2020 DIAMOND AWARDS
FOR ENGINEERING EXCELLENCE

Thursday, February 27, 2020
LANCASTER MARriott AT PENN SQUARE
LANCASTER, PA
Welcome to the 2020 ACEC/PA Diamond Awards for Engineering Excellence Gala! What an enjoyable evening to celebrate the outstanding achievements of our many award recipients, colleagues, and guests.

Tonight’s program highlights the many strides and achievements our industry has accomplished in finding unique solutions to unique challenges. There is strategic focus with each submission that meets the needs of our clients and provides a positive and long-lasting impact for critical projects while putting safety, innovation and solutions the priority in all you do each and every day. I commend you all for your dedication and talents.

I want to thank all our sponsors for making this evening possible. Their generosity and support of ACEC/PA and our industry is extraordinary.

I hope you join me in celebrating with pride and elegance the most outstanding achievements of the engineering profession.

Leeann Sherman, MPS, CAE | Executive Director
We would like to thank our sponsors.

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In 1997, Hurricane Danny inspired Dan Tomaso to study meteorology when the storm caught his attention due to the name. As a native of Harrisburg, he watched the local weather for fun and learned as much as he could from evening newscasts on abc27 with the StormTrack Team.

Dan first began communicating his weather knowledge over a closed-circuit television channel titled the “Royal News Network” at Saint Catherine Laboure School during his seventh and eighth-grade years. In 2003, a special broadcast on this channel featured Chuck Rhodes as a guest co-anchor, who further inspired him to pursue the study of meteorology. He was offered a part-time meteorology position at abc27 in August 2009 and has worked at the station ever since.

Before starting full-time at abc27, he studied meteorology at Penn State University from August 2008 to March 2015 in the Bachelors, Masters, and Ph.D. programs working for Dr. Raymond G. Najjar. During his time as a Penn State student, he would work at abc27 mainly on weekends and during school breaks. In August 2013, he completed his Bachelors and Masters degrees in meteorology through the prestigious Penn State Integrated Undergraduate/Graduate Program. He was accepted into this program in the spring of 2011 and worked with Dr. Najjar on his thesis research titled, “Seasonal and Interannual Variability of the Upper Delaware Estuary Dissolved Oxygen and Dissolved Inorganic Carbon Budgets”. This work is now part of a published manuscript in the Journal of Geophysical Research: Biogeosciences.

He stepped away from Penn State in March 2015 to pursue his dream job in broadcast meteorology at abc27 with a full-time on-air position. While his Ph.D. dissertation remains unfinished, he realized that his passion for forecasting and broadcasting in his hometown was the direction he needed to go for his career. He continues to broaden his weather and forecasting education as a broadcast meteorologist seal holder for the National Weather Association, a certification he received in February 2019.

You can see his latest forecast every weekend evening live during abc27 News at 6 p.m. and 11 p.m. each Saturday and Sunday! He also enjoys participating and volunteering in local events, so stop by and say hello if you see him outside of the station!
Melissa J. Batula, P.E.
Deputy Secretary for Highway Administration
Pennsylvania Department of Transportation

Melissa J. Batula, P.E., was appointed Deputy Secretary for Highway Administration on January 7, 2020. She was a senior design engineer in the private sector from 1987 to 2006. She joined the Department of Transportation in 2006 as a senior civil engineer. She has progressed through the department in various management positions, such as chief of the Accelerated Bridge Program, assistant chief bridge engineer, and asset management division chief in the Bureau of Maintenance and Operations. In 2014, she became the highway delivery division chief and has served as acting director for the Bureau of Project Delivery since 2018.

Mark P. Compton
Chief Executive Officer
Pennsylvania Turnpike Commission

Mark P. Compton of Manheim, Pennsylvania began serving as chief executive officer of the Pennsylvania Turnpike Commission on Feb. 1, 2013. A professional with nearly two decades of public and private-sector experience in transportation, administration, government affairs and construction, Compton holds a Bachelor of Science degree from Penn State University with a major in government management and administration. He previously served as PennDOT’s deputy secretary of administration, overseeing eight bureaus within the agency. Before joining PennDOT, he was director of government affairs for American Infrastructure, a heavy civil construction company headquartered in Worcester, Pennsylvania. Prior to that, he worked in various public and private operations, focusing largely on transportation, construction and economic development. He currently serves as chair of the International Bridge, Tunnel & Turnpike Association’s government affairs committee.

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Through exceptional planning and engineering design, these award-winning projects significantly contribute to the quality of life for Pennsylvania citizens. The awards also recognize the involved design professionals for their expertise and dedication to our profession. We applaud and thank our members for making Pennsylvania a better place to live and work.

This year’s winners strengthened our infrastructure, enhanced public safety, raised the profile of the engineering profession, and offered sustainable, economical solutions for clients and taxpayers. The winning projects are as diverse as the firms involved. A Diamond Award for Engineering Excellence is a tribute to not only the winning project and its engineering firm, but also to the clients, owners, subconsultants, contractors, and everyone who played a role in making these projects a reality. Our winners embody the spirit of teamwork.

ACEC/PA represents nearly 13,000 engineers, architects, land surveyors and other specialists in Pennsylvania. The association's primary mission is to strengthen and foster the relationships between its member firms, clients, government agencies and elected officials.

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In 1987, the Federal Highway Administration (FHWA) released a technical advisory emphasizing that the goal of the NEPA process was to make better decisions and not create more documentation. Change is slow. It has been more than 30 years. Many EAs and EISs were processed after this advisory was released, but few were able to remain concise, clear and to the point as the advisory had recommended.

Enter the I-83 North York Widening Environmental Assessment (EA) published in August 2019. This document was conceived early in the transportation development process to document the engineering and environmental process associated with a 5-mile widening and interchange improvement project along I-83 in York County. The project is complex. The infrastructure is antiquated. The resources are numerous.

The EA was developed to be compact and crisp; supported by digital technical files. Visually appealing infographics, photos and text boxes are sprinkled through the document explaining key terms. The use of maps, flow charts using layperson’s terms allowed the I-83 North York Widening EA to easily convey complex content to a public audience while remaining legally sufficient and defensible of the decisions made.

This EA represents true collaboration between the transportation agencies, regulatory agencies, local stakeholders and the public.

As one of the first all-digital, concise and visually appealing EAs in Pennsylvania, the I-83 North York Widening EA will set the standard for the future, both in District 8-0 and statewide.

Lancaster County is anticipating a population increase of 100,000 people in the next 20 years. To accommodate this growth while maximizing the transportation investment dollar, a new direction in planning and investment was needed.

WRA created a state-of-the-art parcel scorecard to determine preferred land use within the study area. When evaluating impacts of the preferred land scenario, it was clear that simply locating future development in areas that are most desirable for the specific land use significantly reduced congestion. This study confirmed that sound decision-making regarding land use combined with targeted transportation improvements maximizes the transportation investment dollar.
As a part of the Paxton Creek Restoration Master Plan to transform Paxton Creek into an urban green space, restore the ecosystem and improve functions and services, Michael Baker International conducted a multiphase flood control study of Paxton Creek to determine if/how a reduction in flooding severity and frequency of Paxton Creek could be achieved. Feasibility was proven, and in March 2019, the project ownership was transferred from PennDOT to community stakeholders for their implementation.

The S.R. 0061, Section 14M roadway improvement project is located along Route 61 in Schuylkill County, PA. The proposed improvements include the total reconstruction and widening of Route 61, realignment of four substandard curves, slope stabilization, installation of 1,100 feet of new retaining walls, and rehabilitation of 9 culverts.

TPD created a visualization fly-through video for presentation to the public, to allow the local community to preview this project that will have such a significant impact on the surrounding community. The 3D design provided the public with a clear visualization of the scope of the proposed improvements.

A first-of-its-kind facility on the “front porch” of the U.S. Navy. An innovative project delivery method. A signature look and a new standard for lodging guests that need to be mission-ready at a moment’s notice. This is the Navy Gateway Inns & Suites (NGIS) design-build project at Naval Station Newport, Rhode Island.

NGIS Newport involved the design and construction of a secure, sustainable lodge/hotel and corresponding site development. As the lead designer, Michael Baker International set out to create a facility that would fuel a new vision for NGIS as a whole and establish its signature look moving forward. Our team performed architecture, interior design, mechanical engineering, plumbing design, and fire protection engineering, as well as site development including civil engineering and landscape architecture. The facility’s security provisions met the requirements set by the Department of Defense (DoD) for anti-terrorism/force protection, while its sustainability solutions achieved LEED Silver certification.

The team incorporated the latest trends and innovations in the hospitality industry that focused on the guest experience and encompassed everything from visual appeal to comfort. Interior designs integrated local architectural styles and incorporated blast analyses. Harbor views were prioritized both inside and outside of the structure, and local artwork, natural wood and stone finishes contributed to a sense of place.

Due to the facility’s location along a coastal flood zone, the project team also accounted for potential storm surge, wave action, and coastal erosion in the design. Sustainability and security were also important, necessitating unique approaches to building design.
Nominees

**Project Name:** Philadelphia International Airport LED Lighting
**Firm:** Johnson, Mirmiran & Thompson, Inc.
**Owner:** City of Philadelphia, Department of Commerce, Division of Aviation
**Key Partners:** City of Philadelphia, Division of Aviation, Greentech Energy Services, Diversified Lighting Associates, Inc., ED3 Consultants, Inc.

Sustainability has become a paramount project objective for many agencies/owners and it’s increasingly difficult to justify major capital expenditures without demonstrating a sustainability or energy efficiency benefit. While lighting replacements are viewed as “low hanging fruit” for improved energy savings, replacement projects can be cut short to avoid challenging/more costly areas with systems that may be impractical to replace due to fixture locations or other parameters. The Philadelphia Division of Aviation conducted a program at Philadelphia International Airport to replace 2,500 fixtures with high efficiency LED equivalents. JMT provided engineering and design documents in support of the initiative.

**Project Name:** Swarthmore College New Palmer, Pittenger, Roberts Residence Hall
**Firm:** Langan Engineering and Environmental Services, Inc.
**Owner:** Swarthmore College
**Key Partners:** DIGSAU, Studio Bryan Hanes, Revision Architecture, Bruce E. Brooks & Associates

In order to accommodate a rapidly growing student population, Swarthmore College added a 128-bed residence hall near its Palmer, Pittenger and Roberts residence hall complex in Swarthmore Borough, Delaware County, PA.

Retained by the project architect, Langan provided site/civil engineering, survey and geotechnical services to facilitate designing, permitting, and constructing the new residence hall. The project was designed to minimize environmental impact by following the recommendations established in the college’s sustainability framework.

Langan’s experience with designing and permitting innovative stormwater management on tight urban sites was a key contribution to the success in the design and approval process for this project.

A Special Thank You to the Diamond Awards Committee Members.

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**Legislative Day**

April 6 & 7, 2020

Learn more here: www.acecpa.org/page/LegislativeDay
Rivaling Venice, Italy, Pittsburgh boasts 446 bridges of every shape and size, but only one true one suspension bridge, the Philip Murray Bridge, locally known as the South 10th Street Bridge, making this circa 1933 structure one of a kind in the City’s landscape. 

Constant bombardment from water and weather creates corrosion and cracks and brakes wires inside the cable. The premier preservation method for suspension bridge cables is through dehumidification. Dehumidified “dry” air is pushed through a piping system into the cable, removing internal moisture from the strands.

Planning, scheduling and training were key to the project’s success. In concert with a full structural rehabilitation, the dehumidification system was installed with minimal impact to travelers. Not your typical project for ironworkers, specialize training was conducted in the delicate art of cable splicing, wrapping and sealing using a test rig on the ground. Then, using secure scaffolding on the full length of the cable, two teams worked in tandem preparing the cables for the new system. Without space for a full anchorage plant room for the system, our team creatively sealed the interior of the anchorage using an epoxy coating, traditionally for bridge exteriors, to help keep moisture out and the dry air in.

This cost-efficient and socially responsible alternative will protect the bridge from Pittsburgh winters well into the future. Through dehumidification, the cables were successfully dried out in a short 4.5 months and already protecting the bridge for the future!

Nominees

Lesner Bridge
Firm: FIGG Bridge Engineers, Inc.
Owner: City of Virginia Beach

Designed with the community in a theme of “Reflections of the Bay,” the Lesner Bridge is a new segmental concrete signature bridge for the City of Virginia Beach. The new twin eastbound and westbound bridges have 10 spans totaling a length of 1,575 feet each and carrying US 60 over the Lynnhaven Inlet. The new bridge opened to the public on December 12, 2018 and provides an aesthetically pleasing gateway structure that enhances regional mobility. The City of Virginia Beach has experienced overwhelmingly positive feedback from the local community and tourists who enjoy this vital connection over the Lynnhaven Inlet.

Pond Eddy Bridge Replacement
Firm: SAI Consulting Engineers, Inc.
Owner: PennDOT Engineering District 4-0
Key Partners: Pennsylvania Department of Transportation – District 4-0, New York State Department of Transportation – District 9-0, Pennsylvania Department of Transportation, Bureau of Project Delivery, FHWA-Pennsylvania Division, Casco Bay Steel Structures, Inc., DA Collins Construction Company, Eastern Steel Constructors, Inc., McCormick Taylor, Inc., Skelly and Loy, Inc.

The historic SR 1011 Pond Eddy Bridge over the Delaware River in Pike County, Pennsylvania, was replaced in 2018 with a two-span Pratt truss structure constructed upstream. Complex causeway and ATON staging facilitated construction while maintaining recreational boating traffic. The project involved significant coordination with environmental and government agencies and in-depth community involvement through a Design Advisory Committee (DAC) of local stakeholders; a 3D model of the structure was used at public meetings.
Nominees

JMT provided CM/CI services for PennDOT District 6 rehabilitation of the Walnut Lane Bridge, a 110-year-old open spandrel reinforced concrete arch bridge located in Philadelphia County. Listed on the National Register of Historic Places, the bridge crosses Wissahickon Creek and Forbidden Drive and includes a popular walking trail. As the prime CM/CI consultant on this $20M project, JMT provided full-time inspectors and part-time CM staff to ensure the rehabilitation proceeded efficiently and to code. In addition to the bridge rehab, the adjacent roundabout (approximately 500 feet north of the bridge) had to be modified to comply with current design criteria.

Category D  |  Surveying and Mapping Technology

Winner

Project Name: Catch It Early GIS Web Application
Firm: KCI Technologies, Inc.
Owner: Pennsylvania Turnpike Commission
Key Partner: Pennsylvania Turnpike Commission

The Pennsylvania Turnpike Commission wanted to leverage available information to reduce delays associated with accidents and other incidents across their entire network, which spans more than 500 miles in length. The organization’s GeoAnalytics team and Traffic, Engineering and Operations Department partnered with KCI Technologies Inc. to develop the Catch it Early, Act, Analyze and Review program, or CAAR. The goal was integration of data from various sources into one viewable application to provide the TEO with an efficient tool to quickly detect and respond to safety and traffic flow situations, and in turn improve customer experience while traveling the turnpike. The result is a revolutionary web-based geographic information system that connects technology, social media, artificial intelligence and the Internet of Things to improve awareness of the total roadway network.

The team’s objectives focused on safety, efficiency, innovation and continuous improvement. A data lake was created to merge many independent information sources, including feeds from partner organizations such as Waze, AccuWeather, INRIX and Verizon, as well as social media and real-time open data. As a custom safety-centric incident visualization tool, GIS applications and dashboards display real-time data, video, photos, travel speeds, weather, traffic conditions, and the PTC safety and truck locations. These data layers help users and duty officers to make the roads safer by allowing whole system monitoring of traffic situations and quick identification of major traffic incidents. Since inception, clearance times have decreased by 28 minutes, which has reduced backlogs, cost and first responder and safety resources required on the roadway.

2020 SPRING CONFERENCE

MAY 11-13, 2020
HARRISBURG, PA
This project involved the DeHart Reservoir boundary survey and the detailed records research of deeds, plans, and related documents to enable field searches for and location of boundary evidence. The recovered boundary evidence was reviewed relative to existing records and utilized to re-establish the boundary of the DeHart Reservoir enabling an accurate determination of the boundary and total area. The area is over 8,000 acres, approximately 5 miles long and 1/2-mile-wide and is comprised of 31 individual parcels. A boundary plan depicting found and set boundary markers, a summary report and digital pictures of boundary markers was provided.

In an effort to restore normal traffic flow for both residents and emergency services, Mahanoy City Borough and PennDOT District 5-0 replaced the top slab of two sections of the Market Street Culvert in Mahanoy City Borough, Schuylkill County, PA. The project included the construction of a reinforced concrete slab spanning Mahanoy Creek as well as two open channel sanitary sewer troughs. Also, the project upgraded sidewalk and ADA ramps throughout two blocks and four intersections as well as upgraded drainage within both sections. Through efficient collaboration, the project advanced from project scoping to substantial completion in just 26 months.

Carusone Construction, Inc. hired McMahon to provide survey services at the Southwest Water Pollution Plant in Philadelphia, PA. This project included temporary excavation support and protection required to build a PWD Dilution Water Tank and an Underflow Bypass. Movement monitoring of the adjacent building’s walls was required due to the proximity of the excavation. Multiple reflective targets were placed on the building columns which were sighted from project control points. Each target was located from multiple control points during the excavation to ensure no movement. Daily position analysis was performed to ensure the existing building showed no signs of disturbance.

To identify the Commonwealth’s most pressing infrastructure needs, PennDOT needed to enhance cooperation between districts, planning partners, and municipalities. GeoDecisions built the PennDOT Connects Application, which leverages business process management principles to streamline procedures. A mapping interface for project location identification, environmental assessment, social networking, and collaboration tools is incorporated into the portal to promote discussion, knowledge sharing, and form completion – ensuring that the needs of the communities served are at the forefront of all projects. This first-of-its-kind portal for Pennsylvania has not only enhanced collaborative planning but has made the planning processes more efficient and cost effective.
The South Valley Parkway is located within Hanover and Newport Townships and Nanticoke City, Luzerne County, Pennsylvania. Now constructed, the Parkway improves the region’s roadway network and provides a safe and efficient route to the Luzerne County Community College campus and other destinations, including the Greater Nanticoke Area School District campus. This new highway also provides opportunities for new development and redevelopment on properties that are vacant or underutilized, giving the local economy a needed boost. Skelly and Loy’s environmental studies, including preparation of the project’s Environmental Assessment and design of compensatory mitigation plans, were an integral step in bringing the South Valley Parkway to fruition.

One of the key environmental constraints for the project’s development and construction was that the site was located within the range of state and federally-listed threatened and endangered species of bats and required extensive habitat assessment, presence and absence surveys, radio telemetry, monitoring, resultant habitat mitigation, preparation of a Biological Assessment, and agency coordination.

Skelly and Loy’s design and construction/post-construction monitoring of four replacement bat habitat structures along the top of the reconstructed PA Route 29 rock face has proven successful as both a summer and maternity roost location for the Eastern Small-footed Myotis, a state threatened bat species.

This project is an excellent example of blending design and construction of a needed roadway with protection of threatened and endangered species and can be used as a model for progressing future roadway projects with threatened and endangered species constraints within the project corridor.
The Bellefonte Borough Wastewater Treatment Facility is located along a pristine, prized trout stream (Spring Creek) in Centre County and discharges upstream of a recreational lake used by all types of water enthusiasts. In a snapshot, the facility had little treatment capacity remaining in the core treatment area within the plant (Activated Sludge System) and found that other supplemental treatment equipment (Rotating Biological Contractors—RBC’s) were mechanically failing at the limits of their life expectancy, and must be replaced in-kind, or with another treatment process.

BBA needed a solution to replace the RBC’s and manage additional future pollution for the next 20 years that would fit into the facility footprint within an affordable, practical approach. Century’s design included the BioMag® system which uses magnetite (fully inert iron ore particles) to enhance the clarification process. The system uses the world’s fastest proven settling clarification technology for biological floc allowing capacity expansion and performance improvement minimizing plant modifications and capital investments.

Incorporating BioMag into the existing BBA plant tanks has provided excellent clarification performance at higher clarifier loadings with an increased biological treatment population in the tanks producing very low ammonia results. Based on the improvements, the new capacity for the facility has been increased by 41 percent with the ability to treat a higher influent organic load. In addition, the overall sludge treatment has been significantly improved with cleaner, better screened biosolids with little to no odor from the process which was a priority for the Authority.

Congratulations to the 2020 Award Recipients
ACEC/PA Diamond Awards for Engineering Excellence

Philip Murray Bridge (South 10th Street Bridge)
Rehabilitation and Main Cable Dehumidification
Nominees

Project Name: Town of Nichols Water/Wastewater System  
Firm: Larson Design Group  
Owner: Tioga County Economic Development & Planning  

In 2018, a landslide collapsed a combined sewer main and several manholes in the Overbrook neighborhood. PWSA immediately set out to design and construct a new sewer to restore service. The JMT team completed design between July-November, and construction began February 2019 for the installation of 550 feet of new sewer pipe. The construction team was challenged with working against the natural slope of the street so gravity could do its job conveying sewage. Crews dug trenches nearly 30-feet deep to install the pipe. This unique, $1.2 million project restored sewer service for residents, providing much needed water quality improvements.

After aluminum packaging giant Crown Cork & Seal chose the Town of Nichols, NY for a new manufacturing facility, the Industrial Development Agency of Tioga County agreed to upgrade Nichols’ public drinking water and wastewater treatment infrastructure to serve the new site. In just 11 months, LDG completed the design, approval and construction of all water/wastewater upgrades required by the EPA, increasing the Town’s wastewater treatment capacity from 40,000 to 240,000 GPD and giving it the ability to treat Crown’s unique industrial wastewater – proving that a multi-stakeholder project with significant environmental agency involvement can happen quickly.

Nominees

Project Name: Ivyglen and Odette Sewer Reconstruction and Separation  
Firm: Johnson, Mirmiran & Thompson, Inc.  
Owner: Pittsburgh Water and Sewer Authority  
Key Partners: Pittsburgh Water and Sewer Authority, A. Merante Contracting Inc., DLZ Pennsylvania, LLC., Monaloh Basin Engineers, Hatch Ltd.

In 2018, a landslide collapsed a combined sewer main and several manholes in the Overbrook neighborhood. PWSA immediately set out to design and construct a new sewer to restore service. The JMT team completed design between July-November, and construction began February 2019 for the installation of 550 feet of new sewer pipe. The construction team was challenged with working against the natural slope of the street so gravity could do its job conveying sewage. Crews dug trenches nearly 30-feet deep to install the pipe. This unique, $1.2 million project restored sewer service for residents, providing much needed water quality improvements.

The Stormwater Management for Liberty at Middlesex Warehousing and Distribution Center exemplifies an innovative solution which maximizes the footprint of the project while providing environmental stewardship in a high-quality watershed with karst geology.

Stormwater is directed through an extended detention basin, where a unique outlet structure distributes the flow through a system of level spreaders which discharge to a preserved meadow. The upstream Stormwater BMPs serve to extend the event time and reduce peak flows allowing the meadow to act as an efficient vegetated filter effectively infiltrating the increase in stormwater volume due to the development.

SAVE THE DATE

Join us for the 2020 ACEC/PA Annual Leadership Meeting

June 7-9, 2020 | The Chateaux Deer Valley in Park City, Utah

The 2020 event will offer educational and networking opportunities for you and our industry partners and guests.
**Category G | Water Resources**

**Project Name:** Pikes Creek Dam Rehabilitation  
**Firm:** Gannett Fleming, Inc.  
**Owner:** Pennsylvania American Water Company  
**Key Partners:** Hydroplus Inc., KC Construction Company, BIDCO Marine Group

Pikes Creek Dam stores 2.9 billion gallons of water and provides drinking water for 29,000 customers in 15 Luzerne County municipalities. When the existing spillways passed only 23% of the probable maximum flood (PMF) before overtopping the dam, the owner, Pennsylvania American Water Company took action to meet PADEP regulations requiring it to pass 100% of the PMF. The $20 million rehabilitation addressed inadequate spillway capacity, upstream closure, embankment slope stability, and seepage deficiencies.

The century-old Pikes Creek Dam auxiliary spillway was upgraded with the Hydroplus® Fusegate® System, an innovative solution for increasing spillway capacity. The Fusegate alternative saved up to $5 million in construction costs and is the first installation of labyrinth-style Fusegates in Pennsylvania.

The spillway is designed with 18 Fusegates that tip at progressively higher reservoir levels during a precipitation event, which prevents the dam from being overtopped. Pikes Creek Dam Fusegates will tip for an event significantly greater than the 1,000-year storm.

An underwater installation of pneumatically operated knife gate valves provides upstream closure of the outlet works. Adding a chimney, blanket, and toe drain provides collection and filtration of seepage. Flattening the downstream slope improves embankment stability.

Gannett Fleming led the dam rehabilitation design while maintaining continuous service and supplying raw water throughout construction. The rehabilitated infrastructure not only meets standards but also safeguards downstream communities.

Anthony Nokovich, PE, Pennsylvania American Water Company’s engineering practice lead praised the rehabilitation efforts stating, “the enhanced efficiency of the spillway system ensures the dam will never be overtopped.”

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**Category H | Transportation**

**Project Name:** I-95: Sections D10 and D20  
**Firm:** Gannett Fleming, Inc.  
**Owner:** Pennsylvania Turnpike Commission  

The Interstate 95 (I-95) "missing link" north of Philadelphia caused 75,000 daily motorists to travel 16 miles off the highway and use alternate roadways to complete their trip. This redirect on the nation's longest north-south highway led to miles of back-ups and congestion on local roads. As a result, I-95 infrastructure improvements were completed to alleviate gridlock and enhance mobility throughout the southeastern Pennsylvania region.

As engineer-of-record to complete I-95 Sections D10 and D20, Gannett Fleming provided preliminary and final design involving highway, civil, geotechnical, structural, and traffic engineering. In addition, Gannett Fleming led production of the final design plans and coordinated with 15 consultants for this highly-complex undertaking. During the design phase, stakeholders agreed to bid this project through the Pennsylvania Department of Transportation (PennDOT) Engineering and Construction Management System (ECMS). This decision resulted in Gannett Fleming successfully combining Pennsylvania Turnpike Commission (PTC) bid processes with PennDOT’s ECMS.

The overall $260 million roadway improvement project required multi-jurisdictional collaboration between the PTC, PennDOT, and Federal Highway Administration. Accomplishments feature the reconstruction of three bridges, construction of three new multi-span bridges, 12,500 linear feet (LF) of retaining wall, 4,500 LF of sound wall, 500,000 square feet of pavement, 14 stormwater basins, and 43,000 LF of drainage pipe. The project also included affordable structural design techniques including pile testing programs, site-specific seismic studies, steel straddle bents, and prestressed concrete integral pier caps. Combining these unique methods resulted in an approximately $6 million cost savings.

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**Winner**

**Category G | Water Resources**

**Project Name:** Pikes Creek Dam Rehabilitation  
**Firm:** Gannett Fleming, Inc.  
**Owner:** Pennsylvania American Water Company  
**Key Partners:** Hydroplus Inc., KC Construction Company, BIDCO Marine Group

**Winner**

**Category H | Transportation**

**Project Name:** I-95: Sections D10 and D20  
**Firm:** Gannett Fleming, Inc.  
**Owner:** Pennsylvania Turnpike Commission  

**Winner”
Nominees

Project Name: Dallas 5-Leg Roundabout | SR 0415
Owner: PennDOT Engineering District 4-0
Key Partners: PennDOT District 4-0, CHRS, Inc., Latona Trucking, Taylor Wiseman & Taylor, Stell

McMahon was the prime consultant responsible for preliminary engineering and final design of the $3.5 million “Dallas 5-Leg” intersection improvement project. This project was identified as a “high priority” in the Back Mountain Area Council of Government’s Transportation Plan.

McMahon led a team of subconsultants, PennDOT and a Community Advisory Committee (CAC) in the development of design alternatives. Through more than eight public and CAC meetings, McMahon built consensus for an oval roundabout. Construction began in 2016 and commenced in three stages. By working closely with the contractor and PennDOT on staging adjustments, the project was completed eight months early.

Project Name: Extension of Runway 27L
Firm: Urban Engineers, Inc.
Owner: City of Philadelphia

The City of Philadelphia opened the 1,500-foot extension of Runway 27L at Philadelphia International Airport in 2018, bringing its total length to 12,000 feet. This extension increased capacity and improved safety for travelers at the airport. The included upgrades enable new generation aircraft to fly to the Pacific Rim without load restrictions. Urban Engineers’ team formed a partnership with the city to manage 10 design consultants involved with this major project in PHL’s master plan. Urban assisted in developing three bid/construction packages, which allowed for partial project construction to proceed while other items were still in design.

Project Name: SR 0001 INT Project (Route 1 and 32 Interchange)
Firm: HNTB Corporation
Owner: PennDOT Engineering District 6-0
Key Partners: PennDOT District 6-0, Maser Consulting P.A.

Faced with the need to improve safety at the Route 1 and 32 interchange, PennDOT tasked HNTB to deliver this project, using innovative tools. During design, the team faced an accelerated design timeline (five months), working within the existing ROW and a $2.5 million construction budget. In collaboration with PennDOT, HNTB analyzed safety benefits during design, developed a solution to improve safety in the project area and completed the design for this accelerated project on schedule. The use of IHSDM justified the safety benefits of the proposed reconfiguration and was the first use of this program in PennDOT District 6-0.

Project Name: PennDOT District 9-0 S.R. 6219 Section 020
Firm: L.R. Kimball
Owner: PennDOT Engineering District 9-0

The PennDOT District 9-0 S.R. 6219 Section 020 project involved preliminary, final design, and construction consultation services for approximately 11 miles of new, limited-access, four-lane highway in Somerset County, from the northern terminus of the Meyersdale Bypass to the southern end of the existing US 219 four-lane in Somerset, PA.

This project included construction of 2 new interchanges and modification to 1 interchange, 6 sets of new dual structures, 1 set of modified dual structures, construction of 4 new box culverts, the relocation of 6 township roads and 2 state road and 10 million cubic yards of earthwork.
Nominees

Project Name: SR 160 Truck Safety Improvement Project
Owner: PennDOT Engineering District 9-0
Key Partners: PennDOT District 9-0, Gibson-Thomas Engineering

Several truck crashes have occurred on Big Savage Mountain over the years. However, a runaway truck that destroyed the Mount Harmony United Methodist Church in Wellersburg, Pennsylvania was the last straw for the community. Crash history provided little information to determine the cause of the crashes. PennDOT sought help from RETTEW in developing a plan. RETTEW recommended an expanded truck pulloff area at the top of the mountain. This area creates space for truck drivers to safely exit their vehicles and evaluate their descent. The corridor received signage upgrades, and two Intelligent Transportation Systems were installed.

Project Name: Yeager Airport Runway 5 Safety Area
Firm: Schnabel Engineering, LLC
Owner: Yeager Airport/ Central West Virginia Regional Airport Authority

Billed as “West Virginia’s largest airport and gateway to the world,” Yeager occupies 767 acres and serves commercial, military and general aviation traffic from a single runway featuring an engineered material arresting system (EMAS). In March 2015, the 240-foot-high emergency overrun structure experienced a catastrophic failure. The collapse left a 140-foot-high vertical face of partially reinforced fill looming over a massive debris field. The geotechnical, mitigation and reconstruction plan stabilized the collapsed safety overrun and restored the EMAS and runway safety area by re-engineering the site with a new 83-foot-high retaining wall backfilled with soil and geofoam.

DIAMOND AWARDS

Winner

Category 1 | Special Projects

Project Name: Diamond Park Renaissance Project
Firm: The EADS Group, Inc.
Owner: Borough of Ligonier

The Diamond Park Renaissance Project is the redesign of the historic town square and park located in Ligonier, Pennsylvania. Due to site constraints including a vehicular roundabout with no alternate truck route, central business district shops located around the site, a strict construction deadline, and the varying project elements, this has been one of most complex and unique projects The EADS Group has designed.

The EADS design was a radical departure from the design that had been largely unchanged since 1894. All of the existing elements were changed to meet the goals. In order to satisfy the community, we needed to retain a sense of those characteristics that made the Diamond special in the past. This was our greatest challenge.

Our design incorporates semi-circular seating areas to promote social interaction. The seating layout increased capacity by 33% and, along with wider walkways to accommodate more people, became the core design theme. Traffic Control and Construction Phasing Plans were prepared to safely allow passage through the Diamond during construction. A snow melt system is incorporated in all walkways to reduce maintenance and improve safety. An addition to the Bandstand was designed to increase floor area and provide a crawl space for mechanical and electrical equipment.

All of Ligonier Borough’s goals were achieved and the project was completed on time and under budget. Park usage has increased, and the redesign has been embraced by the public lending credence to the success of the EADS design solution.
As the Benjamin Franklin Bridge neared its 93rd Birthday, the DRPA completed a high-profile modification to the south walkway of this iconic structure. The bridge carries three modes of transportation, one of which is a pedestrian walkway/bike path. However, the walkway was only accessible via a 25-foot high steel stairway which was not ADA accessible, and bicyclists carried their bike up or down the stair.

Therefore, the DRPA embarked on a nearly $9 million-dollar project to demolish the stairway and a portion of the walkway. It was replaced it with a wider, constant slope ramp which is ADA compliant.

When PBF Energy’s 8-inch natural gas pipeline was accidentally damaged by a third party, PBF decided to replace the line with a 24-inch-diameter pipeline on an expedited schedule to maintain the U.S. Army Corps of Engineers’ Delaware River deepening and widening project’s schedule. STV’s engineering, design, permitting and construction management solutions to the multi-faceted, complex project enabled PBF to increase their line size, install the new line while meeting permitting requirements, and remove a line section, allowing the Delaware River deepening and widening program to maintain its schedule. Concurrently, Philadelphia International Airport’s improvements were completed without interruption of airport operations.

RVE was retained by the Township of Robinson to provide engineering, design and construction inspection services for the Clever Park Pool Complex. RVE executed an innovative design which incorporated the existing pool and equipment while making the necessary improvements to make the complex state-of-the-art. The rehabilitation of portions of the complex allowed the Township to stay within budget while creating a contemporary facility. RVE’s involvement throughout the project, including during the construction process, was key to getting the project completed on time and within budget to best serve the Township and residents.

Providing access to thousands of drivers per day, the historic, winding Lincoln Drive corridor had become the site of many crashes and lacked the necessary infrastructure for pedestrian traffic to connect neighborhoods to the nearby park. The Lincoln Drive Resurfacing and Restoration Project in Philadelphia, Pennsylvania focused on roadway restoration, innovative drainage and pavement markings designs and attention to aesthetic detail. Michael Baker International, PennDOT and the City of Philadelphia were able to implement the safety and drainage designs on time and within budget, preserve the region’s historic character of the region and increase residents’ quality of life.
The Perry County Commissioners requested Pennoni perform a post-fire study on the historic Dellville Covered Bridge after it was nearly destroyed by a fire in November 2014. Built in 1889, the bridge is listed on the National Register of Historic Places. The study weighed two alternatives to address the damage: bridge rehabilitation and bridge removal. The study included the development of preliminary cost estimates, research of historic resource requirements, and investigation of funding sources for the project. The study findings were cost competitive, but rehabilitation proved more socially beneficial. The bridge was completed and open to the public in 2019.

High Associates, Ltd. owned land with good proximity to the City of Lancaster, a major highway (U.S. Route 30), and many other amenities, making it an ideal site for a mixed-use community. However, the property contained steep slopes, wetlands, 37 acres of floodplains, and historic buildings. This project incorporates 210,000 square feet of retail shops, restaurants, and other recreational facilities, along with multi-family housing in a pedestrian-oriented streetscape environment and a hotel. The project also included trails and wildlife viewing areas along the adjacent stream corridor.

Prior to implementing the detour, the concrete-filled pipe piles were installed at each abutment utilizing a single lane closure with temporary signals. The complete spread box beam superstructure including cast-in-place end diaphragms, deck, and barriers was constructed on temporary footings immediately south of the bridge.

To execute the slide, the bridge superstructure was lowered onto rollers and two hydraulic jacks connected to threaded rods pulled the superstructure into position. After the superstructure was lowered into place, grout was pumped into the splice couplers and the gap between the pile cap and superstructure.

The final roadway pavement and guardrail was installed, and the roadway was opened to traffic five hours ahead of schedule.

WRA served as the prime consultant and provided preliminary engineering, final design, and construction consultation services for this design/bid/build project in PennDOT District 11-0. The existing structurally deficient single-span bridge carried SR 0208 (Pulaski Road) over Deer Creek in Pulaski Township along a tangent alignment. The project site is in a rural area with the Rolling Hills Golf Course located immediately adjacent to the bridge on both sides of SR 0208. The Department asked that Accelerated Bridge Construction (ABC) methods be considered since the golf course owner expressed concern about how a long-term 13.5-mile detour would negatively affect his business.

After evaluating the alternatives, WRA proposed that the replacement spread box beam superstructure be constructed off alignment and slid laterally into place onto precast integral abutments during a five-day road closure.

The final roadway pavement and guardrail was installed, and the roadway was opened to traffic five hours ahead of schedule.

Project Name: SR 0208 Pulaski Bridge over Deer Creek
Firm: Whitman, Requardt and Associates, LLP
Owner: PennDOT Engineering District 11-0
The Charlotte Street Two-way Conversion transformed the existing one-way street, which consisted of two travel lanes with street parking, into a two-way vehicular corridor. A complete streets approach and innovative green infrastructure components with budgetary constraints make this project unique, employing multi-faceted techniques that resulted in an aesthetically pleasing, usable, and sustainable facility.

McCormick Taylor led the project's preliminary and final design effort and was responsible for the overall roadway and traffic designs. This included roadway cross slope corrections, sections of full-depth pavement replacement, sections of mill and overlay, driveway adjustments, curb bulb-outs for rain gardens, and ADA-compliant ramp designs.

Remington & Vernick Engineers (RVE) was retained by the City of Philadelphia, Department of Public Property, to provide professional engineering services for the replacement of the concrete North Apron of City Hall. The project required the replacement of the concrete apron, repair and reset the granite treads, a foundation for the temporary steps and ADA compliance for accessibility in the most cost-effective manner, while using sustainable products during construction. All work was completed without compromising the historical features of City Hall and while maintaining pedestrian and vehicular traffic, mitigating the project’s impact on the public.

PennDOT District 4-0 contacted Pennoni regarding a partial bridge collapse on SR 0092 in Exeter to coordinate the design of the emergency replacement structure. The original single span steel plate pipe arch bridge collapsed when an intersecting storm drain separated from the plate arch pipe, washed out the surrounding fill material, and created an unbalanced condition for the arch. With an average daily traffic of more than 7,500 vehicles per day, SR 0092 is a vital arterial roadway.

Pennoni completed the design process for bidding within 23 days. Construction was complete and the road open to traffic in August 2019.

Seeking to address needs of Pottstown Borough’s residents and visitors for a safe, efficient network of bike/pedestrian routes through the area, the Borough pursued grant funding to develop and implement a complete streets project along crucial corridors. The project team worked with local stakeholders to develop plans for a low-stress bicycle network from preliminary route planning stages to final bicycle network design. The network includes an extension of existing downtown bike lanes, a new two-way separated bike lane, and over four miles of bicycle boulevards to connect residents to destinations, including neighborhood schools, downtown businesses, and the Schuylkill River Trail.
**Nominees**

**Project Name:** Power Capacity Enhancements for the Philadelphia Navy Yard  
**Firm:** Burns Engineering, Inc.  
**Owner:** Philadelphia Industrial Development Corporation  
**Client:** DTE Energy Philadelphia  

The Philadelphia Navy Yard (PNY) is a leading example of successfully adapting a former Naval Base into an economic powerhouse. The 1,200 acre “City-within-a-City” is now home to over 150 companies and 14,000 employees working for prominent commercial, industrial and US Government tenants. PNY’s “Smart Energy Campus,” a 52-megawatt unregulated electric grid, is one of the largest nonmilitary, unregulated electric distribution systems on the East Coast.

The US Navy is the PNY’s largest tenant. They needed a 15 MW power capacity increase in 18 months, to produce parts for the Columbia-Class ballistic missile submarine. The traditional utility approach entailed constructing a 6-mile power supply that would require 4 years, disruptive construction and $45 million. The traditional approach would not allow the Navy to begin production, and jeopardized high-skilled jobs and the entire operation in Philadelphia.

Burns, with the utility operator DTE Philadelphia, developed a groundbreaking method to bring the extra power supply to the site. The solution, a “Utility of the Future” model, deploys a hybrid of both utility supply and self-generation. Burns’ approach utilized: Fast Track and P3 Project Delivery, Smart Infrastructure, load profile shaping, leveraging existing electrical infrastructure, alignment of stakeholders, creative underground utility distribution.

The power capacity was on-line within the 18-month window, allowing the US Navy to be production-ready. Despite many challenges, the approach minimized environmental impact and disruption to tenants. It provides additional resilience and revenue stream benefits. This multi-benefit approach is an ideal model to replicate in the future for similar electrical infrastructure improvements.

**Project Name:** Sayreville Solar Array  
**Firm:** RETTEW Associates, Inc.  
**Owner:** J&J Solar Power, LLC  
**Key Partners:** J&J Solar Power, LLC, Solar Renewable Energy, LLC, Meadow Valley Electric, LLC, Monticello Energy Finance, LLC

Looking for the most effective way to meet renewable energy goals at its Bordentown Road Water Treatment Plant, the Borough hired a team to design, build, own, and operate the largest floating solar array in the United States. The team included RETTEW, a New York City-based investment firm, an international equipment manufacturer, and a Pennsylvania-based contractor.

We designed and constructed a 4.4-MWdc floating solar array to eliminate grid-supplied power and reduce annual electricity costs at the plant. The purpose of the project was to produce all the energy needed to operate the water treatment plant on an annual basis.
Nominees

Project Name: Talen Energy High Rad Project
Firm: Borton-Lawson
Owner: Talen Energy
Key Partners: Talen Energy, BHI Energy

Borton-Lawson provided on-site generation of as-built fabrication drawings during a planned outage for a Reactor Water Clean-Up system loop pipe replacement job utilizing a 3D project approach. Fabrication drawings did not exist so welders typically completed all work using traditional pipe fitting methods within the high radiation area.

The application of technology allowed the welders to pre-fabricate each loop in the shop environment, reducing 24 welds down to 8 within the high radiation-controlled area. This resulted in 3,000 millirem savings, fit up within 1/16", and 48-hour critical path savings.

Project Name: Temporary Emergency Power Program - Puerto Rico
Firm: WSP USA Solutions
Owner: US Army Corps of Engineers - Pittsburgh District
Key Partners: ACP, LLC, Macro Companies, HP Services, BLUESOURCE Solar, GenServe Global, Pedro Panzardi and Associates

When Hurricane Maria hit Puerto Rico in 2017, it caused the largest power blackout in US history. With power infrastructure crippled, the US Army Corps of Engineers and FEMA engaged WSP to bring emergency power to crucial life and safety support facilities island-wide, and to maintain it until the main power grid was restored. Over 440 days, WSP transported, installed, fueled, maintained and repaired nearly 2,000 emergency generators deployed across Puerto Rico under post-disaster conditions. This unprecedented $650 million effort led to multiple advancements in emergency response engineering and technology that are now in application around the country today.
Diversity and Inclusion Award Submissions

Diversity and Inclusion is a principle that at its core intentionally links the acquisition of talents from various backgrounds (age, gender, race, sexual orientation, people with disabilities, military service, etc.) and an inclusive work environment that leverages these differences as valuable resources contributing to the success of the business. Statistics continue to prove that companies that embrace diversity and inclusion as one pragmatic value are more profitable, have a competitive advantage, generate more forward-thinking and innovative ideas, and create environments where employees perform better and stay longer. ACEC/PA’s Diversity and Inclusion Award honors an organization that embodies these principles and serves as an example for our industry by demonstrating how diversity and inclusion practices are essential to business success. The following companies have submitted entries for the 2020 Diversity & Inclusion Award:

- **Gannett Fleming**: Supported by our strategic action plan, Gannett Fleming is increasing leadership accountability and providing employees with competency increasing tools. Since 2016, Gannett Fleming’s nine-person D&I Steering Committee develops, reviews, and measures D&I goals. Even though D&I is embedded in our programs, tailored training is underway.

- **Jacobs**: Jacobs puts people at the heart of our business. We have an unparalleled focus on inclusion with a diverse team of visionaries, thinkers and doers. We embrace all perspectives, collaborating to make a positive impact.

- **PRIME AE Group**: PRIME AE Group has created an imbedded cultural mindset of diversity and inclusion, a strength that we strongly believe has allowed us to continue that rapid growth into 2019. With so many firms still struggling to identify the benefits of increasing their attention to diversity, we are proud that PRIME AE is a diverse firm that exemplifies growth and performance.

- **Traffic Planning and Design**: Traffic Planning and Design believes in a diverse workforce and inclusive culture. Flexibility and family-friendly policies are essential to cultivating an atmosphere where employees can thrive professionally without sacrificing essential personal or family obligations.

- **Urban Engineers**: Urban values a diverse workforce. We believe that building a workforce through inclusion, acceptance, understanding, and respect of diverse cultures and backgrounds leads to the production of fresh ideas, personal and professional growth for our staff, and ultimately better projects and service to our clients.

**Save the Date for the 2021 Diamond Awards Gala**

**January 28, 2021**

Lancaster Marriott at Penn Square
Allegheny County Airport Authority (ACAA) is highly regarded within the consulting engineering community for its willingness to "spread the work around to qualified consultants" and their fair business practices.

Their fair business practices center around treating the members of the consulting engineering community as extensions of their staff and respecting their contributions to helping ACAA fulfill its mission. ACAA has shown time and time again that they fully understand the nuances and complexities associated with an engineering project. To that end, they continually demonstrate the level of esteem and trust they have for consulting engineers by hiring qualified professionals and then letting them do what they were hired to do.

With the arrival of CEO Christina A. Cassotis, ACAA has undergone a transformation to become the best origin and destination airport in the country.

ACAA conducts multiple outreach and educational events for the engineering community including DBE Bonding Seminars, small business networking events, and participation in African American Chamber of Commerce events, along with others. Leadership has also proven its skills at effectively rallying bi-partisan government support for funding aimed at improving the infrastructure at both Pittsburgh International and Allegheny County Airports.

ACAA is also a leader in the sustainability arena - committed to increasing environmental sustainability through the Terminal Modernization Program. For construction and operation of the new terminal and multi-modal complex, the program design team aims to comply with the LEED® Environmental Product Declaration (EPD) credit for building materials, while also seeking reductions in energy, emissions, water, and waste. The organization will also soon become the first major US airport to be powered by its own microgrid.

ACAA demonstrates its utilization of consulting engineering firms through its willingness to engage as many qualified engineering firms as is practical to assist with and address the wide variety of capital projects emanating from both Pittsburgh International and Allegheny County Airports. Combined, ACAA has hired a total of 44 individual subconsultants, 32 of which are DBE firms, including the dozens of consulting engineering firms currently engaged in day-to-day engineering activities at both Pittsburgh International and Allegheny County Airports.

For these above-mentioned reasons, Larson Design Group has nominated, and ACEC/PA is proud to recognize the Allegheny County Airport Authority as the winner of the 2020 Client of Distinction Award.

Nominated by: Larson Design Group\textsuperscript{v}
After 80+ years in service, Pump Station EPS-1 struggled to manage wastewater flows. Owner DELCORA envisioned an innovative, sustainable, and community-focused solution. Pump Station 6 (PS-6), a $14 million, 28 mgd facility was born.

The second of its kind in Pennsylvania, PS-6 features a self-cleaning trench wet well. It also includes an odor control system that couples ionization with high-velocity dispersion to reduce community impacts.

Delivered four months early and $4 million under the estimate of probable construction cost, PS-6 doubles the original facility’s capacity, improves reliability, and helps protect the Delaware River from combined sewer overflows during rain events.

Tom Riester is a man of steadfast dedication, as would be a fitting description for anyone who worked for the same firm for almost forty-seven years. Tom began his career at Mackin Engineering Company in 1973. In that year, the first mobile phone call was made in Manhattan. The World Trade Center opened. The Watergate hearings began. In some ways, nothing has changed, but in others, everything has. Tom started at Mackin as a structural engineer, and by 2011, had rose through the ranks to become President of the firm.

In Pittsburgh, back in those days, the Steelers reigned. Their coach, the legendary Chuck Noll, was known to say, “Whatever it Takes.” Whatever it takes, at that time, was understood to mean, whatever needed to be done to succeed, to win the prize, to reach the goal, in an ethical, hard-working way, was what was required. It was what was expected. Tom embodies that thinking. If that meant attending an ASHE dinner in Hollidaysburg (2.5 hours from Pittsburgh) at 6:00 PM and being back in the office at 7:15 AM the next day working on an SOI, that’s what Tom did. With no complaints, no drama. Just focused on the task at hand. I think Tom could have made a good doctor. A doctor is someone who has expertise; can apply it under pressure; during chaos; when others all around are panicking. You want that kind of person on your team.

During the years, as a result of the large contribution that Tom made to the firm, Mackin grew from a very small local firm, to one able to handle large and complex projects, from large Pennsylvania Turnpike projects, to the rehabilitation of the iconic Smithfield St. Bridge in Pittsburgh, on which Tom was Project Manager.

Tom, you have provided an excellent example to the profession. You have done excellent work, with dedication, humility, and empathy for your colleagues. Because of all this, you are truly deserving of the 2020 Award of Merit.
JMT is proud to support ACEC/PA and congratulates all the recipients of the 2020 Diamond Awards for Engineering Excellence.

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