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Engineers Week
Feb 18-24, 2024



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Welcome to the Future, Kansas City!

By Randy Gorton, P.E., PTOE | BHC

In 2024, the Kansas City region is a dynamic hub, setting the stage for what will soon be commonplace in the future. As we traverse this evolving landscape, various facets of our community – from technological advancements and transportation innovations to shifting weather expectations and resilient living – engineering and STEM professionals are leading the way as key players in that process.

From the heart of Kansas City to the growing communities that will become their own urban areas in the future, engineers are finding solutions, big and small, to add new transportation options and improve the safety and lifespan of existing facilities. The expansion of the very successful and transformative streetcar will now serve riders from Downtown all the way to UMKC. The Buck O'Neil Bridge replacement is making travel to and from the Northland more dependable, safer, and ready for the future. Communities spanning from Independence to Edwardsville, Leavenworth to Grandview, are undergoing transformations in their local streets. The aim is to create dedicated spaces for multimodal

transportation, enhancing the functionality of our public right-of-way to better serve various types of users. Engineers are charged with a duty to serve the health and welfare of the public, so these types of transportation improvements will help create a safer and more accessible future for the region.

One notable development generating enthusiasm is the new battery production facility being built by Panasonic in De Soto. Electric vehicles (EV) will continue to become more common, and Panasonic is adding capacity in the region to meet future national demand for the batteries powering those EVs. Behind the scenes, engineers have designed new EV batteries to use hundreds or thousands of very small battery cells combined to power the vehicle. Engineers are involved every step of the way by designing the battery cells, designing and building the equipment that build the cells, assisting architects and builders with laying out new facilities, and designing and overseeing construction of new roads and infrastructure to support these new businesses and associated growth in our region.

The expanded availability of fiber and true high-speed wireless/satellite Internet access mean that we can be productive almost anywhere. The anticipation of BEAD (Broadband Equity Access and Deployment) funding on the horizon is set to revolutionize local telecommunications infrastructure. As fiber networks gain prominence, the BEAD funding will likely support the expansion of fiber optics, providing a sturdy backbone for reliable and fast internet services and enhanced connectivity. Engineers will play a crucial role in designing and implementing these advanced telecom solutions, contributing to the region's technological evolution and support for our evolving digital landscape.

In recent years there has been intense discussion about climate change, extreme weather, and making our communities more resilient to a broad range of future events. Engineers are on the frontlines of the battle to identify how much more rain, temperature extremes, intense winds, and drought conditions we should design and retrofit the region to endure and continue to thrive in the coming years. Several local governments and the Kansas City chapter of the American

Public Works Association have begun to craft an updated set of design criteria and tools for engineers to use in evaluating and designing the drainage facilities and development policies to better manage our changing climate and reduce the likelihood of flooding of transportation systems, homes, and businesses.

Likewise, utility providers, communities, and private developers are investing in relocating power lines underground to make them less susceptible to storms and cluttering the view. Other public infrastructure is being upgraded and redesigned by engineers to better meet future needs and support new sustainable energy sources and technology.

While finding solutions to meet the needs of the region today and in the future, engineers of all types are experimenting with scope of work, defining workspaces, and achieving work-life equilibrium. Virtual and augmented reality, along with other technologies continue to give teams new ways to understand projects and identify solutions outside of the traditional office. What an exciting time to be an engineer in Kansas City. ●

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Forging Pathways: Wilson & Company and BNSF Elevate Rail Safety and Community Connectivity

By Wilson & Company, Inc., Engineers & Architects

In an era where transportation infrastructure is receiving unprecedented attention and funding, the collaboration between industry leaders and communities becomes paramount. One such noteworthy partnership is expanding between Wilson & Company and the Burlington Northern Santa Fe (BNSF) railroad. This article explores the strategic partnership between Wilson & Company and BNSF, emphasizing their proactive approach to leveraging funding for projects that prioritize safety and community connectivity across a 14-state region.

The Infrastructure Investment and Jobs Act (IIJA), a landmark legislation, has injected a surge of funding into transportation projects, opening avenues for innovation and improvement. Through this legislative framework, opportunities abound for organizations like BNSF and Wilson & Company to assist communities in addressing critical issues and collaborate with stakeholders to enhance the overall transportation ecosystem.

At the forefront of this collaborative effort is BNSF, a leading player in the railway industry. BNSF has taken

a proactive stance in working with communities across their extensive network to enhance safety and connectivity. BNSF has chosen to actively engage in a meaningful dialogue with the communities they serve and interact with to understand their unique needs and concerns and look for opportunities to collaborate. This proactive approach sets the stage for a more inclusive and community-centric infrastructure development process.

Wilson & Company, as a key collaborator with BNSF, is playing a pivotal role in identifying opportunities for local agency projects that can enhance safety and improve community quality of life. The team at Wilson & Company is actively involved in the meticulous task of scrutinizing potential projects and forming strategic partnerships with the communities. By finding win-win opportunities, the collaboration aims to secure funding and to contribute meaningfully to the safety and connectivity of the communities involved.

One of the standout features of this partnership is its commitment to turning ideas into actionable

projects. Wilson & Company's team, in collaboration with BNSF, is dedicated to advancing innovative proposals and ensuring they materialize into constructive projects. This transformative approach goes beyond securing funding; it embodies a commitment to tangible outcomes that positively impact rail crossing safety and community connectivity. For many, example projects include upgrading at-grade crossings to grade separated, developing pedestrian bridges or tunnels across the railroad, or even developing a plan so the community and BNSF can be aligned on a direction forward as they work towards implementation.

The collaborative efforts extend beyond the technical aspects of rail projects. Wilson & Company is actively engaged in supporting BNSF with planning and grant writing services. This comprehensive approach ensures projects not only meet safety standards but are also aligned with the unique characteristics and aspirations of the communities they serve. The emphasis on community-centric development underscores the long-term sustainability and acceptance of the proposed projects.

As the strategic partnership between Wilson & Company and BNSF continues to evolve, the outlook for rail crossing safety and community connectivity appears promising. By leveraging the opportunities presented by the IIJA, these industry leaders are demonstrating a commitment to responsible and inclusive infrastructure development. The collaboration serves as a model for how communities that partner with private entities can play a transformative role in shaping the future of transportation, making it safer and more interconnected for communities across the nation.

In the realm of transportation infrastructure, the collaboration between Wilson & Company and BNSF stands as a testament to the positive outcomes that can emerge when industry leaders actively engage with communities. As the projects identified and advanced by this collaboration come to fruition, the impact on rail crossing safety and community connectivity is poised to be impactful, substantial and lasting. ●

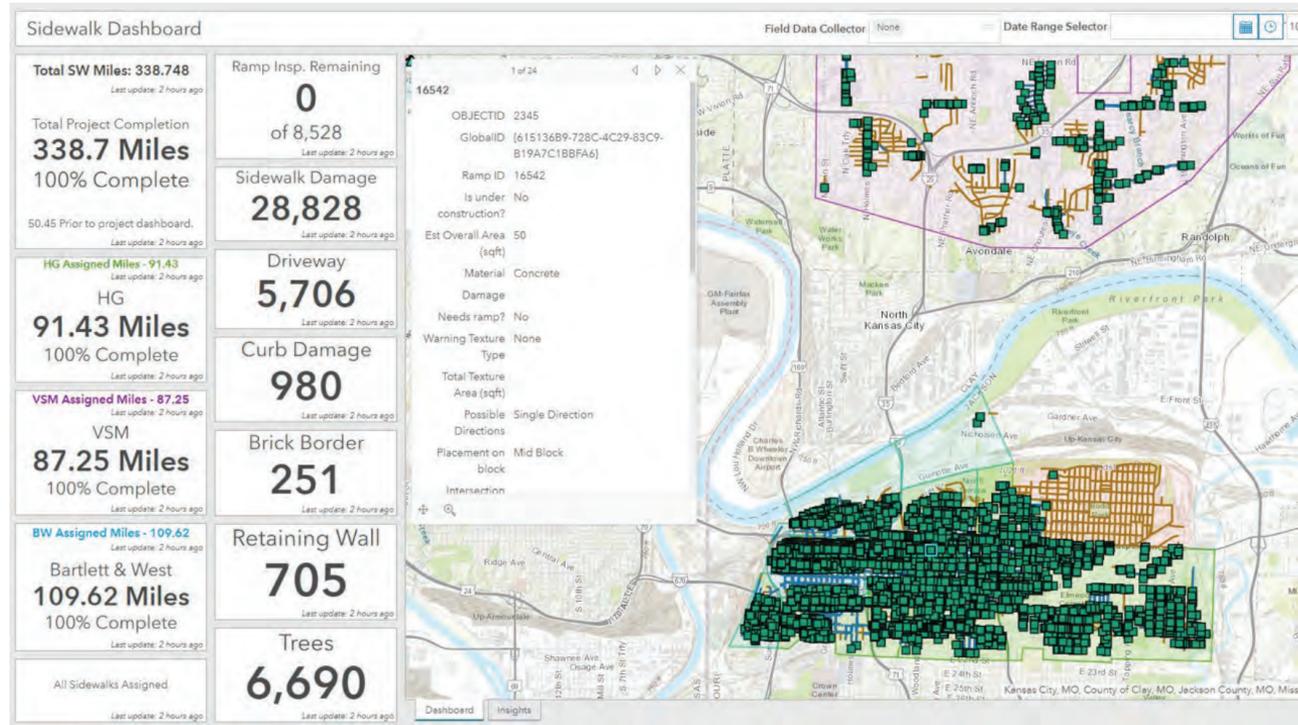
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HIGHER RELATIONSHIPS

Using Smart Technologies to Assess KCMO's Sidewalks



By Bartlett & West

In April 2017, the residents of City of Kansas City, Missouri voted and passed a General Obligation bond funds to be used for a Systemwide Sidewalk Repair Program. The City made a commitment to the residents of Kansas City, Missouri (KCMO), to inspect every sidewalk at least twice during the next 20 years. As part of that commitment, KCMO selected Bartlett & West to provide inspection and GIS Mapping Services for the program.

This project included sidewalks that were adjacent to 271 miles of roadway centerline. The KCMO project team included Bartlett & West as prime, and HG Consultants and VSM Engineering as subconsultant partners. Collectively the team inspected the sidewalks utilizing mobile technologies coupled with smart devices. These technologies provided the means to consume, view, monitor and manage the data from the field to the office and back to the field in real-time.

Bartlett & West developed processes and procedures to inspect and collect the damaged sidewalk segments in accordance with the City's out-of-repair criteria. The project area had pockets of sidewalks north of the Missouri River, and all sidewalks south of the Union Pacific Railroad line to 22nd Street in KCMO, including the

River Market and the Power & Light District.

Of the sidewalk inspected, nearly 52,000 data points were collected that met KCMO's out-of-repair criteria. Bartlett & West provided project oversight, coordinated the inspection teams, and data management. Bartlett & West supplied the mobile interface, processed the data and developed the mapping and data deliverables that was imported into KCMO's Cartograph System.

Two unique aspects of this project included the significant amount of information to be collected via mobile technologies to seamlessly coordinate field and office efforts; and, no special software had to be developed to complete the project. GIS/Technology professionals had the knowledge and understanding of the project to deliver a sustainable solution using a stack of off-the-shelf technologies and equipment.

The information gathered for this project will help guide KCMO to make responsible decisions of how to allocate funds for the much-needed sidewalk repairs for the residents of KCMO. ●



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Bartlett & West

MOVING FORWARD, TOGETHER: Terracon is Shaping the Future of Transportation Infrastructure

By Terracon

Anticipating and developing solutions for our nation's future transportation needs has never been more critical. Whether it's replacing aging infrastructure, building new routes and modes to meet changing demands, or addressing new ways of working, the A/E/C industry has arrived at an exciting juncture. Engineering is the critical link that brings it all together.

"There is a new focus on transportation that we haven't seen for several decades," said Janet Keiser, P.E., PTOE, vice president and national director for transportation and infrastructure. "Terracon has the mindset to roll up our sleeves and explore the solutions that will solve the challenges our transportation industry clients are experiencing."

As we look forward to Engineers Week 2024, the employee-owners at Terracon are excited to help our clients meet current and emerging challenges to advance the transportation infrastructure of the future.

From major highway projects to bridge inspections, our engineers, scientists and other technical professionals partner with transportation clients in multiple ways to advance critical infrastructure projects. Our nationwide network of environmental professionals provides local and state-level expertise on environmental compliance challenges. With more than 140 accredited materials testing labs nationwide, we are positioned to provide our clients with critical data quickly. We're one of the nation's leading geotechnical consultants, providing essential geotechnical data on thousands of projects over the last 55 years.

When working with alternate delivery projects, identifying and mitigating probable impacts of potential risks is crucial. Terracon has established an alternate delivery group dedicated to this growing market sector, which includes design-build, progressive design-build, public-private partnership (P3), construction manager/general

"There is a new focus on transportation that we haven't seen for several decades."

Janet Keiser, P.E., PTOE, Terracon

contractor, and other alternate delivery methods. Our dedicated professionals know how to meet alternate delivery projects' unique timing and scheduling challenges.

Whether the transportation project is small and local or has a big impact such as an airport terminal, interstate bridge, or railway, there are myriad factors to consider. Engineering professionals provide solutions and services throughout the life of transportation projects, from selecting a site through design, construction, and beyond. Maximizing resources, such as public and private funding, construction materials, and equipment, is one of many priorities we're keeping in mind.

As important as it is to solve problems and avoid challenges, it's also important to look beyond the practical issues of transportation today to anticipate - and invent - the future of the sector.

While some trends are clear, we don't know the specifics of how things will evolve. But we can say for sure that engineering is the critical component to building the transportation networks of the future, starting today. We encourage those working in engineering and related professions to find solutions to today's challenges while still allowing space for all the things we haven't anticipated yet. ●

Explore with us



Investing in communities, building the future

Hometown pride is a universal concept. When you join our growing team, you'll have the opportunity to contribute to meaningful projects that make a difference, here in Kansas City or across the country. The strength of our company lies in the cities and neighborhoods we serve. Join us and grow your career while you help grow your community.

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Inspiring a passion for STEM

At Garver, we believe that laying strong foundations builds better communities. That's why — through our corporate giving program, GarverGives — we're introducing young learners to the world of STEM to help cultivate the next generation of engineers.

How internships help build the next generation of engineers

By Zac Buckmiller, PE



Zac Buckmiller, PE
Kansas City MEPF Practice Leader,
Garver

looked more like a typical 9-5 desk job. I knew I wanted to do something different. I decided to set up the office like a classroom. I improvised and used one of the glass dividing walls as a marker board; I did a lot of drawing; and I gave lessons once or twice a week.

These interns had very little experience in our industry, so exposing them to as much as I could during our limited time together was a top priority. I assigned research tasks and project work, but I also knew it was really important to get out and physically see some things — to bridge the gap between theory and practice.

On one outing, we visited a company that sells diffusers and other equipment for a lunch-and-learn and warehouse tour. We returned at the end of summer, which allowed the interns to see the products with a new understanding of what they were and how they worked.

We also visited a massive central plant that provides heating and cooling for about a dozen buildings in Kansas City, both historic structures and high-rises. It's a fascinating process that involves taking water from the Missouri River and creating steam that then creates the power to run the chiller. In addition, we got to visit a hospital and tour their mechanical systems. These outings piqued their interest and ignited their curiosity, which was

“So, make sure you choose wisely— a place that prioritizes its people and is building something positive.”

Zac Buckmiller, PE, Garver

very intentional on my part. I wanted to give them an introduction to our industry that would get them excited about engineering, and about Garver.

Beyond acquiring technical knowledge and new skills, I also wanted my interns to walk away understanding the importance of being well-rounded, honing your craft, expanding your knowledge outside of your discipline, and building your brand. And I wanted to impress upon them the value of getting involved in the community, whether that's through professional and civic organizations or non-profits. I also wanted to instill in them something I wish someone had shared with me when I was embarking on a career path: You're a product of who you work for.

So, make sure you choose wisely— a place that prioritizes its people and is

building something positive.

I've enjoyed keeping in touch with my interns. Two were from K-State, my alma mater, one was from University of Arkansas, and the other from Rockhurst University. One — who'd worked on a complicated ventilation calculation during her internship— shared that when she returned to school, her first assignment was this very calculation. Another said that her semester was a breeze because of all she's learned during the summer. That was pretty rewarding to hear. The other two internships resulted in an extended internship and a new hire who starts this month. I'd call the experience a success.

And as for next summer? We've already got a few interns waiting in the wings — and I can't wait to meet them.●

One of the most important things we can do as engineers is inspire and mentor the next generation. This past summer, I had the opportunity to welcome four interns to Garver's Kansas City office. This was prior to hiring a new team member, so it was just me — and the interns. (Did I mention there were four of them?) And, though admittedly, it was a little overwhelming at times, it was also very exciting.

I spent a lot of time preparing for their arrival. I myself had been an intern years ago, and though I gained something from the experience, that was a different time. My internships



Engineers Week Q & A

Featuring Jordyn Brown



Jordyn Brown
Black & Veatch

your current or future interests.

3. *Did you have any internships or earlier work experience related to your initial or current position at Black & Veatch?*

During high school, I was a Black & Veatch telecommunications intern at our headquarters. My main role consisted of drafting — a cornerstone of my ability to communicate now with CAD technicians. I had two internships in college — first as an inspections intern for a tower engineering company, then as a Black & Veatch civil engineering intern in power. Those experiences — from inspecting towers to broadening my perspectives about design — gave me hands-on, technical experience that translated into my current role. Long story short, I got a preview of Black & Veatch's design process and became familiar with the company's standards.

4. *What drew you to Black & Veatch?*

I was introduced to Black & Veatch through a program the company offered through my high school, helping me absorb the company culture and appreciate early on Black & Veatch's commitment to career development. After my high school internship, I wanted to return to Black & Veatch and sought out the company at a college job fair, making further connections. I was thrilled to join the company full-time in June 2022.

5. *What is your current position, and*

what are your major responsibilities?

I'm a Civil Engineer II in our governments and environment sector, mostly in relation to water and wastewater treatment. I prepare design deliverables — plans, calculations, specifications and reports — and focus on internal project coordination, supporting the project team where needed. I also assist with preparing and monitoring project schedules and budgets.

6. *Does your current position reflect a promotion from the original position into which you were hired by Black & Veatch? If yes, what was the original position and its major responsibilities?*

My current position reflects a promotion from Civil Engineer I to Civil Engineer II. My initial role was entry level and focused on absorbing all the knowledge imparted on me by colleagues. I applied a basic understanding of engineering principles to complete my assignments.

7. *Can you move from a technical track onto a managerial track during your career with Black & Veatch?*

Black & Veatch is dedicated to fostering people and career development. Because transparency regarding your aspirations and networking play pivotal roles in career progression, the company clearly delineates the necessary requirements for advancement. If you are pursuing an advanced degree or licensure, Black &

Veatch offers an employee assistance program and a comprehensive plan. Mentorship is crucial to career development, and Black & Veatch cultivates a culture that encourages professionals to invest in each other.

8. *Have you joined any employee resource groups so you can network and share ideas and experiences with others in the company?*

Black & Veatch has multiple employee resource groups (ERGs), and I'm a member of the Young Professionals and EBONY ERGs that I joined for a sense of community and for support. ERGs also allow me to network across business lines within Black & Veatch and hear different perspectives. These groups also give me the opportunity to support and promote inclusion within Black & Veatch.

9. *What is a typical workday like for you in your current position?*

I start my day by prioritizing assignments and dividing my time accordingly. Typically, I modify technical specifications and create markups during various design phases. I coordinate with different disciplines to ensure a cohesive deliverable, and I support project management tasks such as schedule monitoring and budget development. My schedule's flexibility enables me to support engineering and project managers with time-sensitive tasks.●

You can influence Kansas City's next generation of innovators

Local educators need engineering pros for lessons that go well beyond the classroom

By Kansas City Stem Alliance

As the Kansas City community builds on its foundation of best-practice STEM programs by emphasizing relevant, real-world experiences for all high school students, the need for connections with engineering professionals is greater than ever.

Along with growing enrollment in Project Lead The Way engineering courses, districts are integrating additional Real World Learning experiences that bring students and professionals together. As you think about how you and your company can be part of this movement, here are three things to consider:

1. **You don't have to give a lot of time to make a big difference**

Giving even a small amount of your time matters, especially to students in

early high school. At this stage, learning about the breadth of engineering disciplines and how this field shapes our world can ignite their interest.

You'll find opportunities to go into a classroom or to beam in virtually. Both matter. In the North Kansas City School District, teachers in the Design, Innovation and Technology pathway aim to give ninth graders at least two industry contacts per semester, introducing them to potential careers.

Winnetonka High School teacher Heath Lay invites his students to help choose which fields to explore and uses tools like The Connector, managed locally by PREP KC, to connect with professionals who can answer their questions.

"The video connections are nice because it makes it easier to follow students' interests," Lay says. "And

they're much more engaged that way."

Getting to know the STEM teachers at schools near your home or workplace can make it easier to manage in-person classroom visits, which are prized by teachers to fill a multitude of needs. These range from mock interviews and resume building to project feedback.

Another way to give back without a major time commitment comes through programs organized by the KC STEM Alliance. Giving a few hours to a fall workshop for PLTW seniors allows those students to talk through their ideas and get a reality check before they dive into their capstone projects.

During Teacher Mentor Days, you can "speed network" with engineering teachers so they can take up-to-date and relevant information back to their students. And in spring, industry

professionals judge online engineering design competitions, a short-term project that's fully online. The PLTW Senior Showcase on April 23 brings another quick volunteer option—serving as an informal reviewer so students can practice presenting their work to a professional. (Plus you get to see how those senior capstone projects turned out!)

2. **Show and tell with the tools of your trade**

Wherever you do connect with students, get creative about how you can share your knowledge. Teachers say some of the most effective guests bring tools of the trade to show and tell.

For example, North Kansas City High School teacher Louis Breinin said students in his engineering classes

Continued on next page

loved learning about tracking heat loss and gain by testing out thermo guns in real life applications.

Aaron Dalton, who teaches PLTW at Staley High School, said his students appreciated seeing tools surveyors use in person.

"They got to see and touch the equipment, see the GPS units, drones and land layouts," Dalton said. "It's so effective when it's aligned with their classwork."

That classwork now includes a client-connected project with Habitat for

Humanity, which North Kansas City District students take on during their junior year. Spending time with professionals helps them visualize and get ready for the job, their teachers said.

3. Inviting students into the workplace and job sites is priceless

"Nothing tops site visits," Breinin said. "Students see these as the best kind of field trip, and I've had them come back saying that they want to go work for the companies we visit."

On-site visits work best with interactive

elements. Tour an active construction site. Talk about the engineering and design disciplines involved. Share some of the challenges. Discuss safety considerations (and don't forget to provide appropriate PPE!). In the office, highlight the departments and disciplines. Share the software you use. Host a Q&A session that includes young professionals.

To make a site visit even more effective, add a hands-on activity. For example, when CFS Engineers hosted Grandview High School students for a Civil Engineering Day, they included a 7-minute design challenge. After

hearing about infrastructure planning from a landscape architecture team leader, students were asked to come up with design features for a pedestrian-oriented streetscape. They then shared summaries of their designs, touching on contexts of safety, mobility, educational programming and community heritage.

Team members involved with the day said this activity helped students internalize the planning process and visualize having a career where they can share their inspirations and contribute to their community. ●

Blair is not alone in his interest to design sustainable infrastructure. The federal government awarded UMKC a \$10 million grant to develop innovative approaches to improve the sustainability and equity of transportation infrastructure. The grant will support research such as technology to prevent sidewalks from freezing in the winter, improved bus stops for all weather, drones to help inspect bridges and deliver packages, 3D printing-simulated vehicle parts and improving methods to increase concrete durability for highways and roads.

"With this grant, our urban, public-research university and its partner institutions will work collaboratively to perform cutting-edge research and to help build an environmentally

responsible, 21st century U.S. transportation infrastructure," said UMKC Chancellor C. Mauli Agrawal. "It is a great opportunity for our students and our community."

Bill Yord is an adjunct professor at the UMKC School of Science and Engineering, a senior project manager at the Kansas City Area Transportation Authority and the utility manager for the KC Streetcar south line extension. In 2021 his students contributed design ideas for the south terminus of the streetcar at 51st and Brookside, steps away from the UMKC campus.

"Engineering is a team sport," Yord said. "It's not just designing the project, but it's also keeping in mind who you are designing the project for and the larger community. So the students got a real-

world experience of what engineering really is through their experience with KCATA and the streetcar."

Jordan Salt, a student who worked on the project, said he would walk past the stop site every day on his way to campus to "trigger" thoughts on how to do things differently.

"Knowing that this project was going to potentially contribute to a major infrastructure project made it one of the most interesting projects in my college career," Salt said. "The project's proximity to where I study and live inspired me."

Students' experience with the streetcar has been beyond theoretical. Students involved in the American Society of Civil Engineers have had several

opportunities to observe various parts of the extension's construction and ask questions from the engineers on site.

"The value of boots on the ground is you actually see what it takes to build it," Yord said. "It's not just a line on a screen."

Plans for the 51st and Brookside stop have UMKC at the center. The site will serve as a test site for research conducted by science and engineering students and faculty, with the research on display periodically rotating.

"I really am proud to be a Roo," Blair said. "I'm proud to graduate from Kansas City and I'm really proud to know that I'm making a difference in the city that I live in and love so much." ●

Civil engineering possibilities come to life in new IMAX film 'Cities of the Future'

By ASCE Kansas City Section

Imagine a world where you get around your city in an autonomous flying pod. Your home is powered by the sun thanks to panels beaming down to you from space.

Sounds wild, maybe, but that world might not be as far away as you think. Welcome to the future!

In the new giant-screen film "Cities of the Future," produced by the American Society of Civil Engineers with MacGillivray Freeman Films, these amazing engineering possibilities and technologies come to life on the IMAX screen.

"'Cities of the Future' will take audiences into the imagination of the world's most innovative engineers who are working right now to design the cities we will live in 50 years from now," said producer Shaun MacGillivray.

"From electric flying vehicles to space-based solar power to the most cutting-edge green technologies, the creative innovations being designed to solve society's greatest challenges are downright mind-boggling and totally awe-inspiring, and the immense

scope of this kind of creativity matches perfectly with the power of the giant screen," MacGillivray said.

The film opens in theaters around the world in February, presenting a tremendous opportunity for educational outreach to students of all ages, inspiring in them a passion for STEM.

Elisa De La Peña is a transportation engineer for Michael Baker International in Santa Ana, California, and loves inspiring children to get excited about civil engineering.

"I love that the film features kids," De La Peña said. "That's the demographic we're targeting. So, seeing kids actively engaging in engineering challenges like that and being excited by the potential of what the world could look like is just great. I want to see more of that in the world, and I love that a seed is being planted with this film."

ASCE Kansas City Section is proud to bring the new giant-screen film "Cities of the Future" to you! In March 2024, the premiere will be shown to leaders in the Kansas City engineering community. Soon after, showings will



be available to thousands of Kansas City area students. It's time to inspire the future generation of engineers! ASCE Kansas City Section is excited to support this film and inspire the imaginations of kids in our area. Sponsorship opportunities will soon be

announced, with funds going directly to film showings and coordinated STEM activities.

Floating city? Mega-City? Get ready Kansas City for Engineering the Future! ●

Missouri River navigation restoration efforts hit major milestone despite challenges

By Christine E. Paul, USACE Public Affairs Specialist

2024 will mark five years since the historic flood of 2019 in Kansas City and the surrounding region. Water levels on the Missouri River reached heights not seen for decades and caused an estimated \$2.9 billion in damages across the Midwest.

While the historic flooding impacted many in the area in ways they will likely not soon forget, it might be hard to believe that just a couple of years after the historic flooding, the region entered a period of historic drought. With water levels now at historic lows, repairing the river's navigation channel to its pre-flood condition has not been an easy feat.

Despite these challenges, the Kansas City District, U.S. Army Corps of Engineers closed out 2023 by hitting a major milestone in efforts to restore the navigation channel on the Missouri River. The project reached 52% completion heading into the new year—right on track, according to Dane Morris, Kansas City District Missouri River navigation and restoration program manager.

After the flooding, Congress gave the Kansas City and Omaha districts a combined \$484 million in additional funding, with \$316 million coming from the Bipartisan Infrastructure Bill, for repairs to the navigation channel. The additional funds allowed teams from both districts to begin the arduous process of repairing and restoring the navigation channel.

"Those funds have allowed us to go do a detailed inspection of all the

repairs that need to be made and then go out and make it happen," said Morris. "[To date, USACE] has awarded \$275 million in repair contracts."

There are roughly 7,000 river structures along the 735 miles of the Missouri River. Nearly all the structures needed repair of varying degrees after the flood waters receded in 2019. According to Morris, in a typical year, the Kansas City District places between 100,000 to 150,000 tons of rock as part of standard maintenance of its portion of the navigation channel.

To date, the district has contracted about 5.3 million tons of rock to be placed. Last year alone the district placed 1.2 million tons of rock as part of the repair project.

"Our inspections after the 2019 flood revealed that there was hardly a structure to be found that wasn't damaged as a result of that flood," said Morris. "So, much larger magnitude of damage than we typically see and really than we've ever seen because of the duration of that high water."

Due to the magnitude of repairs needed, the Kansas City District opened a satellite construction office solely to oversee the repair efforts, located in Lexington, Missouri.

Together with the Missouri River Area Office, located in Napoleon, Missouri, the district has been making significant strides in the repairs needed to keep the navigation channel operational.



Newt Marine, a contractor, places rock on a damaged river structure on the Missouri River on April 7, 2022. Photo by Dane Morris, Kansas City District, U.S. Army Corps of Engineers.

"We prioritized which structures were going to be repaired first to make sure we were getting the highest priority areas with the biggest problems," said Morris. "Since we've started repairs, the navigation channel has remained open, which I think has been a huge success."

In addition to keeping the navigation channel open, Morris and his team have had other successes since starting the project. These include engaging and collaborating with the commercial navigation industry as part of the repair process and researching and developing innovative ways to operate and maintain the navigation channel.

"I think that's been one of the silver

linings of this whole catastrophe—we've been able to go back, do some very detailed inspections, take some time and rethink how and why we are doing things," said Morris.

In conjunction with the navigation channel repairs, the Kansas City District is also part of a navigation study, which hopes to shed light on future operations of the river.

"Climate is changing, the river is changing, so that is part of our challenge," said Morris. "Looking into the future and understanding what the state of the river is going to be in 50 years, what do we want it to be, what does the region need it to be, and how can we best make that happen." ●

UMKC Builds Engineering Workforce for Today and Tomorrow

From the River to the Roos, Students at Kansas City's university collaborate with local firms, KC Streetcar

The Kansas City Streetcar will come to the UMKC front door in 2025, but Roos have had opportunities to gain real-world experience ever since the extension first broke ground. From designing possible streetcar stops, construction site visits and working with local firms on the extension. The engineering power in Kansas

City and the tremendous research opportunities of course means UMKC students don't have to wait until graduation to make meaningful contributions to transportation solutions in KC. Every day, UMKC students are working alongside licensed engineers in renowned KC firms, giving students important connections for jobs, guidance and

opportunities.

As a UMKC civil engineering student, Iain Blair worked with an award-winning, nationally recognized team to help write the sustainability certification for the main street extension. Now a UMKC master's student, Blair is working as a transportation planner with the

company.

The streetcar is the perfect fit for Blair, who chose to minor in environmental sustainability. The pairing provided him the opportunity to learn the interesting crossroads of designing systems to account for climate change.

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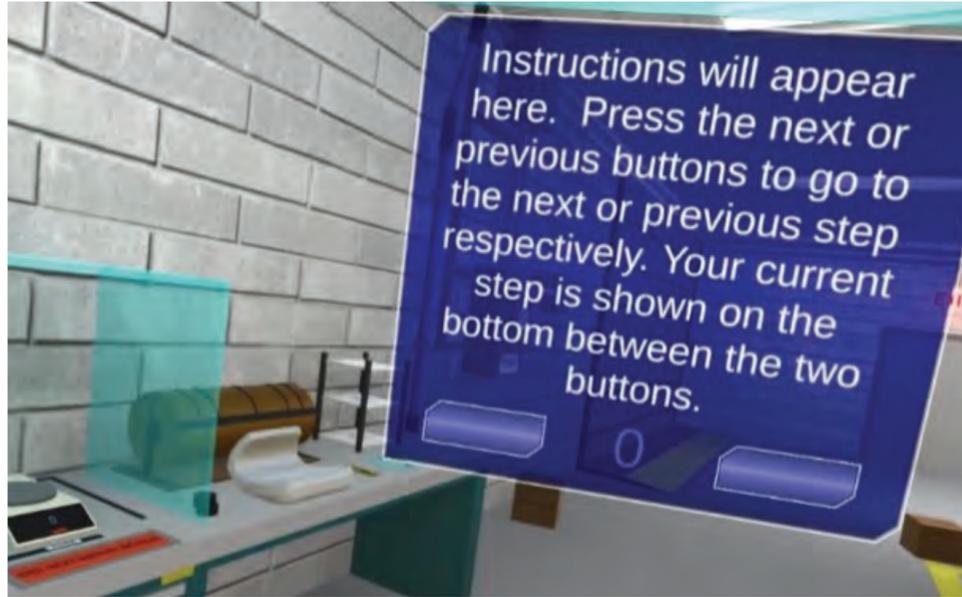
Immersive technology transforming KCNSC's future to fulfill its national security mission

By Honeywell

Engineers at the Kansas City National Security Campus (KCNSC), managed and operated by Honeywell Federal Manufacturing and Technologies, see extended reality (XR) as a key factor in helping to shape existing and future solutions for the campus' national security role.

KCNSC, which is celebrating its 75th anniversary this year as one of eight sites comprising the National Nuclear Security Administration's Nuclear Security Enterprise, manufactures more than 80% of non-nuclear components that go into the nuclear stockpile.

KCNSC's work with XR began about 10 years ago with a few augmented reality (AR) focused, plant directed research and development projects. It has since expanded to include more than \$1.2 million in research efforts while supporting a handful of production applications. With XR technology, the physical world is merged with a digital one, allowing users to interact with it. Principal types of immersive technology under the XR umbrella include AR, virtual reality (VR) and mixed reality (MR).



and collaborate. At KCNSC, this means reviewing new 3D geometry models, live video of an assembly or troubleshooting an issue in an XR space.

"The intent is to decrease downtime, decrease travel time, and increase overall productivity," Speer said. "The XR team successfully implemented its first production collaboration tool called RemoteAR. This tool allows multiple people to review a piece part or assembly in real time without being in the same physical location by creating a secure, interactive video connection."

XR work instructions provide additional clarity for the operators on the manufacturing floor by creating interactive and immersive directions, allowing operators to dig into a given set of instructions, which varies depending on what the task entails.

"Typically, the operator is given a 3D model of the assembly, a 3D animation to view, and additional task specific instructions," Speer said. "The XR team deployed its first XR work instructions app, called VEGA (visually enhanced guidance application), as a pilot to test and gather data."

Speer said the team saw a positive effect on the assembly time and overall user understanding, and is developing the next generation of work instruction tools to take advantage of head-mounted display technology.

"The XR Consortium acts as the hub of KCNSC XR information, helping to connect teams across KCNSC with external groups at universities, industry leaders, and working groups."

Lauren Speer, KCNSC

XR training has also allowed the KCNSC team to bring multiple training applications to production.

"By providing an XR training environment, the learner can safely and quickly learn how to operate complex technology, high-demand equipment, or potentially dangerous machinery," Speer said. "The learning and development team is integrated into the larger XR team, helping to streamline selection, development, and integration of a new training scenario."

While XR visualization is a bit open-ended, Speer said its application at KCNSC is to help teams better understand their data. XR visualization seeks to do this by creating interactive and visually appealing data displays, which

includes immersive and digital walkthroughs of the manufacturing floor, giving new hires the chance to see where they will be working. While XR is being used in various industries now - from gaming and education to manufacturing - how widely its future applied use will be remains a question. Speer said she believes the adoption of the technology by everyday consumers will ultimately determine whether it becomes as ubiquitous as the advent of the smart phone.

"The crystal ball is definitely fuzzy. But I think that overall promise of XR remains that it will help humans better understand the world around them, engage with each other in new and exciting ways, and improve the quality of work and life all around us," Speer said. ●



Lauren Speer
senior mechanical engineer
KCNSC

Lauren Speer, a senior mechanical engineer, leads the XR Consortium for KCNSC and has helped increase the campus' XR footprint. "The XR Consortium acts as the hub of KCNSC XR information, helping to connect teams across KCNSC with external groups at universities, industry leaders, and working groups," Speer said.

She said XR has been applied to four main areas: collaborations, work instructions, training and visualization. XR collaboration is a growing field where multiple users join a virtual or augmented space to connect

Unleashing the Power of Technology within Engineering

By GBA

Any time you can use innovative technology to make a dangerous, labor-intensive, manual process turn it into a safer, more efficient use of time and money, that's a win!

GBA's Transportation team was looking for a technology that could transform traditional data collection methods into a safer and more efficient process. Since 2012, as part of the Kansas Department of Transportation (KDOT) High-Performance Signing on-call Projects, the team was tasked with inventorying existing road signs in Kansas using handheld GPS devices and iPads, which can be hazardous and labor-intensive. To help reduce safety for GBA staff, Mobile LiDAR (Light Detection and Ranging) technology was selected to collect signing inventory for our latest project in Sedgwick County. It utilizes survey-grade GPS and a laser scanner mounted on a vehicle to capture intricate, high-resolution, 3D data of the surrounding environment. It was a game-changer in engineering and safety, significantly reducing collection time and improving safety, especially since much of the data collection was located within the Wichita metropolitan area and consisted of the collection of sign trusses.

By utilizing this innovative technology, staff was able to streamline the inventory process of over 1500 signs. What once posed risks in manual data collection is now a swift and precise task. Mobile LiDAR enables data collection from vehicles at driving speeds rather than personnel standing at the edge of the busy roadway. GBA's integration of this technology ensures accuracy and underscores the team's commitment to engineering excellence and showcases the power of innovation in shaping a safer and more efficient future.

For over 50 years, GBA has been at the forefront of new engineering technologies. The recent integration of the Mobile LiDAR service is a testament to our continued commitment to innovation and has significantly shifted our surveying methodologies.

What makes Mobile LiDAR so innovative?

The Power of Mobile LiDAR

Unveiling the Benefits:

- Enhanced Efficiency: Mobile LiDAR systems capture data at a high rate of speed while the collection vehicle travels at, or near, highway

speeds, allowing for the efficient mapping of large areas. Long stretches of roadways, parking areas, or streetscapes are scanned quickly and accurately. This allows GBA to collect survey data in a fraction of the time compared to traditional surveying methods.

- Versatility: Mobile LiDAR can be used in various settings, including urban environments, long stretches of roadways, parking areas and streetscapes. It can also be used to survey bridge decks, building exteriors and tunnels.

- Safety Priority: Mobile LiDAR can be performed from the safety of a vehicle. This reduces the need for surveyors to work in hazardous conditions such as busy roadways and allows GBA to collect data accurately and efficiently while maintaining the safety of the public and our survey crews.

- Precision and Completeness: Mobile LiDAR captures data with sub-centimeter accuracy, providing more precise information for design and analysis. Additionally, LiDAR reduces the need for repeat trips to a project site when additional

scope is required. This is because once the data is collected, it can be accessed at any time to extract additional information as needed.

- Improved Visual Experience: This data creates detailed 3D models and visualizations, which can help stakeholders better understand the terrain of the project site and help them make more informed decisions. Additionally, hardware technology like GBA's Ladybug camera system continuously collects images in a 360° view while scanning. Because of advancements in LiDAR, these images can be used to aid the drafter during the extraction process. This gives our clients real-time images of the project site.

Future in Focus

The use of Mobile LiDAR not only redefines surveying processes but also challenges future engineers, highlighting the endless possibilities of technology. This project showcases how engineering expertise coupled with transformative technology doesn't just shape the future; it empowers engineers to lead a world where innovation thrives and efficiency knows no bounds. ●

TRANSYSTEMS

JOIN OUR TEAM OF PASSIONATE PROBLEM SOLVERS

“ I chose to pursue a career as a Civil Engineer because I've always enjoyed math and science. The thing I love most about my job is getting to work on many different projects at once, such as traffic safety studies, signing, and pavement marking projects. **”**

I love constantly learning new things.”

KIARA G.
Civil Engineer
Kansas City, MO

transystems.com

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