasked to fund, design and construct the relocation of State Route 794 to meet the current Department of Defense force protection clearance requirements and allow for anticipated growth of the Springfield Air National Guard Base.

The base is operated by the United States Air Force 178th Fighter Wing (FW). In addition to its 900 personnel, the 178th FW also supports 320 members

of the Headquarters, 251st Communications Group and the 269th Combat Communications Squadron, which are also located on the base. The Springfield-Beckley Municipal Airport is a 1,400-acre General Aviation Airport with a 9,000-foot-long primary runway and a 5,500-foot-long crosswind runway, serving business, instructional, recreational, commercial and military air traffic.

The relocation project included a pavement overlay for nearly 6,000 feet of existing roadway, including 8,300 feet of new full-depth pavement and mill and resurfacing of all existing pavement at the project ends; one culvert replacement; nine new culverts; over 1,500 feet of new storm sewer, a new combined open and closed drainage system; striping the new road; and restriping the overlay section. The project involved the design of vegetated biofilters for storm water quality Best Management Practices (BMPs) and depressed inverts on culverts for storm water quantity BMPs. Since drainage was an issue due to the flat terrain within the project area, the roadway was raised, and several culverts were added to allow the storm water to pass from one side of the road to the other.

There were several complex issues that engineers had to work through. Continuous coordination with all of the stakeholders occurred throughout the duration of the environmental studies and subsequent engineering design. A series of public meetings were held to open up the lines of communication and to help the public understand the project. American Structurepoint went a step further to provide materials and exhibits that included three-dimensional, computer-generated renderings. In addition, members from American Structurepoint met with several residents one-on-one to assure them that their voices were heard and their suggestions were evaluated.

The roadway also provided challenges for the engineers. It was originally owned by ODOT, so it had to meet ODOT's criteria, as well as the county's. The Ohio Air National Guard had to approve the plan based on the Department of Homeland Security's base protection criteria requirements, as well as proper access to the base. These plans had to be coordinated with the Springfield Air National Guard Base to ensure roadway alignment followed force protection clearance requirements. Also, the City of Springfield owns the airport on the base and is leasing the property to the Guard. The city had to approve these plans, particularly the access to the municipal side of the airport. A total of six organizations had to work together closely to complete this project.


Looking West, Relocated County Road 794 on right

The project relocated a total of 1.6 miles of full-depth pavement and 1.1 miles of resurfacing. It came in under budget at $2.3 million and was completed earlier than expected. The project allowed the base to stay in operation, allowing for a safe and secure facility that added even more jobs to the local economy.

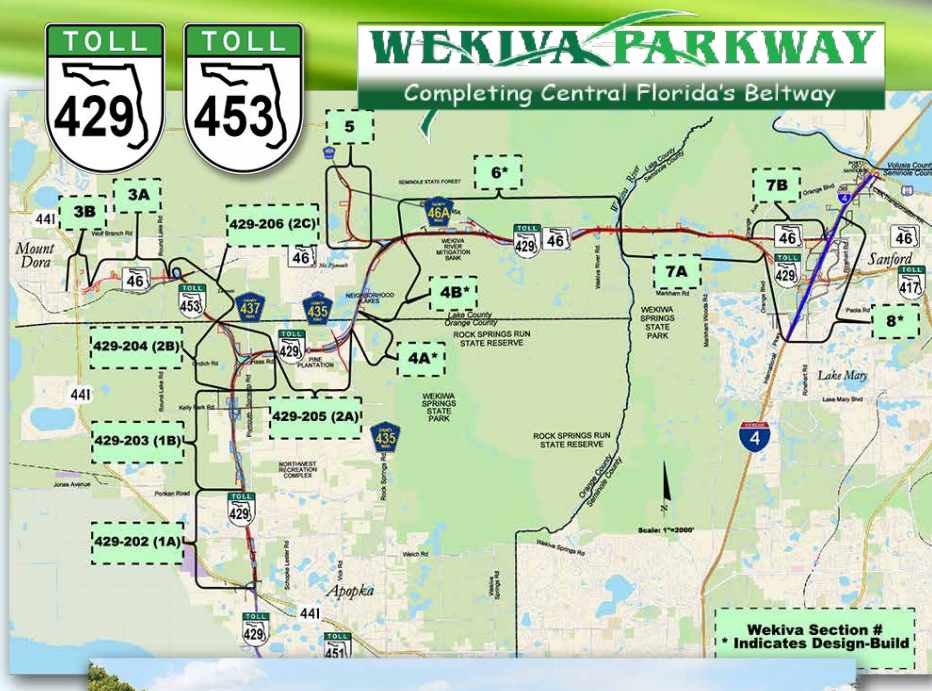
MileMarkers

News From Across ASHE-Miles

Tami Hayes helps Samir Mody, PE, ASHE National President 2014-2015, pull the winner's name in a prize drawing during the APC/PennDOT 36th Annual Fall Seminar at the Hershey Lodge and Convention Center in Hershey, PA, in November. The winner received a Kindle Fire HDX 7-inch Tablet.

Wekiva Parkway—
Rounding Out Central Florida's Beltway

by Gene Lozano, PE, Graef-USA,
ASHE Central Florida Section



The Wekiva Parkway (SR 429/SR 453) is a collaborative effort between the Florida Department of Transportation (FDOT), the Central Florida Expressway Authority (CFX) and local partners to improve regional mobility. The parkway will connect the existing SR 429 in Apopka (Orange County) to the existing I-4/SR 417 interchange in Seminole County, completing central Florida's beltway around northwest metropolitan Orlando. The new 25-mile tolled expressway will provide travel alternatives and relieve Interstate 4 and major arterials, including US 441, SR 46 and other area roads, from traffic congestion resulting from continued growth and increased travel between Orange, Lake and Seminole counties. The project involves construction of an initial four-lane expressway that will allow ultimate widening to six lanes when needed. The estimated $1.7 billion project includes $500 million of non-toll road improvements, such as widening seven miles of SR 46, rebuilding the US 441/SR 46 interchange, shifting roadway connections for improved wildlife and habitat connectivity and building a multi-use trail along portions of the parkway in East Lake and Seminole counties.

Authorized in 2004 by the Wekiva Parkway and Protection Act (Chapter 369, Part III, Florida Statutes), this expressway has been heralded as an example for transportation planning through an environmentally sensitive area —the Wekiva River Basin and National Park Service-approved bridges over the designated Wild and Scenic river. Development of the Wekiva Parkway will be constructed through largely undeveloped areas and includes setting aside more than 3,400 acres of land for conservation.The parkway will also include numerous wildlife bridges, and will be largely elevated to reduce accidents between vehicles and wildlife. The proposed improvements are a result of extensive planning and environmental collaboration between FDOT, CFX and Federal, state and local environmental agencies.

Construction on the Wekiva Parkway is being done in 14 sections by FDOT and CFX. FDOT began the first two segments of construction (4A and 4B) in February 2013, which are anticipated to be open to traffic in late summer 2015. CFX will begin construction on two additional segments (1A and 1B) in summer 2015 for completion in spring 2017. In March 2015, U.S. Transportation Secretary Anthony Foxx announced a Transportation Infrastructure Finance and Innovation Act (TIFIA) loan for approximately $194 million to help pay for portions of the five CFX sections of the Wekiva Parkway. The TIFIA loan includes the lowest rate (1.23%) historically offered in the Federal TIFIA program and will result in expedited construction of three CFX sections by eighteen months. Construction will begin on the remaining FDOT seven sections of the parkway in phases from 2017 on, until the parkway is completed in 2021. When the parkway opens, FDOT/Florida's Turnpike Enterprise and CFX will own, operate, maintain and toll their respective sections.

CH2M HILL serves as Corridor Consultant for CFX and FDOT, providing program management and project development of the CFX design sections. This includes providing oversight on design reviews to ensure environmental commitments and design criteria, as well as design review support for FDOT, to ensure overall coordination and collaboration between the two regional partners. For more information about the project or the history of the project development, visit www.WekivaParkway.com.

Centennial FDOT 1915 ★ 2015

CENTRAL FLORIDA EXPRESSWAY AUTHORITY

ch2m

New Rapid Transit Station Will Enhance Safety, Convenience in Thriving Cleveland Neighborhood

by Christopher Cummings, PE, and Joseph L. Shaffer, PE, Michael Baker International, **ASHE Lake Erie Section**

The Greater Cleveland Regional Transit Authority (GCRTA), in cooperation with the Federal Transit Administration (FTA), is constructing the new University Circle – Little Italy Rapid Transit Station (RTS). This project integrates a new rapid transit station in the fastest-growing neighborhood in Cleveland, near several museums, Case Western Reserve University, University Hospitals and Cleveland's historic Little Italy neighborhood. The primary impetus for the project is the voluntary agreement between the GCRTA and the FTA to upgrade all key rail stations for ADA compliance, but the project is also viewed as a key piece in the transit-oriented development taking place in this area. The project is funded, in part, with a Department of Transportation TIGER grant of $12.5 million.

The new rapid transit station is located on GCRTA's Red Line and will replace the current center platform station at East 120th Street/Euclid Avenue. The project addresses:

• ADA Compliance – The Voluntary Agreement between the GCRTA and the FTA is to upgrade all key rail stations for ADA compliance. The new station is replacing the non-compliant East 120th Street station.

• Safe and Secure Environment – The existing East 120th Street station platform, stairs and hallway create perceivable security concerns and blind spots.

• Ridership –The existing East 120th station is located on the outside edges of the population and employment centers of Little Italy and University Circle, and current access to these points requires the use of mostly indirect routes of streets and parking lots.

• Structural Deficient Bridge Structures – Portions of the two GCRTA transit bridges over Mayfield Road required rehabilitation to lengthen the service life of the structure. These bridges were built in 1929 and modified in 1954.

History of the Location: The proposed station is being built approximately 1,200 feet to the south of the existing East 120th Street station, incorporating an existing concrete vault adjacent to Mayfield Road. This vault, constructed in 1929, was intended to be a passenger station, though it was never used for this purpose. The original rail configuration allowed for stairs from street (Mayfield Road) level up to a proposed center platform. In the 1950s, the eastbound rail bridge was relocated immediately adjacent to the westbound rail bridge.

Proposed Station Configuration: The proposed station is located along Mayfield Road in Cleveland on a highly constrained site, adjacent to Norfolk Southern Railroad and a privately owned parcel. Various station and platform configuration alternatives were studied during preliminary design.

Crane and Rigging Setup Prior to Bridge Relocation

It was determined that a new station with a single center head house and 15-foot, six-inch platform would minimize the construction area, initial construction and future maintenance costs, disruption to GCRTA revenue service and required property takes. The preferred station configuration required relocating the eastbound bridge near its original location, opening up room for a center platform.

Designing the Bridge Move: To accommodate the center platform, the three-span, 68-foot-long eastbound bridge needed to be relocated approximately 10 feet to the east. This relocation and the associated eastbound track realignment open up room for a new center platform. GCRTA's engineering consultant, Michael Baker Jr., Inc., performed an inspection and load rating of the structure and evaluated structural integrity for the proposed relocation. They developed rehabilitation plans to address found deficiencies and accommodate the proposed eastbound bridge relocation.

The primary challenges regarding the bridge relocation were related to site constraints. The bridge carries the GCRTA Red Line, powered by a 600-volt DC overhead propulsion system. A City of Cleveland-owned 13.8 kV electric line runs parallel to Mayfield Road, approximately 40 feet above the bridges. Mayfield Road itself is Ohio State Route 322 and carries a significant amount of vehicular traffic through the area.

The design team consulted with several contractors and evaluated multiple options. The two most studied involved:

- Sliding the bridges from underneath on falsework (or)
- Lifting and relocating from above, using a crane.

Sliding the bridge was determined to be the preferred alternative. The factors driving the decision were:

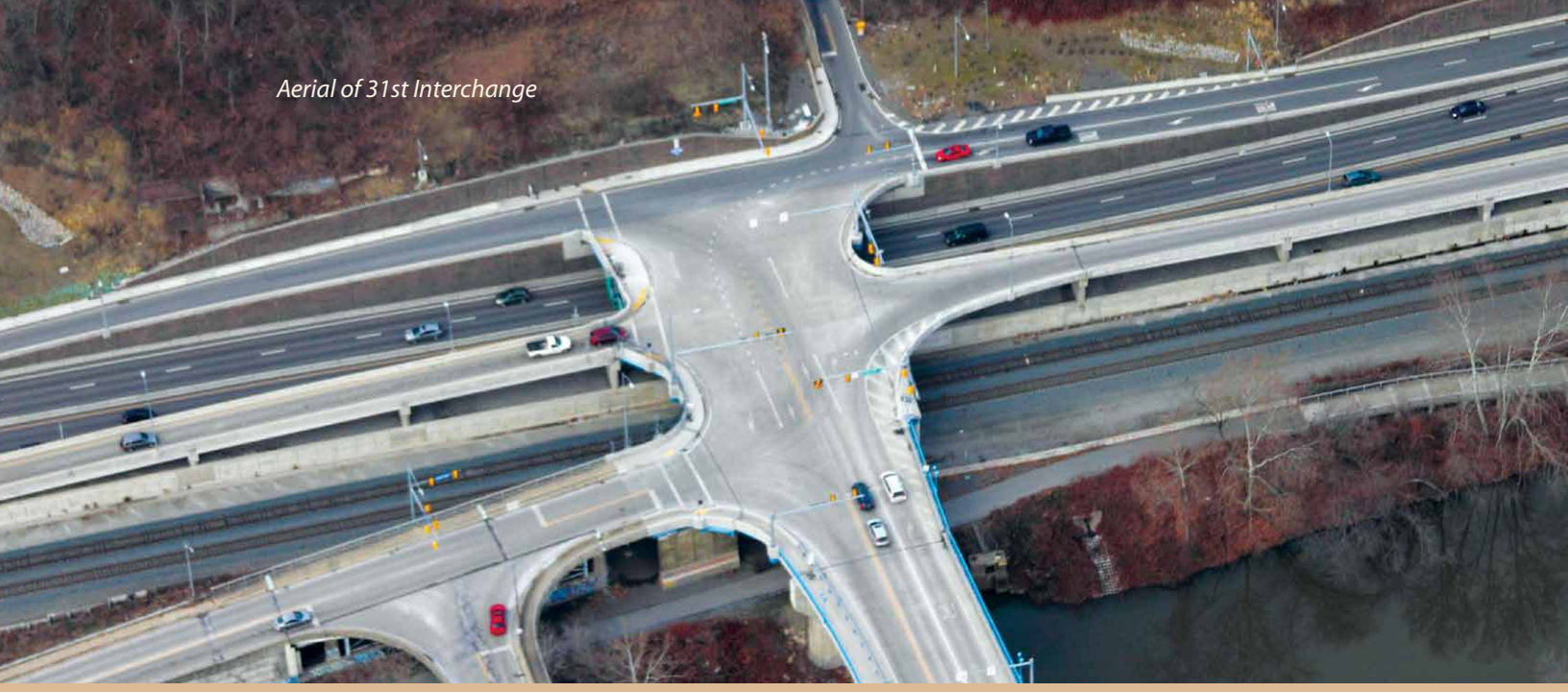
- Sliding the bridge via falsework on Hillman rollers had been done locally by multiple contractors.
- Sliding the bridge would allow for the westbound bridge to remain in service during the eastbound relocation, keeping GCRTA in service and giving a contractor more schedule flexibility. Use of a crane would require the overhead catenary power westbound to be de-energized.
- Crane mobilization and removal, in addition to the bridge relocation itself, would necessitate an extended closure of Mayfield Road (US 322).
- The existing three-span bridge consists of simple spans. A typical construction, involving strongbacks or another supporting mechanism, would likely be required to support the shorter end spans during the relocation.

Ultimately, the design team proposed a horizontal slide from below in the contract documents. Conceptual falsework details were provided, with means and methods left to the contractor.

Constructing the Bridge Move: McTech Corp was awarded the construction contract for the new station in October 2013 for $11.11M, electing to relocate the bridge from overhead using a large crane set up in Mayfield Road. They addressed the key concerns from design:

- McTech, in cooperation with GCRTA, was able to negotiate with local stakeholders a closure of Mayfield Road for 22 days.
- McTech incorporated the bridge relocation into a planned extended closure of both eastbound and westbound tracks. The extended closure was set up in the contract documents to allow for the construction of underground elements of the new station.
- McTech and their subcontractor, Norris Brothers, Inc., engaged an engineering consultant to design a shoring system to stabilize the bridge end spans during the relocation.

McTech's subcontractor, Norris Brothers, Inc., executed the move on July 17, 2014, using a 550-ton Grove GMK 7550 hydraulic crane. The bridge was lifted from two main pick points. The load from these two points was distributed, using a 36-inch deep spreader beam. The GCRTA eastbound and westbound trains are now in service, the eastbound trains running on their new alignment over the relocated bridge.



Aerial of 31st Interchange

Enhancing a Pittsburgh Gateway—PA Route 28, East Ohio Street Corridor

(continued from page 19)

further celebrates the history of a variety of people and community institutions that played an important role in this part of the North Side. The retaining wall includes a large stone pattern with staining, similar to the walls recently constructed along this corridor. The selected artist wanted to blend the wall style as a platform to metaphorically "chip away" the familiar stone block and reveal vignettes from the past via sandblasted images. The images are approximately 14 feet high and 30 to 60 feet wide.

Planning and implementing construction phasing that not only provides sufficient room to build, but also maintains and protects motorists and minimizes delays was complicated within this tight corridor. Two southbound lanes and one northbound lane on PA Route 28 proved to be successful throughout the majority of the construction contracts, as it allowed the traffic that was already on southbound PA Route 28 heading into the City of Pittsburgh to maintain two lanes. Northbound PA Route 28 essentially begins at the project limits, which ultimately allowed motorists to find alternate routes around the construction before entering onto PA Route 28. Supplemental alternate routes were signed to assist drivers in finding these optional ways around construction. These techniques proved to be successful as minimal delays were experienced, very few user complaints were received and the contractors maintained their schedules as planned.

Sandblasted Artwork

Shifting of the Norfolk Southern train tracks along this project corridor was necessary to implement the PA Route 28 roadway improvements. The vertical clearance over the railroad at the 31st Street Bridge overpass was improved from 19 feet to 23 feet, allowing the transport of double-stacked cargo containers. This enhanced the efficiency of freight rail transport through the project area. There is a confluence of Norfolk Southern Railroad tracks along the north shore area of Pittsburgh, not far from the PA Route 28 project area. The closeness of the PA Route 28 project location to the track confluence is valuable to Norfolk Southern Railroad; it provides an area for storing trains, which helps scheduling and reduces the amount of delays to the trains.

Motorists are now experiencing the improved travel times through this area, which have decreased from approximately 14 minutes to 3 minutes during rush hours. This enhancement, along with the added features that improve safety, such as the installation of a median barrier, creates positive news channel reports for this section of road.

PennDOT orchestrated a project that positively impacts peoples' lives by not only providing a safer, more efficient and more sustainable transportation system, but also improving multimodal connectivity as well as appropriately addressing aesthetics. Understanding the communities' needs while being sensitive to their desires showed respect for the past, present and future.

The 21st Century Solution for a Historic Village's Traffic Congestion

by PennDOT District 8-0/Stantec Consulting Services, Inc., **ASHE Harrisburg Section**

The Schaefferstown Bypass Story

Founded in the early 1700s, Schaefferstown in Lebanon County, PA, still reflects the heritage of its European founders in its authentic harvest festivals, historic homes and buildings and close community ties. Increasing traffic congestion in this village with small-town ambiance has been a growing safety and congestion concern for decades. The need for a transportation bypass route was evident.

While seemingly minor relative to other roadway projects built on new alignments, an attempt was made in the 1970s to create a much-needed bypass in Schaefferstown, but the initiative was hampered by agricultural impacts and lack of funding. In July 2000, the project finally became a reality, and the Stantec Team was assigned by PennDOT Engineering District 8-0 to the task of delivering this safety improvement project for the benefit of the Schaefferstown community and traveling public.

Natural, Social and Cultural Resources Challenges

The complexity of this project was governed by the numerous natural and social resources in the project corridor and how the project would mitigate impacts to these existing resources.

The multiple concerns for natural resources included Exceptional Value wetlands along two unnamed tributaries to Hammer Creek. These streams are classified as High Quality–Cold Water Fishes and support naturally reproducing trout. The Hammer Creek watershed is also an Approved Act 167 Stormwater Management Plan with requirements for water quality and peak rate of runoff.

The wetlands were determined to be suitable habitat for the bog turtle, which is a threatened and endangered species protected by the Federal and state governments.

The primary social resource in the corridor is agricultural land; Schaefferstown is surrounded by active farmlands. Cultural resources are present throughout the study corridor, including two historic districts and other individually significant historic properties. Stantec engineers faced multiple challenges in designing around these environmental considerations.

Alternative Solutions for Existing and Future Traffic Flow Challenges

The project goals were focused on SR 0501—but the engineering and traffic analysis had to consider the effects of two other primary roadways: SR 0419 and SR 0897. All three of these routes converged near the center of Schaefferstown, with SR 0501 traffic negotiating turns at two signalized intersections. PennDOT Engineering District 8-0 had previously improved both intersections with Transportation Systems Management (TSM) strategies that increased turning radii and retimed traffic signals to improve the flow of SR 0501 traffic, in particular the truck traffic, which constitutes 11 percent of the vehicles. However, Stantec's traffic analysis was projecting these two intersections to operate at a Level of Service F in the 2031 design year, if nothing was done. It was also apparent that the majority of SR 0501 traffic was traveling through Schaefferstown on more regional trips. So the apparent solution had to involve removing this traffic from Schaefferstown to create a bypass.

The primary goals for this project were to reduce congestion along SR 0501 within the village, improve safety along SR 0501 and improve the regional system continuity.

During the initial project phase, the team evaluated seven alternatives, including the No-Build, TSM, and five other

SR 0501 finished bypass. Roadside vegetation blends the bypass roadway into the landscape.

Southbound 0501 traffic congestion before new bypass.

New southbound 0501 traffic flows smoothly.

alternatives. With the goal of avoiding impacts (if at all possible)—then minimizing, then mitigating as a last resort—Stantec carefully considered the multiple relevant factors and developed the five alternatives. Four alternatives resulted in bypass roadways to the west of Schaefferstown, while the fifth alternative extended the SR 0501 roadway north out of town, effectively removing the two inefficient turning movements. Each alternative had varying degrees of impact to the different resources, but it was clear that all would have some level of impacts to agricultural properties. All standard project development processes were followed, including coordination with state and Federal resource agencies, and public meetings and early mitigation strategies were determined.

Ultimately, the alignment designated as "Alternative 1" was selected as the Preferred Alternative and resulted in a Finding of No Significant Impact for the Environmental Assessment. Final Design began in the summer of 2007, with key goals of achieving the Section 404/Chapter 105 Waterway Permit, an Individual National Pollution Discharge Elimination Systems permit and the acquisition of right-of-way.

To obtain the waterway permit, Stantec engineers and scientists had to resolve impacts to the stream and the associated wetlands. Stantec used early coordination meetings to gain input from Federal and state government agencies to ensure that the design satisfied all stakeholders. While on-site mitigation of wetlands was feasible, it would increase impacts to agricultural lands. A determination was made to mitigate in a new wetland bank in Lebanon County located about one mile from the project site. For stream impacts, the mitigation included the creation of a riparian buffer extending 50 feet in width on each stream bank, and the structures had to maintain a natural bottom.

During preliminary engineering, Stantec's structural engineers concluded that bridges would be cost prohibitive, and an effective alternative was to use precast concrete arch structures. The final size was set to a 24-foot span with a 10 foot, six-inch rise for the culverts; the lengths were 103 feet and 157 feet. The wide culvert span would allow the channel to create its own meander during low flow periods.

To mitigate for environmental effects, design plans included aesthetic treatments on structures to blend sympathetically with the historic setting, and a culvert for cattle to pass under the roadway to maintain the connection of existing pastureland. The headwalls and wingwalls of the structures received a faux stone architectural pattern that was colored to specifically blend with the look of adjacent historic stone buildings.

A Transformational Stormwater Management Design

Designing a Stormwater Management Plan proved to be extremely challenging in this approved Act 167 Watershed of Hammer Creek, especially in a time when post-construction Best Management Practices (BMPs) were evolving in Pennsylvania. The Pennsylvania Department of Environmental Protection had just finalized its manual for stormwater management in December 2006.

Stantec was an early adopter of the creative use of BMPs in Pennsylvania, and its engineers began to create a design using a variety of BMPs dispersed throughout the project corridor. This was a major deviation from the standard protocol of using only extended detention basins at drainage discharge locations. The Stantec design incorporated trapezoidal, vegetated channels adjacent to the roadway, which required special approval by District 8-0 for a non-standard roadside treatment. The design also used bioretention facilities that would promote vegetative growth and infiltration. The final BMP was the use of concrete level spreaders for larger bioretention facilities so the discharge would be converted from concentrated to sheet flow prior to entering the stream floodplain. Again, Stantec used early coordination meetings to gain input from state and municipal government agencies to ensure that the design satisfied all stakeholders.

The Final Challenge: Right-of-Way Acquisition

The final goal hinged on the acquisition of land, most of which was agricultural land and has special protection in Pennsylvania. While the selected alternative generally followed property line boundaries to minimize the effects of a new alignment, one agricultural property was bisected, and an amicable settlement could not be achieved. This required PennDOT to use eminent domain to condemn the property. PennDOT and Stantec presented the project to the Agricultural Lands Condemnation Approval Board (ALCAB) at a hearing to obtain approval to begin condemnation proceedings. A lengthy legal process ensued, and the ALCAB approval to proceed was ultimately obtained to complete the planned acquisition of right-of-way.

Consequently, with all right-of-way acquired and all necessary permits achieved, Stantec delivered the final plans for the Schaefferstown Bypass project to PennDOT Engineering District 8-0 for advertisement in March 2011. The Schaefferstown Bypass would finally become a reality and fulfill the desire of PennDOT and the community for safety and relief from traffic congestion in the picturesque, historic village of Schaefferstown.

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