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AUGUST 2025

INSIGHTS

Benesch's multidisciplinary experts share their latest insights into planning, design, safety and innovation.

TOPICS TO EXPLORE:

Suburban Roadway Trends

Funding Resilient Wastewater Systems

Deep Learning Applications

Efficient Management of Park Infrastructure

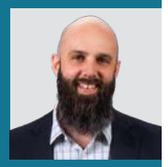
And more!

ABOUT BENESCH

At Benesch, we are dedicated to shaping the future of infrastructure by providing innovative, efficient solutions to municipalities across the country. Our multidisciplinary team leverages a forward-thinking approach and commitment to innovation to set new standards for excellence, empowering clients and communities to embrace smarter, safer and more resilient infrastructure.

Explore the following pages to gain expert insight into industry trends, innovative new technology, data-driven approaches and more.

Scan to learn more!





BENESCH SESSIONS AT PWX

Innovative Applications of Deep Learning in Drone Imagery: Detecting Defects, Classifying Land Cover and Monitoring Change

Monday, August 18
8:00 AM - 8:50 AM

Presenters:
Dan Gwartney, GISP, CFM
Jarrod Russell, PE, CAMP

Innovative Asset Planning for Unique Park Infrastructure Needs

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TRANSPORTATION PLANNING

Incorporating Multimodal Elements to Modernize Suburban Roadways

By: Jill Hayes, PE
Planning and Preliminary Engineering Group Manager

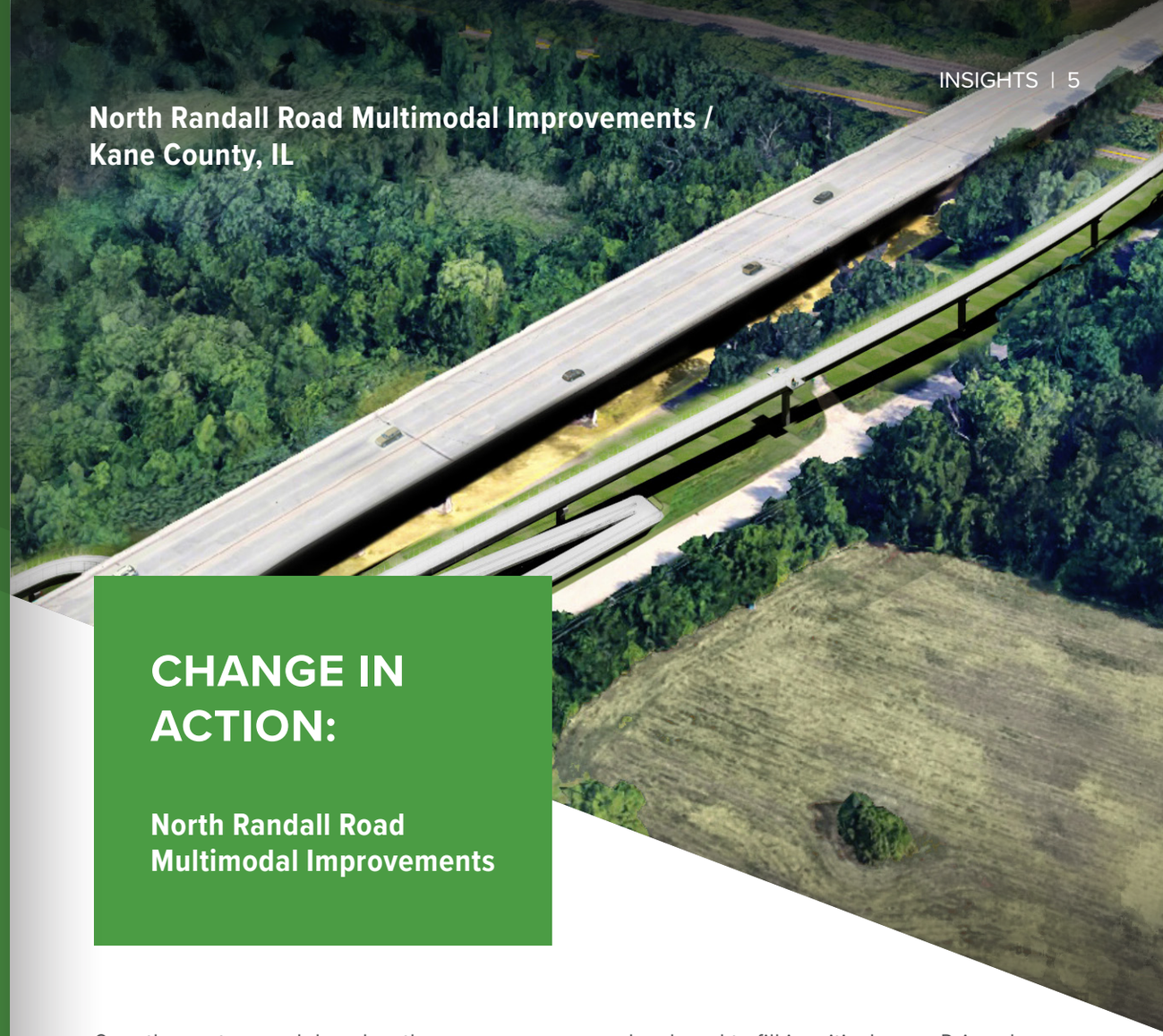
When suburban living took off, the infrastructure built to support the sprawl was designed to accommodate travel by car. For decades, this was accepted and preferred by residents; however, in recent years, suburban demographics have changed. Now, more people, including older adults, young professionals and low-income households, are living in suburban settings and span a wide range of socio-economic backgrounds.

Communities are now facing challenges like traffic congestion, limited mobility options for non-drivers and rising infrastructure maintenance costs. As towns continue to grow and work to improve aging roadways, agencies are increasingly looking for opportunities to modernize infrastructure in a way that fits the needs of all residents. For many of our clients, this means working to incorporate multimodal elements as part of larger corridor improvement and/or reconstruction projects.

For example: while a project's main goal may be to increase an intersection's capacity for car travel, there is often now a secondary goal to make the intersection safer and more convenient for pedestrians. This typically looks like adding sidewalks and multiuse paths, incorporating crosswalks or even adding public transit access. These improvements don't inhibit or discourage car travel by any means, but they do improve safety and mobility for more of the community.

> **The changing demographics of suburban communities give us an exciting opportunity to rethink how we plan and design roadway improvement projects.**

By working to incorporate multimodal elements, we are making it easier for all residents to access jobs, schools and services while easing traffic congestion and supporting healthier, more active lifestyles.



North Randall Road Multimodal Improvements / Kane County, IL

CHANGE IN ACTION:

North Randall Road Multimodal Improvements

Over the past several decades, the area around North Randall Road in Kane County, Illinois has seen rapid growth. The corridor is home to a variety of busy commercial centers, recreational facilities and residential areas. While it is one of the busiest local roadways for motorists, it's not as accessible for today's increased level of pedestrians, bicyclists and public transit users.

To better meet the needs of this changing area, the Kane County Division of Transportation engaged Benesch to conduct a preliminary engineering and environmental study. With a focus on connectivity, the team first developed a multimodal network plan to link destinations and integrate with existing sidewalks and ongoing projects. From this network, a series of improvements were developed to fill in critical gaps. Driven by public feedback, the team then developed a unique design for a pedestrian bridge that will cross under an existing roadway bridge and then span over a creek and railroad tracks to create a grade-separated crossing to connect residential areas with a nearby Metra transit station.

> **THIS PROJECT is a significant step toward providing full corridor connectivity. The improvements will help ensure that Randall Road serves as a safe, accessible and integrated transportation corridor for the growing needs of residents and visitors.**

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From Planning to Implementation: Taking an Integrated Approach to SS4A

By: Demian Miller, AICP
Community Planning/Complete Streets Group Manager

Over the past three years, the U.S. Department of Transportation has awarded nearly $3 billion in federal funding as part of the Safe Streets and Roads for All (SS4A) competitive grant program. Communities across the country are now working to develop and implement comprehensive safety action plans (Action Plans).

WHAT IS SS4A?

The IIJA established the SS4A program to fund regional, local and Tribal initiatives through grants to prevent roadway fatalities and serious injuries. The SS4A program supports the USDOT's goal of zero roadway deaths.

As a transportation planner and project manager with over two decades of experience, I've learned that the most effective roadway safety improvements come from an integrated approach—one that brings together roadway and traffic engineering, systems planning and analysis, program management and public engagement. This leads to plans that are more efficiently implemented and designs that are tailored to the area's unique safety challenges.

Planning for Zero

The development of an Action Plan should be a collaborative undertaking that challenges all involved to think differently about traffic safety and traditional roles and responsibilities. To reach the eventual goal of zero roadway fatalities and serious injuries, it's important to bring in multidisciplinary expertise early.

At Benesch, we'll often have various experts from around the country share their unique expertise, fresh ideas and practical experience. By leveraging our firm's roadway design, construction management, public finance and community planning expertise during the planning phase, we are able to confidently say that the strategies we recommend are feasible and that the implementation process is thoroughly understood.

Designing the Infrastructure

One of the key components of a successful Action Plan is the selection of projects and strategies that will address the unique safety issues of a given community. While lower-cost, systemic solutions are typically part of the strategy toolkit, our plans also include spot improvements such as intersection realignments, new or alternative signal control, or new bicycle and pedestrian facilities. Because the feasibility of these sorts of improvements requires more insight into the design process, it is important to work with designers who have a keen understanding of your goals and know how to design through both safety and constructability lenses.

This integrated approach was pivotal for Benesch's work on several Vision Zero corridor studies in the Tampa, FL metro area as part of the Hillsborough TPO's Vision Zero implementation planning efforts. After the County reviewed the study recommendations, they tasked Benesch with designing the recommended short- and medium-term improvements. Being involved in the planning and now in the design allows us to better ensure our solutions are in line with the overall goals of the Vision Zero planning efforts.

While not part of an SS4A funded project, our work on 24th Street in Omaha, NE is another great example of how an integrated approach comes into play when improving roadway safety. With a high rate of vehicular crashes and increasing pedestrian and bicycle traffic on 24th Street, the City of Omaha engaged Benesch to help improve safety, enhance pedestrian accommodations and optimize traffic operations. We provided analysis, planning, public outreach, design and construction engineering for this three-mile corridor improvement. Our team brought together the professionals needed to understand the many facets and elements interacting in the street environment, then created a solution to optimize and enhance this corridor.

Learn more at Benesch.com/PWX2025.

Overall, Benesch's multidisciplinary approach for both the planning and implementation of Safety Action Plans has enabled us to better help communities not just work to eliminate traffic-related deaths but also increase healthy and equitable mobility for road users of all abilities.

Enhancing Safety Corridors with Smartphone Data

By: Chris Harker, PE
Transportation Group Manager

While smartphones have a well-earned reputation for putting drivers at risk, the data they collect may hold the key to improving the safety of highways across the country. Telecommunications and connected vehicle data offer unprecedented insight into driver behaviors—such as distracted driving, speeding and harsh braking.

Benesch, in partnership with Michelin Mobility Intelligence (MMI), is exploring how this real-time, segment-specific data can optimize safety investments and save lives. By collecting data from users who have opted-in to over 10 apps from categories such as driving-related, gas, weather, safety and more, we're able to correlate local incident data with driving behavior to help agencies make informed decisions to improve road safety and measure the success of implemented solutions.

The Kansas Safety Corridor Pilot Program

Benesch collaborated with the Kansas Department of Transportation (KDOT) on the Safety Corridor Pilot Program (SCPP) aimed at identifying and evaluating new means of optimizing corridor safety as part of the national "Drive to Zero" effort. The focus of this project was on two of KDOT's identified Safety Corridors, US-24 and US-81, each with higher rates of accidents or fatalities as compared to the state system.

WHAT IS A SAFETY CORRIDOR?

Safety corridors are highway corridors with greater fatality or serious injury rates than similar roadways and are subject to additional safety measures, interventions and regulations.

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Optimizing Corridor Safety through Data-Driven Insights

Tuesday, August 19
3:30 PM - 4:20 PM

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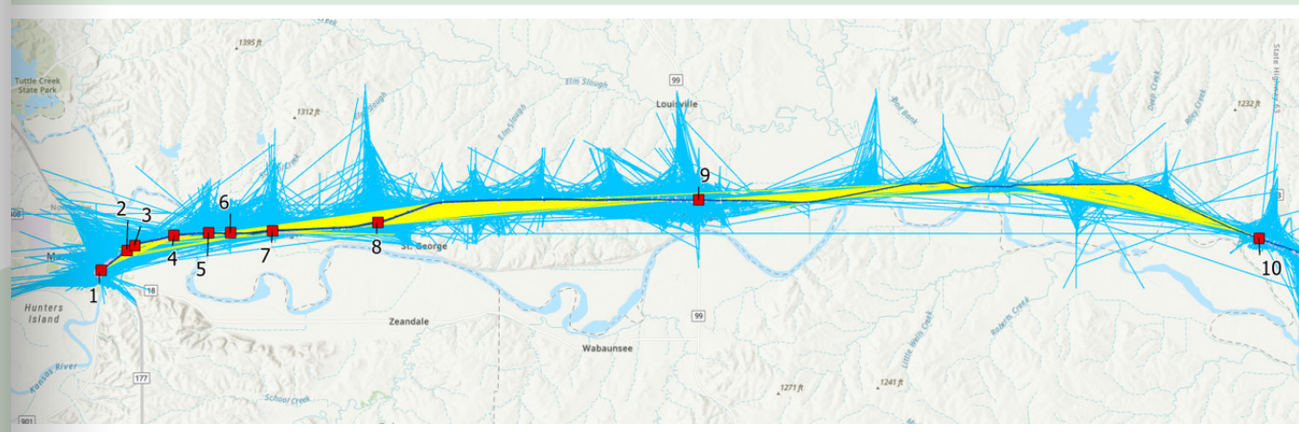
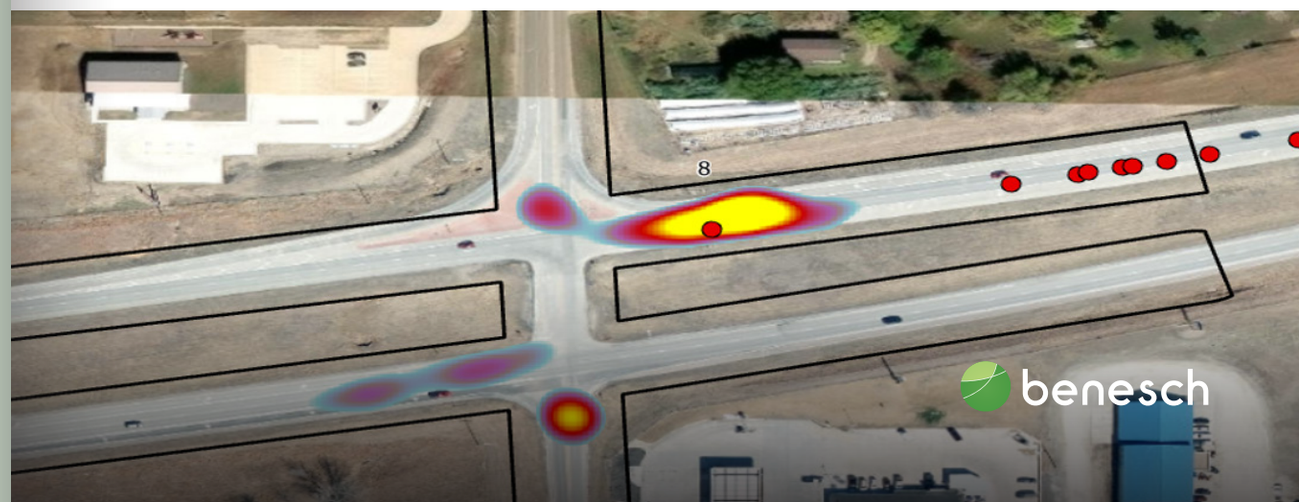
The program utilized available data from MMI to assess driver behaviors. By correlating this data with KDOT's historical collision data and infrastructure changes, Benesch demonstrated a strong link between cellphone usage and crash occurrences, providing both validation of traditional safety assessment data sets and the opportunity to leverage telematic data to identify "higher risk" segments along a corridor. This ultimately supported the development of proactive strategies to mitigate developing crash concentration areas instead of reacting to post-crash events.

SCPP also was utilized to assess and quantify the ROI of implemented safety strategies used along US-24 and US-81. Telematic events were evaluated before and after increased law enforcement, safety education campaigns and enhanced signage schemes were implemented. This project identified quantifiable reductions in telematic events after the strategies, indicating positive ROI. The results suggest that strategies could be optimized to increase ROI based on specific corridor segment characteristics, rather than applying strategies at a corridor-wide level.

The program's innovative methodology is setting a new standard for corridor safety analysis, with the potential to influence industry best practices nationwide.





INNOVATION

Doing More with Less: A Case for Innovation in Municipal Infrastructure Solutions

By: Laura McGovern, PE
Chief Process and Innovation Officer

A combination of aging and expanding infrastructure, a tight labor market and funding limitations means that municipalities across the country are being asked to do more with less. The key to tackling these challenges will be embracing new technologies and forward-thinking solutions.

From AI-powered data collection and GIS-based planning tools to predictive maintenance systems and program management solutions, advancing tech can help cities stretch limited resources, optimize decision-making and deliver long-term value to their communities. These and other innovative solutions offer a path forward.

Ultimately, the municipalities that embrace innovation and are willing to rethink how they plan, build and manage infrastructure will be better positioned to stretch their dollars further and serve their communities more effectively.

At Benesch, we're dedicated to helping our clients create efficient, cost-effective infrastructure solutions by pairing our planning and engineering expertise with innovative technologies. We're harnessing the power of data analytics, artificial intelligence, state-of-the-art modeling techniques and more to improve efficiency, minimize human error and visualize solutions at every stage of a project.

Together, we can shape the future of infrastructure—delivering smarter, safer and more resilient communities for generations to come.

Past, Present & Future Impacts of Drones in the AEC Industry

By: Bret Tremblay
Technical Manager

Advances in drone technology are transforming how AEC professionals approach infrastructure projects, moving beyond their initial novelty to become essential tools for efficiency and innovation. As a licensed FAA drone pilot with nearly two decades of experience, I've had the opportunity to see first-hand how drone usage has evolved and impacted the industry.

In recent years, Benesch has leveraged drones equipped with thermal cameras to inspect bridge decks and parking garages, enabling the detection of concrete delamination that is often invisible to the naked eye.

In a head-to-head comparison on a bridge inspection project, the thermal drone method took 35% less time and cost 36% less than traditional techniques, while also identifying more areas of concern that might have otherwise gone unnoticed.

Beyond inspections, drones are used to create high-resolution aerial imagery, 3D models and digital twins of infrastructure assets. These models support asset management, design and construction monitoring, offering a comprehensive view of project sites that would be difficult or dangerous to obtain otherwise.

Now, the focus has turned to exploring how drones can be paired with artificial intelligence and machine learning to automate tasks like pavement crack detection, further streamlining workflows and reducing the need for extended site visits or lane closures. The integration of drone technology into project workflows not only enhances data collection and analysis but also minimizes disruptions to traffic and improves safety for inspection teams.

Looking ahead, we'll continue to push the boundaries with drones by pairing them with augmented reality (AR) systems to reimagine designs while in the field, fostering efficiency and precision. By integrating AR with aerial drone data, civil engineers will be able to overlay digital models directly onto physical sites in real time, enabling instant visualization of proposed structures, utilities and modifications within the actual environment. This fusion of technologies will streamline site inspections, improve decision-making through enhanced spatial context and significantly reduce design errors by allowing stakeholders

to identify potential conflicts early in the construction process. Ultimately, fleets of AR-enabled drones will help bridge the gap between planning and execution, accelerating project timelines and elevating the accuracy of on-site implementation.

As drone technology continues to evolve, its role in the AEC industry is expected to expand, driving further innovation and delivering greater value to clients through smarter, faster and more cost-effective project delivery.

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Steve Roth, PE, CAMP

Transforming Infrastructure Monitoring with Deep Learning

By: Dan Gwartney, GISP, CFM, Technical Manager and Jarrod Russell, PE, CAMP, Project Manager

While drones have made it easier than ever to capture high-resolution images of infrastructure, accurately and efficiently collecting and interpreting data from the imagery is often still an arduous and time-consuming task.

By integrating deep learning (DL) with drone imagery, we're discovering ways to transform infrastructure monitoring and environmental assessment processes.

What is deep learning?

Deep learning is a subset of machine learning that uses neural networks that mimic how the human brain functions to simulate decision-making power.

How can it help collect and interpret data?

Deep learning can help make any type of drone imagery more powerful by extracting objects of interest and mapping them rapidly for assessment and monitoring purposes. This enhances the accuracy and efficiency of data interpretation while supporting informed decision-making for infrastructure management and environmental monitoring. Imagery sources can include, but are not limited to, standard overhead imagery, standard oblique angle imagery, multispectral/near-infrared imagery, thermal imagery and full motion video.

Key Applications

Detecting Concrete Delamination
By combining thermal imaging with convolutional neural networks (CNNs), we're able to effectively identify possible subsurface defects, namely in concrete bridge decks. This enables timely maintenance that enhances safety and extends the lifespan of critical structures.

Classifying Land Cover
Deep learning can be used to classify land cover types, converting complex aerial images into 2D linework for urban planning and resource management.

Change Detection
Using drone images of an area captured twice over a period of time, we're able to use deep learning to identify changes, facilitating rapid identification of potential hazards.

OVERALL, deep learning has the power to make infrastructure monitoring smarter and more efficient, helping municipalities save time, reduce costs and better serve their communities.

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ASSET MANAGEMENT

Using Asset Planning to Efficiently Manage Park Infrastructure

By: Steve Roth, PE, CAMP
Group Manager

From playgrounds, trails and pedestrian bridges to water conveyance systems, the diversity of park infrastructure poses a challenge for municipalities looking to effectively prioritize the repair and replacement of assets, especially as they age and funding remains limited. A customized asset management plan offers a solution.

LEARN MORE AT PWX!

Innovative Asset Planning for Unique Park Infrastructure Needs

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ASSET PLANNING IN ACTION:

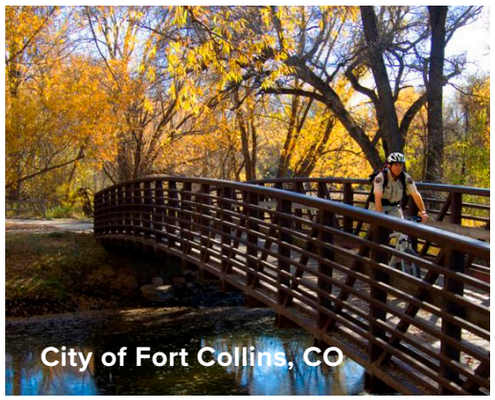
City of Fort Collins Asset Management Program

The City of Fort Collins in Colorado recognized the need for a comprehensive approach to managing its extensive park infrastructure, which includes more than 3,000 individual assets, and engaged Benesch to develop a tailored asset management program. The program's scope included establishing service level categories, defining and quantifying risks, creating condition assessment matrices, conducting field inspections and prioritizing asset work actions.

By building a data-driven plan specifically tailored to a wide array of assets, municipalities can better tackle the evolving demands placed on their parks and implement strategies for extending the lifespan of critical infrastructure. In Fort Collins, this meant leveraging ISO and APWA strategic asset management frameworks and developing custom tools to evaluate and assess individual assets, asset categories and the entire network. The program also integrated data into the City's new data management system, supporting electronic data collection and management to streamline processes and reduce resource use.

To help the City prioritize asset work actions using defendable, data-driven decision-making, the program incorporated unique factors like environmental conditions, asset functionality and community priorities. A ranking system assesses each asset's condition, usability, essentiality, aesthetics and physical attributes to help the City make defendable decisions regarding repairs and replacements. Deterioration and lifecycle models were also developed to forecast asset needs and support capital improvement planning.

The result is a robust, sustainable asset management system that empowers Fort Collins to proactively address maintenance needs, optimize resource allocation, and ensure the long-term performance and safety of its park infrastructure.



City of Fort Collins, CO

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WATER RESOURCES

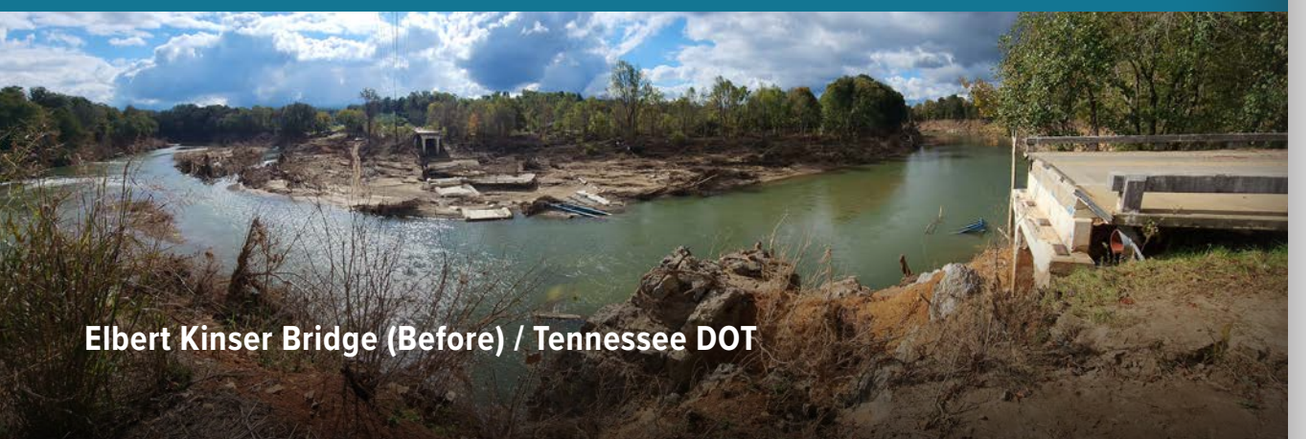
Designing Infrastructure to Withstand Extreme Weather Events

By: Brian Ralstin, PE, VMA
Design Team Lead

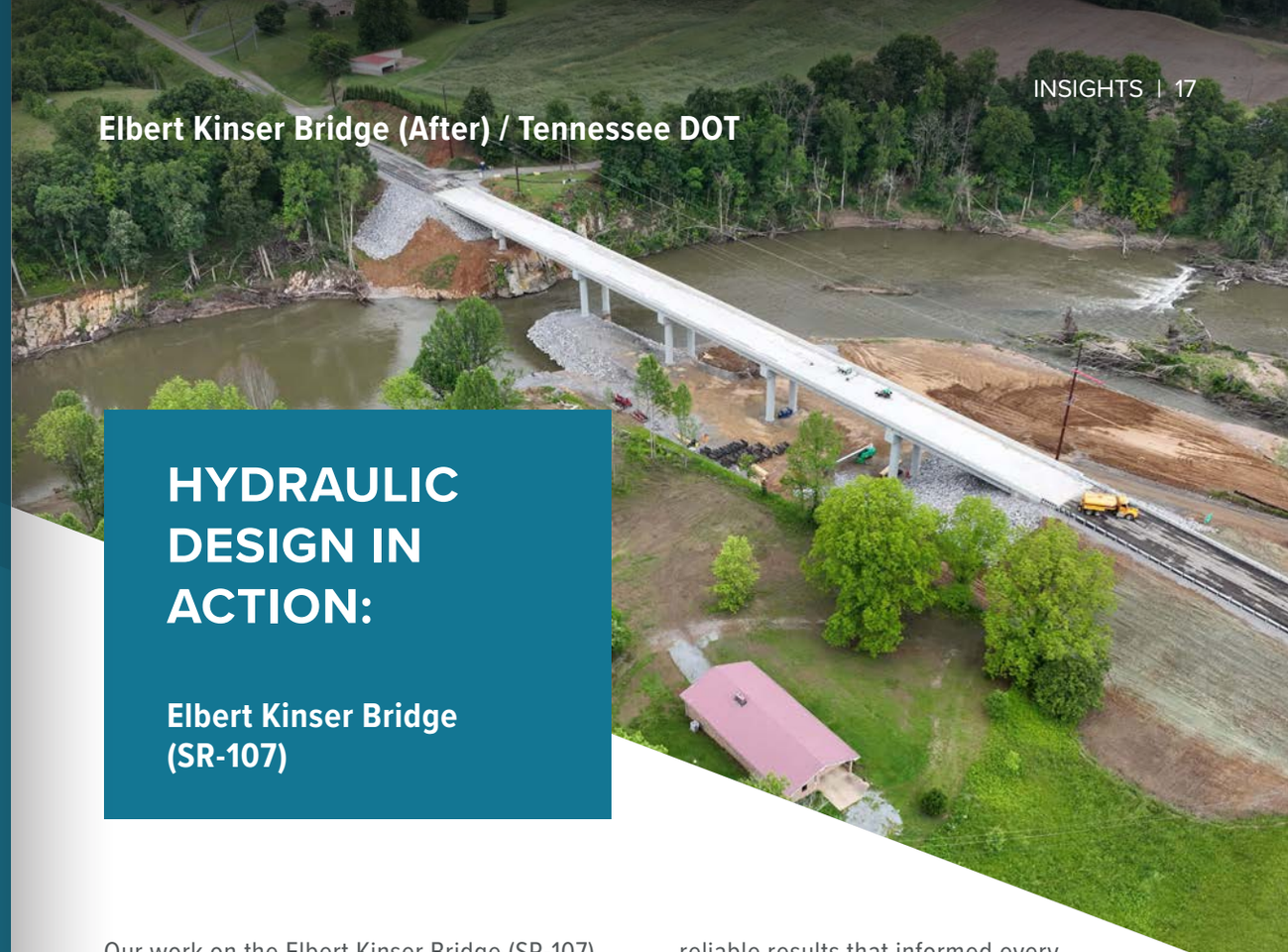
Bridges are vital links in our transportation networks, and their ability to withstand extreme weather conditions is more important than ever. As severe storms, flooding and temperature fluctuations become more frequent, designing resilient bridges is essential for public safety, economic stability and community connectivity.

Hydraulic design is a cornerstone of resilient infrastructure because it enables engineers to anticipate and address the complex interactions between water and the built environment.

By incorporating advanced hydrologic and hydraulic modeling into our design process, we can simulate a range of storm scenarios, assess the resilience of existing and proposed structures and identify potential vulnerabilities. This allows us to recommend design modifications—such as increasing bridge elevation, optimizing hydraulic openings or implementing scour countermeasures—that enhance the structure's ability to withstand high flows and reduce the risk of failure during extreme events.



Elbert Kinser Bridge (Before) / Tennessee DOT



Elbert Kinser Bridge (After) / Tennessee DOT

HYDRAULIC DESIGN IN ACTION:

Elbert Kinser Bridge (SR-107)

Our work on the Elbert Kinser Bridge (SR-107) in eastern Tennessee following Hurricane Helene illustrates the importance of this work. In September 2024, the 587.5-foot-long Kinser Bridge collapsed into raging flood waters, significantly disrupting regional travel. To expedite the emergency replacement, the Tennessee Department of Transportation (TDOT) turned to Progressive Design-Build (PDB). Benesch partnered with Kiewit to deliver the replacement. Serving as the superstructure engineer, Benesch designed the girders and concrete slabs for the bridge, developed the erosion control plan and completed the hydraulic design.

In addition to quickly restoring connectivity for the region, improving the resilience of the bridge was a top priority. We used advanced software and analytical tools to uncover data-driven strategies that would provide improved storm water management solutions and increase the infrastructure's ability to withstand extreme weather. We utilized the latest modeling software to deliver accurate, reliable results that informed every stage of bridge design. Our solution included recommending drilled shaft piers socketed into rock, increasing the bridge span, maintaining the low chord elevation, and providing sufficient rip-rap at the bridge abutments to mitigate the river's velocity when in flood.

Ultimately, integrating robust hydraulic design into bridge projects is essential for building infrastructure that not only meets today's needs but is also prepared for the challenges of tomorrow.

By prioritizing data-driven modeling, regulatory compliance and innovative engineering, we will continue to help communities create bridges that are safer, more durable and better equipped to serve future generations.

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Leveraging Grant Funding to Improve System Resiliency

By: Sunny Mullen, PE
Project Manager

Across the United States, aging wastewater infrastructure is reaching the end of its service life, prompting municipalities to plan for significant repair and replacement projects. Securing grant funding is a critical strategy for communities seeking to improve the resilience of their collection systems while managing costs. The Copper Creek Sewer Interceptor Relocation project in Bellevue, Nebraska (a suburb of Omaha), serves as a compelling case study in leveraging grant funding to address these challenges.

In early 2020, the City of Omaha engaged Benesch to evaluate options for rehabilitating or replacing a 90-inch steel aerial sewer crossing over Copper Creek. The existing infrastructure, constructed in the early 1970s, showed signs of deterioration and had suffered previous damage from storm events. These vulnerabilities increased the risk of service loss and potential environmental violations, as a failure could result in sewage entering local waterways.

Benesch identified a solution that would extend the service life of the interceptor, reduce the risk of damage from high water events, improve maintenance access, enhance aesthetics and protect the integrity of the levee system. Because the solution would improve the system's resilience, the project qualified for both state and federal grants, securing a total of $26.1 million in grant funding.

Copper Creek Sewer Interceptor Relocation / City of Bellevue, NE

WANT TO LEARN MORE?

Sunny will be presenting this topic at the Water Environment Federation Technical Exhibition & Conference (WEFTEC) in Chicago on September 29th!

As a result of our work on this project, we gained a comprehensive understanding of the grant application process and how federal and state grant funding can impact a project. Here are our top lessons learned:

✓ **Understand the Grant Application Process**
Take time to gain a complete understanding of the funding application process, requirements and funding structure. The process can be complex and extend over multiple years. Taking the time at the start for the proper grant due diligence and comprehension will aid in communicating accordingly, tempering expectations, scheduling accurately and planning appropriately.

✓ **Be Prepared for Environmental Reviews**
Plan for additional time for FEMA Environmental and Historic Preservation (EHP) reviews if the project is part of a FEMA-funded program, and for NEPA reviews, especially if it is a federally funded project. Additionally, allocate sufficient time for other environmental and permitting agencies to review the project as their acceptance is required with most projects.

✓ **Take a Systematic Approach to Project Expenditures**
Track expenditures for grant reimbursement with a systematic approach. In addition to the standard quarterly reports and reimbursement requests to track expenditures, we found it incredibly valuable to create a separate budget summary tracker for all expenditures being submitted for reimbursement, broken out by milestone activity, project task, invoice, grant phase and period of services.

✓ **Keep Clear and Organized Records**
Detailed documentation is necessary from the start of the application process through construction and closeout. Whether you are applying for local, state or federal grants, understanding the specific paperwork needed and submitting accurate and thorough documentation will prevent miscommunication, delays and potential loss of the grant opportunity.

✓ **Identify Backup Funding Options**
Owners should consider having internal backup plans for funding. A lot can happen to drive up project costs from the time that a grant is awarded to project completion. Understanding alternative funding options will make it easier to find ways to cover additional costs that may occur.

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INSIGHTS

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