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ADVERTISING SUPPLEMENT

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CREATING THE FUTURE

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Building the bridge to the future with innovations and talent

BY TERRACON

Our present is the future that was once envisioned. While we can sometimes anticipate the future with some precision, other times important innovations have not been anticipated at all. The accuracy of predictions can vary as much as individual opinions, but we know for sure that what engineers do today directly impacts what actualizes tomorrow.

So which ideas and practices will be the ones that determine the direction of the future? It's the ideas and innovations that surface now that will bridge the gap into what's next and to the next generation.

We can confidently anticipate that tech solutions for exploration will continue to evolve and multiply. At Terracon, we are continually looking for new ways to solve the issues impacting current projects, while anticipating future challenges. These innovations include pavement technology solutions and a new family of wind turbine foundations using earth-friendly design.

Pavement Technology Solutions

Pavement repairs can exhaust maintenance and capital budgets and drain resources. This is why we leveraged artificial intelligence (AI) technology to create pavement management solutions that allow us to dramatically improve our understanding of pavement conditions. We can more efficiently plan for maintenance and rehabilitation strategies to proactively meet clients' short- and long-term goals. Timely, accurate, and sufficient data is integral to our pavement solutions. Terracon utilizes digital data collection and AI to create a customized data-driven pavement management strategy that helps clients optimize their budgets and mitigate future risks.

Answering Wind Power Demand Sustainably

Wind energy is a growing renewable alternative for power generation and transmission Terracon's approach helps clients optimize wind energy project design and minimize risk, saving time and money. In the past five years, Terracon has supported more than 1,800 wind projects across 38 states.

Terracon's GripTerraSM family of wind turbine foundations are designed specifically to address today's 3 to 6 MW land-based turbines, utilizing earth-friendly designs which reduce both materials and construction time, offer re-powering and design life extension solutions, and reduce the overall carbon footprint of projects.

Building our Workforce

One way we get to the future is through experienced people in the engineering ecosystem mentoring the next generation. This includes engineers as well as those working in design, construction, technology, field work, scientific discovery, laboratory science, and more, all taking the time to share their knowledge. Every year Terracon seeks promising talent from colleges across the U.S. for internships in their fields of interest.

While outreach to today's younger students will remain important in the future, the rate of population growth in the U.S. and other countries is projected to decline sharply. This will translate into major labor shortages in A/E/C, as well as entire economies.

At Terracon, we're continually investing in the next generation of engineering by supporting events and programs that engage young people early to the wide array of career possibilities that engineering can offer. For several years, we've been executing an annual event with nearly 200 Girl Scouts in the Kansas City area that provides hands-on opportunities to explore the world of STEAM (science, technology, engineering, arts, and math). Every year Terracon's internship program attracts dozens of promising university and college students for 12-week periods of paid training with some of our brightest minds. Internships are available at our offices in most states, and offer benefits including a dedicated mentor, company-paid training for industry certifications, hands-on lab and field experience, and the opportunity to build skills in project and business management.

This is an exciting time to be in the A/E/C industry, and engineering is at the forefront. Every innovation is taking us forward one day at a time.

Welcome to the Engineers Week special section

MSPE-WC and KSPE-EC would like to thank all those involved in making the E-Week Luncheon a success. The luncheon celebration would never be possible without the countless hours of the E-Week committee volunteers.

A special thank you to our E-Week Platinum Sponsors: Burns & McDonnell and HNTB.

Projects of today improve our future, thanks to engineers

BY BHC

Engineers reimagine the possible with each new day, designing new systems and improving processes that directly impact our world. From street improvement to city skylines, they begin at the earliest stages of each project. The word project in itself can reference just about anything, which is exactly what engineers are responsible for (just about anything). If it isn't a naturally occurring structure or object, chances are a few engineers were involved. Now that I've told you nothing and everything about engineering all at once, what do you think? Pretty cool, huh? Put simply, engineers take existing data and concepts to formulate new products and improve current ones. The projects of today improve our future, thanks to the engineers behind the scenes.

It's not just about things that look futuristic, like the recent SoFi Stadium, or the VIA 57 Pyramid building in New York, it's also about sustainability and the positive future impacts resulting from the project. In today's era, the modern engineer will consider factors like how a particular building affects a parcel of land, energy efficiency, carbon emissions, and the materials used in construction. Although these factors are focused on the environment, they improve overall community health and enhance our quality of life. Think about the invention of the wheel, or the start of the Internet, primitive during their early stages yet now we have self-driving cars and the ability to stream information almost anywhere. Engineers have given us this opportunity through trial and error, critical thinking, and most importantly, applied imagination.

Engineers may not be kicking out tractor beams and warp drives ... yet, but what they are doing is finding new, innovative ways to use resources and solve problems for our society. There are many potential outcomes when it comes to innovative design, such as sustainability initiatives and environmental well-being, economic improvement or encouragement, or societal impacts like improved connectedness and public facilities.

CopenHill is a clean waste-to-energy plant in Copenhagen, Denmark, often called one of the most sustainable cities in the world. What's special about this building, however, is its mixed-use capabilities. Innovative engineers were able to successfully incorporate community lifestyle and health into a powerplant design. The building's interior houses the waste incinerator while the rest is left for public use with a ski slope, rock climbing wall, and walking trails on the roof. Did you ever think it possible that an industrial plant could attract tourists and bolster the local economy? This is a prime example of how engineers combine the knowledge they have across different segments and apply it to the development of a new facility or product.

This same ideology is being applied in the Metro, through the development of a new terminal at the Kansas City International Airport. The use of electric buses to connect parking structures and the potential addition of a solar farm are just a few of their environmental initiatives. The Royals recently announced plans to relocate Kauffman Stadium, their home since 1973, into the downtown district of Kansas City. While there is no timeline for this project, this exciting move will undoubtedly impact City infrastructure, and how the population travels across the Metro. Consider the impact of the Power & Light District, since construction it has improved our City's economy, culture, and sparked apartment developments One Light and Two Light. Initiatives like Vision Zero will aid in this process, although it is ultimately up to the engineers to design and incorporate these changes.

As we move further into this technological age we've become more focused on the well-being of one another as well as the planet. Thankfully, the engineers are looking out for us by creating the infrastructure that keeps us connected. While Kansas City continues to grow and uncover new opportunities, engineers will be at the forefront providing design, presenting unique solutions, and serving as agents of progress.

This week serves as a reminder that engineers are all around us, and what we see in our cities and towns would not be possible without their creativity and foresight. We always aim to positively impact everyday living with our "No Problem" attitude and through community development, connectivity, and safety in the world around us.

Black & Veatch strengthens career interest, development opportunities for aspiring engineers

Engineering professionals are the creative problem solvers who will continue to help the world overcome its biggest challenges. Whether reducing carbon footprints, enabling cleaner transportation or protecting and restoring precious water resources, Black & Veatch engineers are creating more reliable, resilient infrastructure that will help communities and businesses thrive well into the future.

While equipping and inspiring tomorrow's engineers with resources that help build upon what's possible, Black & Veatch champions advancing technologies. Lately, that includes such projects as the University of Kansas' new welcome center showcasing the company's expertise in solar power and battery energy storage that will help power the site and influence future engineers.

Black & Veatch's engineering leadership and contributions span several community-based initiatives, including:

Steve Edwards Renewable Energy Lab at Operation Breakthrough

The Steve Edwards Renewable Energy Lab — the namesake of Black & Veatch's recently retired Chairman and CEO — will play a key role at Kansas City, Missouri-based "Operation Breakthrough," where a teen-led hydroponic container farm will help students learn about the process of generating, storing and deploying renewable energy to grow hydroponic crops in two large gardens. Half of the farm's energy will be renewable, generated from the lab's rooftop solar panels and stored in lithium-ion batteries. Students also will experiment with wind power and research how hydroponic crops grow using traditional versus renewable sources of energy.

The Center for Advanced Professional Studies

As the journey from education to employment becomes more complex, the challenges of building tomorrow's workforce are intensifying, notably in the science, technology, engineering and math (STEM) space. To build a foundation for long-term employment solutions for the engineering and construction industry, Black & Veatch has joined the Center for Advanced Professional Studies (CAPS) Network Council of Champions as the inaugural CAPS Network Engineering Champion. Black & Veatch is committed to partnership in expanding profession-based learning to as many students as possible, regardless of their backgrounds or locations.

IgniteX Climate Accelerator Program

Through the company's IgniteX Climate Tech Accelerator, Black & Veatch has funded proposals from bold, cutting-edge thinkers and partners for promising technologies that hasten the development of decarbonization and sustainability solutions.

Black & Veatch Foundation's Scholarships

Looking to expedite the pipeline of tomorrow's problem-solvers in power transmission, the Black & Veatch Foundation is underwriting targeted scholarships to engineering students at Johnson County (Kansas) Community College and Metropolitan Community College in Kansas City, Missouri, as well as at Pittsburg (Kansas) State University and the University of Central Missouri in Warrensburg.

Black & Veatch MakerSpace

The Black & Veatch MakerSpace at the Johnson County Central Resource Library in Overland Park, Kansas, includes free access to 3-D printers, a robotics kit, a soldering and electronics workbench, and equipment for audio and video recording and editing.

STEM Mentoring with Kansas City Public Television

The Black & Veatch STEM mentoring program with Kansas City Public Television (KCPT) involves classroom visits to schools across the Kansas City metro area and uses activities — such as bridge building, water filtration device construction and testing, and electrical circuit building and testing — to teach fifth-grade students about various types of engineering and what opportunities are available to further their interest in the profession.

Explorer Post

The Explorer Post is a program sponsored by Black & Veatch as part of Learning for Life of Kansas City. The program exposes STEM-interested students, 14 to 19 years old, to engineering disciplines through presentations, hands-on activities, engineering tours and community service events supported by Black & Veatch.

From investments in time and money, Black & Veatch deploys its global resources to advance careers in the industry, with a strong focus on tomorrow's engineers and a range of solutions that keep the world running in a safe, resilient and sustainable manner.

Narrow view of school safety ignores design principles

BY LEXI SELVIG

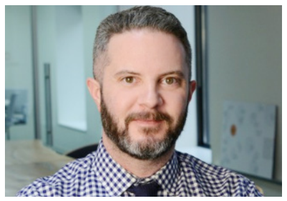
From Columbine to Sandy Hook to Uvalde, mass shootings in schools have been a recurring nightmare in the United States for the past two decades. It's up to the engineering and architecture community to help create a future that is safe for students and educators by taking a fresh look at what can be done to protect schools.

Justin R. Wolf is a communications professional in the A/E industry, based in Minneapolis. Last summer, he wrote an article for Common Edge titled "It's Not a Design Issue," pushing back on those — including the AIA — who suggest that the responsibility for deterring shootings in schools falls on building professionals.

"When shootings take place at grocery stores, synagogues, churches, concert halls, movie theaters, military bases, health care clinics, spas, restaurants, shopping malls, public parks, and other places — all of which have occurred several times over in just that last two years — not once was the issue raised of how these places were designed and what role that might have played in preventing an act of mass murder. Of course, it wasn't, because having that conversation would appear callous, at best," he wrote.

Blaming school design concedes the inevitability of the next massacre, Wolf argued. Instead, industry professionals should look to the future for guidance — by getting input from students.

"Speaking as a professional in the design and building industry, I believe the AIA and other industry governing bodies could develop Knowledge



SUBMITTED BY LS CREDENTIALING SERVICES

"I am all in for making our schools secure and safe, but not at the cost of sacrificing these institutions' value as a source for public good."

Justin R. Wolf,
Communications professional
in the A/E industry

Communities, think tanks or similar that should partner with March for Our Lives, Students Demand Action, Youth Over Guns or any number of the anti-gun violence policy/lobbying groups that also happen to be majority-led by student groups," Wolf said. "Ensuring safe schools that also happen to be designed for active learning, universal engagement, neurodiversity and empathy begins with engaging students and following their lead as community spokespeople."

Roe Gammon is a security consultant for Henderson Engineers, a Kansas City-area firm. He guides schools and districts to identify safety gaps while making security features unobtrusive.

"Though the A/E/C industry has no place in parenting children, we have every obligation to support their education and serve them through healthy environments," he said.

Gammon believes the industry must look beyond security measures such as card readers and cameras, balancing those with "human-centered buildings that help occupants to thrive," he said.

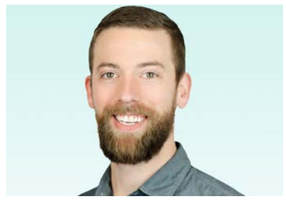
"Gun laws are an effort toward reducing the ability for such catastrophic crime, which is outside the direct scope of the A/E/C industry," Gammon said. "We do, however, have the responsibility of working with building owners to reduce the desire for crime and specifying thoughtful systems toward that goal."

Wolf and Gammon both emphasize the need for schools to remain first and foremost focused on supporting and educating students and caution their colleagues against falling into a trap of designing, as Gammon put it, essentially maximum-security prisons: "The environment itself is threatening and fights against learning and healthy social interaction."

Wolf echoed that sentiment.

"I am all in for making our schools secure and safe, but not at the cost of sacrificing these institutions' value as a source for public good," he said. "Public education is a right, and when our built expressions of that right come to resemble one big panic room, we have failed as a society."

To create the future, engineers and building designers must take a broad



SUBMITTED BY LS CREDENTIALING SERVICES

"Though the A/E/C industry has no place in parenting children, we have every obligation to support their education."

Roe Gammon,
Security consultant
Henderson Engineers

view of protecting our students — not just from a single act of violence, but from chipping away the ideal learning environment by focusing on fear over nurturance.

Lexi Selvig is founder and president of AECredentialing.com, which provides licensed A/E professionals a simple, timely, cost-effective solution to the time-consuming process of managing ever-changing credentials requirements. She publishes a monthly newsletter, The Credential, as a free service to inform industry professionals about the latest news and trends. Sign up at AECredentialing.com.

Delivering One Water solutions to address taste and odor issues for Maryville, MO

BY HDR INC.

Nutrient pollution, or cultural eutrophication, is a pervasive and challenging issue that significantly impacts rivers, lakes, and oceans across the country.

According to data from the U.S. Environmental Protection Agency, approximately 20 percent of water quality impairments nationally are attributed to the impacts of nutrient pollution. Nutrient pollution fuels algal growth. These harmful algal blooms (HAB) lead to reduced dissolved oxygen, water clarity, and aesthetic quality that cause detrimental impacts to fisheries, recreation, and human health. In some cases, HABs are also associated with the production of toxins or taste and odor (T&O) compounds that create unique public health and treatment concerns for municipal utilities.

Over the past five years, the City of Maryville, MO (City), has experienced a significant increase in the magnitude and frequency of HABs in Mozingo Lake, which serves as their surface water supply and is a popular recreational destination. These HABs have been associated with T&O events within the City's distribution system.

In 2020, the City initiated a project to study the watershed, lake, and treatment process to identify holistic, One Water solutions that will address nutrient pollution in the watershed and mitigate T&O effects through the treatment process.

SUBMITTED BY HDR INC.

This One Water approach includes near-term and long-term actions to address treatment and source water quality concerns. In the near term, the City is controlling HABs through periodic algaecide treatments in the lake while making critical water treatment plant (WTP) improvements that reduce T&O compounds and extend the plant's useful life. For treatment of T&O at the exiting treatment plant, a granular activated carbon (GAC) adsorber was placed into service on December 10, 2021. The GAC system produced immediate results and reduced influent geosmin levels from 170 nanograms per liter (ng/L) to less than 5 ng/L, well below the odor threshold of 10 ng/L.

The City is now focused on planning for a new WTP. Currently, the City and HDR Engineering, Inc. (HDR), are performing a pilot-scale study to evaluate the performance and feasibility of installing ozone addition followed by biofiltration at the future facility. The primary objective of the pilot study is to evaluate the technology's capability to reduce impacts from two common T&O compounds, MIB and geosmin, while maintaining finished water quality. The pilot plant is comprised of two equipment skids, one for each treatment process. The pilot is operated for more than eight hours per day by HDR engineer, Vito Palmietto, who manages the equipment and oversees all data collection, laboratory coordination and testing, and data analyses.

The first process skid houses an ozone generator to produce ozone from ambient air. After generation, ozone is introduced to the contact chamber through a pumice stone diffuser. The contact chamber is baffled to increase contact time and contains a series of sample ports for measuring water quality changes through the process. The filter skid consists of four, 10-foot filter columns that allow for running the filters in parallel or series combinations. The Maryville pilot operates with the filters in parallel, testing the performance of both spent GAC and virgin GAC media. Like the ozone skid, the filter skid contains several sample ports to assess water quality changes and inform operational optimization. Both skids are also equipped with peristaltic pumps and chemical storage totes to feed MIB and geosmin to simulate T&O spike events for stress testing.

As mentioned above, the pilot study is a significant component of the City's overall effort to pursue One Water solutions that generate comprehensive and lasting water quality and source water improvements in Maryville. Recently, the City was awarded a $200,000 Nonpoint Source Water Quality Grant to fund data collection and watershed planning efforts for Lake Mozingo. The City is using this grant to create and implement a monitoring plan, convene watershed meetings, and investigate potential best management practices that could be installed to reduce runoff into the lake.

Over the next year, the pilot study and watershed planning effort will generate important information that will direct long-term WTP and lake improvements. The City is excited to complete this phase of the project and work towards the ultimate solutions that will benefit Maryville residents, ratepayers, and visitors.

Mentors help pave the way for success for the future generations of engineers

BY BRETT HOLT

As engineers, we have big dreams — like creating the infrastructure that sustains communities and helps them thrive.

Mine began behind a paver at a young age working for my grandfather, a civil engineer who had a construction company. My father, who dedicated 30 years to the company and was very involved in the industry serving on several committees with the Kansas Contractors Association, instilled a strong worth ethic in me. My grandfather and my uncles were also pilots, and when I later realized that I could combine my love of aviation with a rewarding profession like civil engineering, I took the leap. I credit them with helping show me the way.

I'm now the father of a three-year-old girl, and I want to make sure she knows that she, too, can accomplish anything. I want her to have all opportunities available to her so that she can realize her dreams.

That's part of what motivates me to support STEM programs for kids, like Garver's partnership with Red Tail Academy, which prepares Kansas City youth for careers in aviation. Because sometimes, just introducing kids to a career path they may not know about can be life-altering.

Having a daughter has made me more acutely aware of the gender disparity in STEM careers. But even though women still remain underrepresented, that's starting to change — and programs like EWeek are helping facilitate that shift. The theme of Engineers Week this year is "Creating the Future." In that spirit, I'm going to start envisioning the day when a gender gap doesn't exist and working towards that goal. Here's my plan, what's yours?

At home

Remind my daughter that she can grow up to do anything she wants. Make sure she has ample opportunity to explore her interests, including those related to STEM, such as coding camps and science fairs. I also want to do what I can to make sure other girls have access to those resources.

At work

Uplift and celebrate the women engineers around me and support their ideas. Get involved in women's organizations like WiSTEM, SWE, and the Kansas City chapter of WTS who offer effective solutions to bridging the gender gap in STEM careers.

In my community

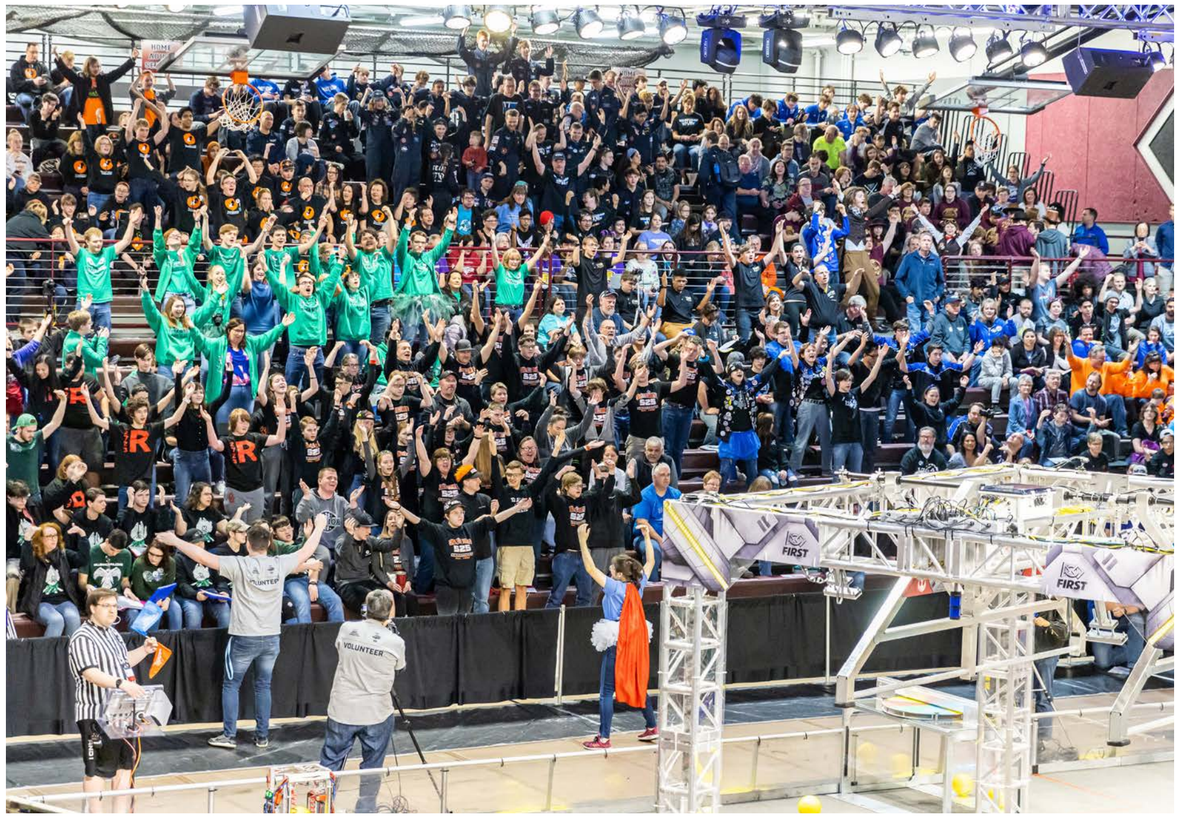
Continue to participate in programs like the Red Tail Academy and EWeek that engage students early on to inspire them and introduce them to STEM concepts. Take any chance I get to expose young learners to the awesome work we get to do as engineers. Impart to them that it's rewarding work that improves quality of life and has visible, tangible effects on the day-to-day.

It's probably still a few years down the road before I'd let my daughter operate a paver, but in the meantime, I can try to set a good example for her — and others — and instill in her the confidence needed to pursue any career path, maybe even one as an engineer.

Brett Holt is Garver's Kansas City Aviation Team Leader currently leading the airside design efforts for the new Kansas City International Terminal. He has experience performing project management, design and construction observation responsibilities throughout the FAA Central, Southwest, and Northwest Mountain regions with a core focus on Kansas and Missouri.

SUBMITTED BY GARVER

Brett Holt and his daughter build a structure with blocks.



KC STEM ALLIANCE

From curious student to empowered employee: Building career resiliency through K-12 STEM education

BY MARTHA McCABE

When you drop into a FIRST robotics event, the first thing that captures your attention is the sky-high energy level. This holds true whether you're at a FIRST LEGO League Explore event with K-2nd graders sharing their adorable LEGO builds or a FIRST Robotics Competition championship where robots designed and built by high school students race across a game field to raucous cheers in an arena-like setting.

FIRST, which stands for "For Inspiration and Recognition of Science and Technology," is a global STEM education program with a 17-year history in Kansas City. Its founder, Dean Kamen, set out to make science and engineering as exciting as sports.

But if you peek under the hood of FIRST and other best-practice STEM programs, what students gain from participating goes well beyond the fun and flashy. The benefits go even beyond developing practical skills like design thinking and math proficiency. According to new research published by The DeBruce Foundation, programs like FIRST can help young people get a jump start on their path to employment empowerment—that is building careers with higher wages, better benefits and less risk of unemployment, no matter how the workforce is trending.

The Foundation initiated this research in the fall of 2020, surveying 16,000 people to assess patterns of employment, income and work conditions in America. **The research revealed two keys to building a resilient career—career literacy and network strength.**

Having **career literacy** includes having a vision for your career, self-awareness of your skills and interests, the capacity to communicate your professional value, robust job search skills and the capability to explore multiple career pathways. Having a **strong network** means you have reliable connections with people spanning a diversity of industries, education levels and social experiences.

According to the research, those who have high career literacy and network strength earn **55 percent more in annual salary** and **26 percent more of them are currently employed**, compared to people who are low in career literacy and network strength.

FIRST programs inherently build career literacy and network strength. In FIRST LEGO League Challenge, students in grades 4-8 learn about different types of jobs as they interview experts for their research projects. They meet teams and coaches from other parts of the city during their competitions and learn how to convey what they've learned when they share their projects with a panel of judges. At the high school level, mentors and coaches work side-by-side with students throughout an intense robot build season. Students not only learn about career options from hearing about their mentors' work, but they also begin building their own networks of STEM professionals they can call upon in the future.

Other STEM education programs also build in the involvement of expert professionals to inform and enhance student experiences. The KC STEM Alliance, in partnership with KC metro school districts and businesses, intentionally includes components of both career literacy and network strength-building in the programs it supports, which together reach more than 90,000 youth.

In addition to FIRST, these programs include Project Lead The Way senior capstone workshops to help high school seniors discover or refine ideas for engineering and biomedical research; career exploration days that bring students to civil engineering workplaces and beyond; Teacher Mentor Days to keep educators and industry connected, and more.

Each of these programs need volunteers from the engineering fields, with opportunities that take as little as a couple of hours to as long as multiple afternoons and evenings for an entire school year. Whether you say "yes" to a short-term or long-term commitment, you may just jump start a young person's path to a resilient career in engineering and beyond.

To learn more about volunteering opportunities with the KC STEM Alliance, visit www.kcstem.info/volunteer.

Martha McCabe is Executive Director, KC STEM Alliance.

Complex KC Levees project will reduce flood risk for local infrastructure, historical neighborhoods and critical rail hub

BY HNTB

The final phase of the KC Levees project, now under construction, will improve the reliability and resiliency of 9 miles of levees and 7 miles of floodwalls along the Kansas River in metropolitan Kansas City. The project will reduce flood risk to the Argentine, Armourdale and Central Industrial District (CID) areas, which encompass historical neighborhoods, a nationally critical warehousing and distribution center and one of the nation's largest railroad hubs.

The areas are at risk of flooding during major Kansas and Missouri River Basin events. During the flood of July 1951, waters overtopped the levees by 5 feet, displacing nearly 40,000 people and submerging rail yards and cattle stockyards. In response, the U.S. Army Corps of Engineers – Kansas City District (USACE) and Kaw Valley Drainage District of Wyandotte County (KVDD) raised the levee system 5 feet and added numerous closure structures – openings or gaps in the levee or floodwall that allow trains to pass through in non-flood conditions but can be closed during a flood as a barrier for homes, businesses and infrastructure behind the levees.

During the Great Flood of 1993, the levees performed as designed, but floodwaters came within inches of the levee tops. Subsequent studies confirmed a need for USACE to raise the levees further to meet current design and safety criteria. The KC Levees project will raise levees and floodwalls by an average of 5 feet, construct 12 replacement stoplogs across tracks operated by Burlington Northern Santa Fe, Union Pacific and Kansas City Terminal Railway, and accomplish other improvements.

The $529 million project is a collaborative effort between the USACE; the KVDD; the Unified Government of Wyandotte County and Kansas City, Kansas; and the City of Kansas City, Missouri. The project will reduce flood risk by approximately 200% for the warehousing and distribution center, the railroad hub and the tens of thousands who live and work within the leveed area, as well as $10 billion of existing investments and infrastructure.

The Missouri and Associated Rivers Coalition (MOARC), of which Kansas City governments and other KC Levees stakeholders are members, worked to get the project included in the federal Bipartisan Budget Act of 2018. Advocacy work resulted in the project being one of only 60 flood and storm damage reduction projects nationwide selected for funding. The Act provided full federal funding upfront, saving Kansas City's local communities $150 million and allowing work to begin immediately.

Alongside USACE, HNTB planned and designed much of the levee and floodwall network, which is being raised by as little as 4 inches to as much as 7 feet, depending on location-specific criteria. Given the size and complexity of the design process, HNTB mobilized structural, civil, mechanical, electrical and geotechnical engineers to address the project's challenges.

SUBMITTED BY HNTB

USACE's design team was embedded with HNTB's, establishing a side-by-side working relationship that empowered the teams to mitigate risk, enhance quality and move the project forward at an aggressive pace.

"USACE is scheduled to deliver the project in 2026 – just seven years after the start of design," said Tom Poer, HNTB Project Manager. "The continuous flow of information among the teams supported risk-informed decision making, with all activities assuring that life-safety considerations for the community were paramount."

Designing and coordinating the 12 critical levee closure structures represented one of the most complex parts of the project. Three of the closure structures will be among the top four largest in the nation for USACE and, because the locations were so different and yet equally complex, each closure structure required analysis of multiple locations and foundation treatments.

During closure structure design, HNTB's role included coordination of the closures with the railroads. Through dozens of crucial conversations with railroad representatives, development of alternatives and site visits utilizing clear and transparent communications, the USACE-HNTB team developed an understanding of the railroad's priorities, potential impacts and limitations and worked to mitigate those concerns through innovative design strategies, construction phasing and operational changes.

At the national USACE level, the Kansas City District Corps is being recognized for the KC Levees' successful execution in early stakeholder engagement, railroad coordination and project delivery.

Engineer tomorrow, starting today

BY ASCE KC

Civil Engineers are the master builders of our future world. Though they hide behind books, computer screens, plot plans, and hard hats, the civil engineering community is the profession meant to use their technical excellence, leadership, and innovation to Create the Future. The American Society of Civil Engineers (ASCE) is preparing future civil engineers to Engineer Tomorrow. The Kansas City Section of ASCE is excited to share with you how it is promoting the civil engineering profession, especially recruitment of bright students.

Here is how we break down the major needs for the future of Civil Engineering.

1. Civil engineers need knowledge to meet the challenge of a changing world!

2. We must prepare the profession for what's next.

3. We must build the civil engineer of the future.

Civil engineers need knowledge to meet the challenge of a changing world. Change is expected, but in today's world technology, intelligence, and materials are developing at an exponential rate. We have never dealt with so much data and been expected to use it so powerfully. The way engineers work is no longer simply drafting and calculations, but includes data analysis, BIM management, and performance-based design. Civil engineers need technical, leadership, and complex problem-solving skills to sustainably advance and protect the health, safety, and welfare of all.

One tool ASCE provides for free is the Civil Engineering Body of Knowledge (CEBOK3). In its third edition, the CEBOK3 serves as a standard on how to become a civil engineer in responsible charge, meaning that you have direct supervision, control, and responsibility for the engineering work. Not many professions come with an instruction manual on how to succeed, so enjoy the opportunity. From students, young professionals, seasoned executives, to mentors/mentees, and academics, the CEBOK3 provides guidance on how to measure competencies in civil engineering. This is how we help the civil engineer of tomorrow learn the depth and breadth of what is needed to create the future world.

We must prepare the profession for what is next. But what is next? ASCE has developed various initiatives like Future World Vision, Engineer Tomorrow, and their latest strategic plan – all geared toward studying what the profession is going to look like in the future. A few key components of how ASCE is addressing the future needs are:

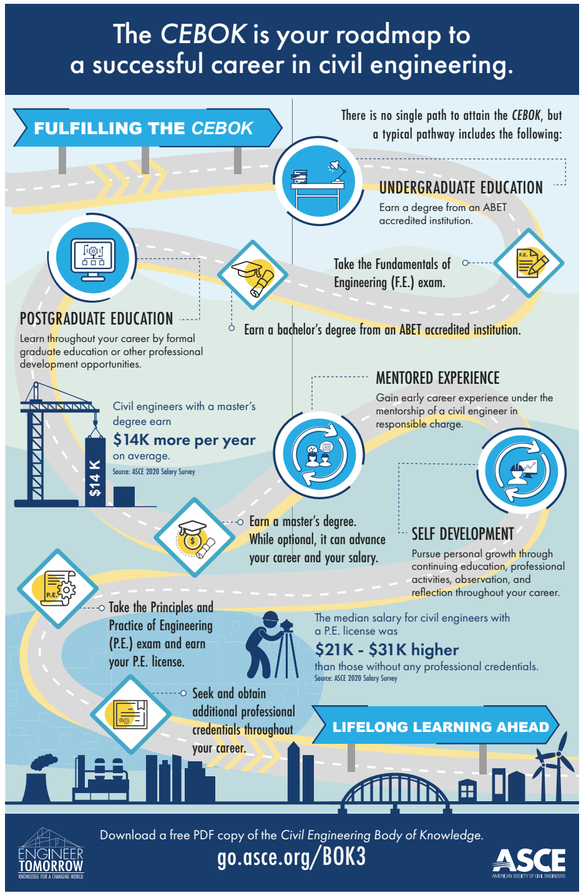
• High standards are necessary to build the infrastructure that will protect and sustain our communities today and for generations to come.

• Post-graduate education and advanced technical, leadership, and problem-solving skills are the hallmarks of esteemed professions.

• We must advocate for the right solutions and assume leadership positions on multi-disciplinary teams.

Civil engineers pursuing decision-making and decision-informing positions on multi-discipline teams is crucial to the success of the profession. They must be in the room, thoughtfully leading discussions that identify the right solutions and the right projects.

We must build the civil engineer of the future. ASCE is advancing the current academic, professional, and technical standards to set the benchmark for future generations of civil engineers. Through mentorship, new and experienced engineers alike set and achieve expectations for excellence in professional practice. This mentorship component is absolutely essential to grow the civil engineering profession for future needs. ASCE provides numerous other resources to members and the engineering community including mentorship, continuing education, and leadership training.



AMERICAN SOCIETY OF CIVIL ENGINEERS

In summary, civil engineers are the master builders of tomorrow and you could be, too. Join the profession at this exciting time in history, when technology is advancing at a rapid rate and the needs of society are evolving just as quickly. Which of you readers will design the next Golden Gate Bridge, Burj Khalifa, or Panama Canal? Most likely the next notable civil engineering project will not be a simple bridge or structure, but something we haven't even imagined yet. Good luck!

The future of exploring the past

BY GEOTECHNOLOGY, A UES COMPANY

Founded in 1857, Quindaro was a city in Kansas known to be a significant stop on the Underground Railroad. Located just across the Missouri River from the slave state of Missouri, Quindaro served as a port of entry to the free state of Kansas. Following the Civil War, the city's population dwindled, and most of its structures fell into ruins, reclaimed by forest overgrowth.

Many are familiar with how advancements in geophysical technology aid in planning and developing construction and mining projects, but these emerging tools and technology also have many applications in fields like archeology. Team members from Geotechnology, a UES company, along with an exciting set of tools, recently assisted with the search for two lost structures of Quindaro: 62 P Street, a home belonging to abolitionist and free state activist Clarina Nichols, as well as a nearby cistern known to be used as an overnight hiding spot for escaped slaves.

Senior Project Manager Andrea Prince, PG, and Senior Geophysicist Eugene Torgashov, PhD, out of Geotechnology's Kansas City and St. Louis offices, along with their teams, used a variety of geophysical and subsurface testing tools to successfully locate the structures. Their efforts were captured as part of episode two on season one of the Discovery+ series "Underground Railroad – The Secret History."

They began by looking at data from aerial, drone-based LIDAR, standing for "light detection and ranging," to look for anomalies in the natural environment. The team then reviewed information gathered using portable, ground-based LIDAR devices which get closer and create more detailed, three-dimensional images of the surface, further homing in on areas to explore.

LIDAR began to be widely used for archeology in the early 2010s, and it has led to breakthroughs in mapping ancient and historic remnants from Mayan cities in Belize to Colonial American structures in southern New England and others around the globe.

After identifying areas of interest, the team explored the subsurface with ground-penetrating radar (GPR). This involved needing to clear a few hundred square feet of wooded area to allow enough access for the GPR device. With the help of GPR, they identified still more specific areas to explore through augers and bore hole cameras, looking for disturbances in the soil indicating former foundations or otherwise man-made structures. These tools garnered evidence of a possible wooden floor, chunks of early forms of concrete, and a nearby cistern that partially protruded from the earth: very likely the location of the two structures they were seeking.

This project serves as just one example of how Geotechnology's team members contribute to the advancement of their industry and its far-reaching applications. As a firm, Geotechnology has been part of thousands of major construction projects, with nearly 300 team members and 10 locations in Missouri, Illinois, Kansas, Ohio, Kentucky, Tennessee, Mississippi, and Arkansas. Geotechnology provides a range of consulting services in applied earth and environmental sciences; exploration; geotechnical engineering; underground consulting services; soils, rock, and construction materials testing; non-destructive testing; special inspections; geophysics and deep foundation testing. In July 2021, Geotechnology was acquired by UES, headquartered in Orlando, FL. With nearly 3,400 professionals across more than 70 branches, UES is a national leading engineering and consulting company, and was named the Hot Firm of the Year by the Zweig Group for 2021 and 2022. Learn more at teamues.com.

Burns & McDonnell partners with Evergy to complete its third solar project in Missouri

BY CHRISTOPHER GABEL

SUBMITTED BY BURNS & McDONNELL

Consumers increasingly have become more interested in renewable energy, the benefits that come from it, and particularly, where it is coming from. This demand has paved the way for solar projects like the Evergy Solar Subscription Program, making renewable energy available to those who don't necessarily want rooftop solar.

In addition to the more than 1,300 MW of solar EPC the team has constructed throughout the country, Burns & McDonnell has successfully executed each of first three customer-focused solar projects in the state of Missouri — one with Liberty Utilities in Joplin, another with Ameren in St. Louis, and, most recently, Evergy's Hawthorn Solar Subscription Project in Kansas City.

Hawthorn Solar Subscription Project

With the recent commissioning of the Hawthorn solar project, Burns & McDonnell and Evergy, longtime partners, have worked to provide renewable energy for families in Kansas City to subscribe to.

The new solar array is part of Evergy's plan to be carbon neutral by 2045. Those plans include adding 500 MW of renewable energy in the next two years and nearly 4,000 MW in the next 10 years. Evergy's continued investment in renewable energy, including wind and solar energy, battery storage and expanded energy efficiency programs, is a step closer to achieving net zero carbon targets.

As the integrated engineer-procure-construct (EPC) contractor, the Burns & McDonnell team led the development, engineering, procurement, construction and commissioning of the 10 MW photovoltaic power plant adjacent to Evergy's Hawthorn Power Plant.

The Hawthorn solar project uses bifacial modules that increases UV resistance, durability and the total energy generation. This plant fulfills Evergy's community solar obligations as well as state of Missouri's solar spending requirements; 5 MW will be for participants in Evergy's Solar Subscription program, and the other 5 MW will serve all Evergy customers.

Utilizing AZCO, a Burns & McDonnell subsidiary, the team self-performed the construction on the project. This pairing delivered efficient site management and streamline procurement during a changing market with pending regulatory and inflation driven cost challenges — which had paused nearly all projects in development during this period.

The development, engineering and construction professionals at Burns & McDonnell collaborated at the earliest stages of the project. This collaboration continued through the project equipping the whole team to solve challenges, continuously improve, and ultimately deliver a successful project.

Creating Opportunities and Showing Exemplary Commitment

The diversity of opportunity for younger engineers at Buns & McDonnell and in the renewables industry at large – whether in development, design, or construction management – was exemplified by this project. We were able to use the site's proximity to our headquarters to offer many of our youngest engineers an opportunity early in their careers to go see the construction methods and sequences, wire management, and commissioning practices that our industry-leading team use to make our clients successful.

Despite supply chain delays and bad weather, the team was committed to finishing the project on time. Burns & McDonnell employee-owners showed immense accountability and dedication as they worked through holidays to achieve the goal to bring the project online before the end of 2022.

"This accomplishment is one we're especially proud of," says Scott Strawn, vice president of strategy in Burns & McDonnell's energy division. "Our mission is to partner with clients to develop and build some of the most complex projects on earth. When we're able to do that in our backyard and provide renewable energy to our friends and families, it's especially gratifying. We're thankful for our partnership with Evergy on this project."

Christopher Gabel is a power generation specialist at Burns & McDonnell. He has worked within the power generation industry, was a project manager on behalf of a utility client managing capital projects in its gas generation fleet, and most recently, expanded his scope to include all things related to power generation.

Support math skills through volunteerism

BY JIM GUTHRIE

Is Math the Stumbling Block to Achieving Required Numbers of Engineer Graduates; and can a stronger link be made between the level of support and enlightenment provided by PE's who volunteer to support local educational; academic; and STEM institutions; and the success of their students?

Western Chapter of the Missouri Society of Professional Engineers has for over five decades supported STEM activities with volunteer mentors, judges, and fundraising activities. Several active STEM activities include: Bridge Building and Busting Competitions; MathCounts; Future Cities; Project Lead The Way; Robotics; Greater KC Science and Engineering Fair Judging; and college scholarships.

MathCounts is an NSPE national competition; with our local competition hosted by Eastern and Western Chapters, which lead to an overall Missouri and Kansas state competitions, and then to the national competition. We can likely increase participation by volunteering in K-12 classrooms.

In a discussion with several secondary and college faculty and administrators, it was observed that engineering students who attain a grade of B or higher in high school Calculus; have an 90% rate of graduation in four years. But excitement in math must start much earlier than in high school math classes.

How do we as a profession and as PEs in our communities support the educators who have the task of providing students with an introduction to STEM topics; including the use of math skills? Helping tutor and making math more fun; PEs may help students see practical applications for the math skills they are developing.

Data shared with the KC STEM Alliance shows the pandemic has made it even more difficult to ensure students are equipped with the math skills they need to succeed.

To highlight just a few local examples of STEM programs where you can help:

• The Blue Valley School's "CAPS"

• Shawnee Mission School's "NASA's HUNCH"

• Grandview School District is beginning a STEM program

• Lee's Summit has a robust Engineering program: "Civil Engineering and Architecture/PLTW/Ind. Tech."

• KC STEM Alliance; needs mentors for PLTW capstone students and First Robotics

• Annual programs provided by Eastern Kansas KSPE and Western Missouri MSPE Chapters.

There are hundreds of educators and advocates in the KC Metro Area; and it could only help their efforts to volunteer to speak to a class, teach how math is used in all areas of technology and life, or mentor and judge STEM projects.

The future of engineering depends on us showing the younger students how much fun engineering is and that this career path is very important to the future success of our country.

Join the hundreds of PEs already volunteering to assure our country has qualified STEM professionals for the future. School districts across the KC metro area are seeking professionals to guide and mentor students.

Author: Jim Guthrie, PE, DE, retired Civil Engineer, and STEM volunteer; with contributions from: Sheryl Gallagher, PE, Geotechnology; Mike Nelson, Blue Valley CAPS; Gina Eberle, Lee's Summit; and Callen Zind, the KC STEM Alliance.

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