

# BAMI-I

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Biannual Journal H1 2025

A LITTLE BUTTERFLY FLAPPING ITS WINGS  
IN A FARAWAY PLACE: THE STORY  
OF A RELENTLESS ENTREPRENEUR IN  
UNDERGROUND ASSET MANAGEMENT  
UTILITIES (Cover Story at page 13)

SWITZ CITY, IN: ASSET  
MANAGEMENT PLAN (AMP)  
(See page 10)

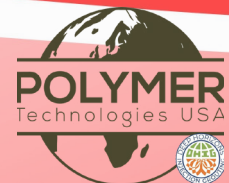
## BAMI-I

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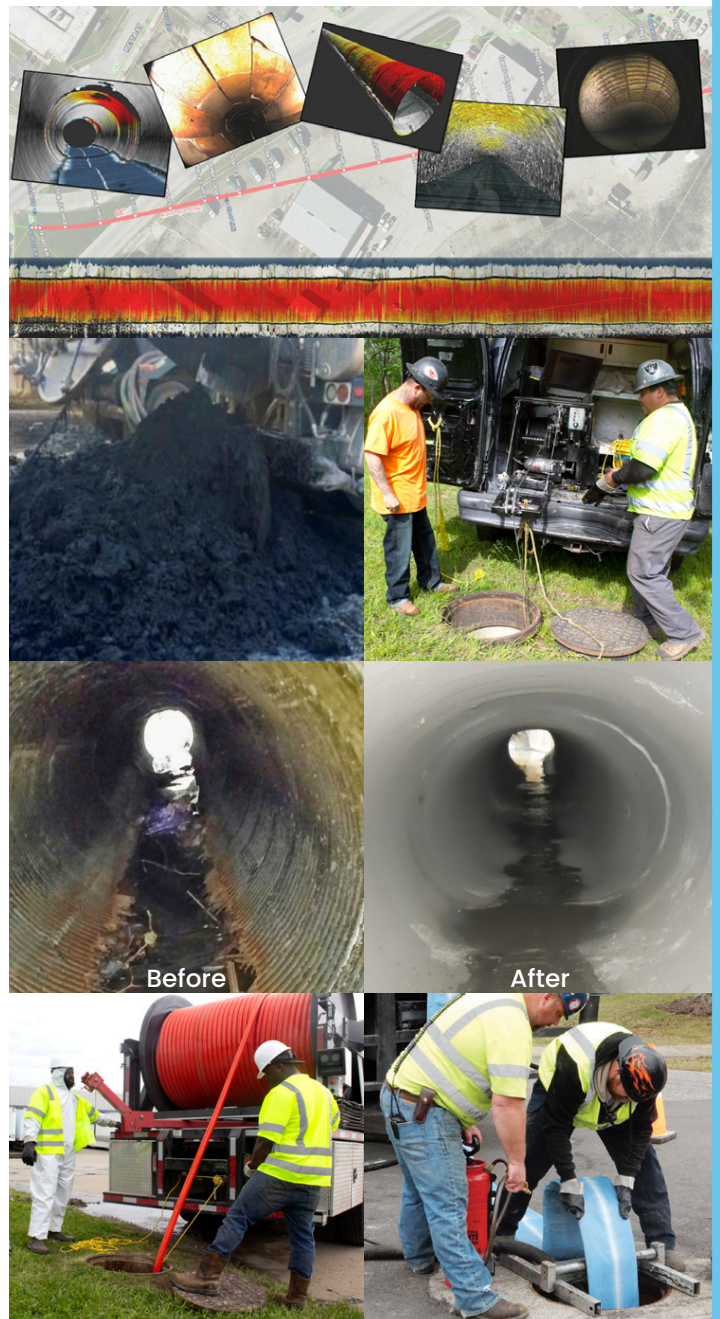
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# Message from BAMI-I President

**Dr. Tom Iseley**

Ph.D., P.E., Dist. M. ASCE, PWAM, BAMI-I President

is enhanced with its partnering relationship with BAMI-I and supported in part by the Beavers, Inc. & Beavers Charitable Trusts as well as many industry sponsors. Our key objective is to prepare future leaders with the academic and experience background who have a burning passion to commit to advancing AMUI.

Our commitment is to support Indiana's national leadership in getting water utilities to understand, embrace and develop asset management programs. From 2015 until the publication of the Indiana Finance Authority (IFA) Asset Management Plan Guidelines in 2019, IFA funded 5 projects to understand what water utilities need to do to increase the effectiveness of the management of water and wastewater assets. This resulted in the State law being signed in March 2022 requiring every water utility applying for funding to have an approved AMP. The IFA Guidelines make it clear that developing the plan is just the first step. The implementation of the plan is essential. This will be addressed by a bill moving forward requiring annual reporting on how each utility is accomplishing the goals stated in their AMP including rate increases.

I have taught the AMUI course several times both at La Tech and Purdue. It now has 3 major components:

We take the students through all 4 of the CTAM courses, and they receive the AWAM Certification,

We take the students through the IFA AMP Guidelines in detail, and

We get the students involved in application. This is where actual projects are utilized such as Switz City and now Reynolds.

I have learned a lot through teaching this course. I have seen enough AMPs developed by professionals to be convinced that lead professionals developing AMPs need to be certified as PWAM (Professional Water Asset Managers) to be qualified to sign off on a certified and approved AMP. AMPs are much more than just developing inventories, GIS mapping, asset condition assessment and developing projects. This is just the technical component of AMPs. This will have little impact on changing the organizations culture from being reactive to proactive until the management and financial components are developed and embraced.

BAMI-I & Purdue: Leading the Way to Advance AMUI

Within the Lyles School of Civil and Construction Engineering at Purdue University there is a unique focus on heavy civil construction and underground construction including AMUI (Asset Management of Underground Infrastructure) which is led by our Purdue UIT (Underground Infrastructure Team). This initiative



# BAMI-I

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ASCE 38-22: Utility Investigation and Documentation Standard

ASCE 75-22: Utility "As-Building" and Utility Record Drawing Standard

ASCE Subsurface Utility Engineering for Municipalities: Scope of Work and Pre-Qual Criteria

### 5 days: December 8-12, 2025

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Professor of Engineering Practice  
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# Message from Journal Editor

**Ms. Wei Liao**

PWAM

The buried asset management industry is undergoing a profound transformation, driven by the dual forces of technological advancement and the growing need for sustainable infrastructure solutions. As we look to the future, the challenges remain clear: how do we enhance asset quality, optimize management processes, and extend the lifespan of our critical infrastructure?

This issue of the journal delves into these pressing questions by revisiting the key discussions from the 2024 Global Buried Asset Management Congress (GBAMC) and exploring groundbreaking developments in the field. The congress invited more than 30 industry thought leaders to deliver keynote presentations and share insights on municipal infrastructure management, technological innovation, energy sustainability, and asset management policies. The speakers presented cutting-edge research and practical experiences, addressing the opportunities and challenges of buried asset management.

The key discussions of the 2024 GBAMC centered on Municipal Infrastructure Management Innovations, Technological Innovations & Applications, Energy & Sustainability, Innovative Practices & Policy Discussions, and Fundamentals of Asset Management.

These sessions explored cutting-edge advancements, strategic planning, and policy frameworks aimed at improving the efficiency and sustainability of buried asset management.

Building on these discussions, this issue of BAMI-I features several articles that highlight different aspects of buried asset management. In *A Lifetime of Innovation: The Story of a Relentless Entrepreneur in Buried Asset Management*, we delve into the experiences of an industry professional whose dedication to innovation has significantly contributed to advancements in buried asset management. His story underscores the importance of not just technological progress but also the practical efforts and determination of individuals committed to improving the field.

Another key area of focus in this issue is quality control in buried asset management, particularly in the context of SUE. The articles *The Crucial Difference: SUE Article* and *The Critical Role of Quality Control in Subsurface Utility Engineering (SUE) and Utility Coordination* examine how rigorous quality control measures and standardized processes can significantly reduce construction errors and improve data reliability. As buried infrastructure projects become more complex, ensuring precision in planning and execution is more critical than ever.

The application of innovative technologies in infrastructure sustainability is also a central theme. In *CPM and BulletLiner - Riverside Force Main Project*, we look at a real-world example of how new materials and advanced repair techniques can enhance pipeline durability while minimizing long-term maintenance costs. This case study reinforces the importance of integrating long-term sustainability considerations into asset management strategies.

Financial planning is another key factor in successful asset management, particularly for small utility systems. The article *Rates for Small Systems* explores the challenges that small water systems face in maintaining financial sustainability. The discussion highlights critical questions: How can utility providers develop reasonable rate models?

How can they balance financial stability with public affordability? How can they optimize resource allocation to improve overall efficiency? These issues are not unique to small systems but resonate across the industry, emphasizing the need for well-structured financial planning to ensure long-term operational stability.

As we reflect on these topics, it becomes evident that the future of buried asset management depends on a balanced approach that combines technological innovation with rigorous standardization and financial prudence. The industry is moving towards greater efficiency, reliability, and sustainability, but achieving these goals requires a commitment to best practices in lifecycle asset planning.

Looking ahead, several key priorities emerge. Standardization must continue to be a cornerstone of buried asset management, ensuring that data accuracy and engineering quality remain at the highest levels. Additionally, optimized management strategies are crucial for extending asset lifespan, reducing maintenance costs, and improving operational efficiency. Equally important is the need for collaboration across industries, as the future of buried infrastructure management will depend on shared knowledge, coordinated efforts, and strategic partnerships.

The 2024 GBAMC offered valuable insights into the evolving landscape of buried asset management. This issue of the journal continues that momentum, serving as a platform for further sharing and discussion, ensuring that the exchange of knowledge and ideas continues beyond the congress. As an industry, we must continue to bridge the gap between technological advancements and practical implementation, transforming innovative ideas into tangible solutions that drive long-term sustainability.

BAMI-I remains committed to supporting the industry's growth through education, collaboration, and the promotion of best practices. By working together, we can navigate the challenges ahead and build a stronger, more resilient buried infrastructure system.

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- Introduction to Appropriate Websites & Tools
- Risk Management
- Government Regulations
- Case Study Examples

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- Asset Inventory, Organization Strategies & Tools
- Water & Wastewater Condition Assessment
- Data Content, Analysis, Sharing & Distribution

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- Strategic Internal & External Financing Tools
- Public-Private Partnerships and Design- Build
- Level of Service and Capital Improvement Plans
- Life-Cycle Costing
- Case Study Examples

### Why offer courses in Asset Management?

The Buried Asset Management Institute-International (BAMI-I) created the Certification of Training in Asset Management (CTAM) program to increase awareness and train utility personnel on the best way to implement and use asset management to extend the life and efficiency of their water and wastewater systems. CTAM is an educational series for obtaining certification of training in the management of water asset infrastructure.

### Levels of Certification

- Certificate of Completion – requires completion of each course
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- Professional Water Asset Manager (PWAM) – requires completion of CTAM 100-400, four years of relevant asset management experience, and an application submitted to the BAMI-I Asset Management Certification Board

### Benefits of the CTAM Series

- Expand your knowledge and access to resources to enable you to initiate, continue or improve your own asset management program.
- Earn internationally recognized certification in the field of asset management.
- Earn CEU / PDHs\* for each course.

# SWITZ CITY, IN: ASSET MANAGEMENT PLAN (AMP)

## PROGRESS REPORT



utilities in Indiana, while \$400,000 is designated for Switz City's emergency repair projects. This initiative supports Indiana Senate Bill 272 (2022), which mandates approved AMPs for all water utilities applying for state infrastructure funding.

### Project Progress & Key Milestones

A special thanks to the following partners for voluntarily providing early support for the Switz City AMP project, helping to establish the initial asset management framework and foundational data collection:

Ziptility contributed existing asset data for Switz City and conducted

an initial asset condition assessment. Notably, team member Adam Hershberger later joined AIRW, continuing to support the AMP project. InfoSense (Acoustic Assessment) performed SL-RAT acoustic testing across 90% of the sewer collection system, classifying pipe conditions using a color-coded GIS map. Utility Inspection Services (UIS) conducted CCTV inspections to assess pipe blockages and detect structural defects. Additionally, 4M Analytics (GIS & Satellite Imaging) introduced AI-driven satellite imaging to enhance asset location mapping and developed comprehensive

geospatial asset databases for Switz City.

### 1. Key Expert Participants & Their Contributions & Progress

Since securing funding, BAMI-I and its partners have made significant progress across multiple fronts. The project has engaged expert organizations to perform various analyses, evaluations, and implementations to ensure a comprehensive and data-driven AMP for Switz City.

#### 1.1 Pipeline & Sewer System Condition Assessments

- **ADS (Flow Monitoring Services)**

ADS provided essential flow monitoring services for the project, contributing to the assessment of infiltration and inflow (I&I) levels. ADS has successfully completed its flow monitoring and data collection work for the Switz City AMP project. In September 2024, ADS installed three flow meters at critical locations within the sewer system. Over the next several months, from September 2024 to January 2025, they conducted comprehensive flow monitoring to assess infiltration and inflow (I&I) levels. With the completion of this phase, ADS has provided crucial pipeline flow data, which will be used for risk assessment, system optimization, and informed decision-making in asset management planning.

**T**he Switz City, IN Asset Management Plan (AMP) project was launched in January 2023 as a collaborative effort between BAMI-I, the Alliance of Indiana Rural Water (AIRW), Ziptility, Bynum Fanyo Utilities (BFU), Purdue Underground Infrastructure Team (Purdue UIT), and several industry partners. In July 2024, the project received an initial \$650,000 in funding from the Indiana Finance Authority (IFA). Of this amount, \$250,000 is allocated to support the development of a comprehensive, scalable, and efficient asset management model for small

- **ACE Pipe Cleaning Company**

ACE Pipe Cleaning Company has completed its assigned tasks and submitted the relevant data and reports. In September 2024, the team carried out sewer pipe cleaning and CCTV inspections, successfully identifying previously unlocatable manholes. Following this, in October 2024, they conducted smoke testing within the wastewater collection system to detect leaks and unauthorized connections. Their findings contribute to a more comprehensive understanding of Switz City’s sewer infrastructure and will inform future maintenance and rehabilitation efforts.

### 1.2 Engineering & Infrastructure Analysis

- **George Kurz (Independent I&I Consultant)**

George Kurz, serving as an independent I&I consultant, led the infiltration and inflow (I&I) analysis for the project. His work focused on evaluating the extent of I&I within the wastewater system to identify potential inefficiencies. In October and December 2024, he provided detailed engineering reports on flow and rainfall monitoring, offering critical insights that will support data-driven decision-making for infrastructure improvements and asset management planning.

- **Kurt Wright, Independent WWTP consultant**

Kurt Wright conducted a comprehensive evaluation of Switz City’s wastewater treatment plant (WWTP) as part of the asset management planning process. In November 2024, he visited the WWTP for an on-site assessment and participated in multiple virtual discussions with project stakeholders to refine his analysis. Following these efforts, he has submitted the official evaluation report, which includes a detailed assessment of the WWTP’s infrastructure, current operational challenges, and recommendations for future upgrades. His findings have also been incorporated into a dedicated WWTP chapter within the Asset Management Plan (AMP), providing a strategic framework for long-term system improvements.



### 1.3 Financial & Utility Management Analysis.

- **Water Finance Assistance (WFA)**

Glenn Barnes from Water Finance Assistance (WFA) visited Switz City on November 4, 2024, where he introduced the ongoing work on the rate structure and led a discussion on the city’s financial data. As part of WFA’s contributions, he conducted a comprehensive rate study to evaluate affordability, financial health, and long-term funding strategies for the city’s utilities. His findings will be presented to Switz City officials, providing valuable insights to support informed financial planning and sustainable utility improvements.

### 1.4 Data Collection & Quality Control

- Purdue UIT (Underground Infrastructure Team) – Project lead, overseeing coordination and execution.

- AIRW (Alliance of Indiana Rural Water)
- Provided field support for data collection, condition assessments, and project management.
  - Assisted in coordinating project meetings and stakeholder engagements.
- BFU (Bynum Fanyo Utilities)
  - Supported data collection, field evaluations, and infrastructure inspections.
  - Managed water meter replacements and contributed to sewer system evaluations.
- Smart Views, LLC (QA/QC Review)
  - Conduct a Quality Control (QC) review of the field data and verify the accuracy and completeness of the Pipeline Condition Assessment (PCA) data, ensuring compliance with IFA’s “Gold Standard” model for asset management under Indiana Senate Bill 272.

## 2. Project Management & Team Coordination

Three key organizations—BAMI-I, AIRW, and BFU—have served as the primary execution and management teams, with BAMI-I leading the initiative. To ensure effective project implementation, they have conducted eight stakeholder meetings focused on execution, data analysis, and strategic planning. Regular collaboration with Switz City officials, particularly the Town Board, has helped maintain transparency and alignment with local needs. Additionally, they have facilitated cross-organizational data integration by coordinating efforts among engineering firms, technology providers, and financial analysts to develop a comprehensive Asset Management Plan (AMP). To ensure efficient budget utilization, they have also provided continuous financial and administrative oversight, managing invoices, contracts, and reimbursement requests.

## 3. Next Steps & Upcoming Priorities

With strong data foundations established through multi-party collaboration, the project is now progressing into the next phase, focusing on the finalization of the Switz City Asset Management Plan (AMP) report and its pilot implementation. The next steps involve integrating all collected data into the final document, reviewing and validating infrastructure condition assessments, and developing 20-year financial projections along with risk management strategies. Simultaneously, the pilot phase will include targeted asset upgrades, such as inflow and infiltration (I&I) repairs, improvements to the wastewater treatment plant (WWTP), and the installation of new water meters to enhance system efficiency.

## Conclusion

The Switz City AMP project has made significant progress in its first six months, laying a solid foundation for the creation of a comprehensive and replicable asset management model. With strong collaboration between BAMI-I, AIRW, Purdue UIT, and industry experts, the project remains on track to achieve its ultimate goal of enhancing asset longevity, improving fi-

ancial sustainability, and ensuring regulatory compliance for small utilities across Indiana.

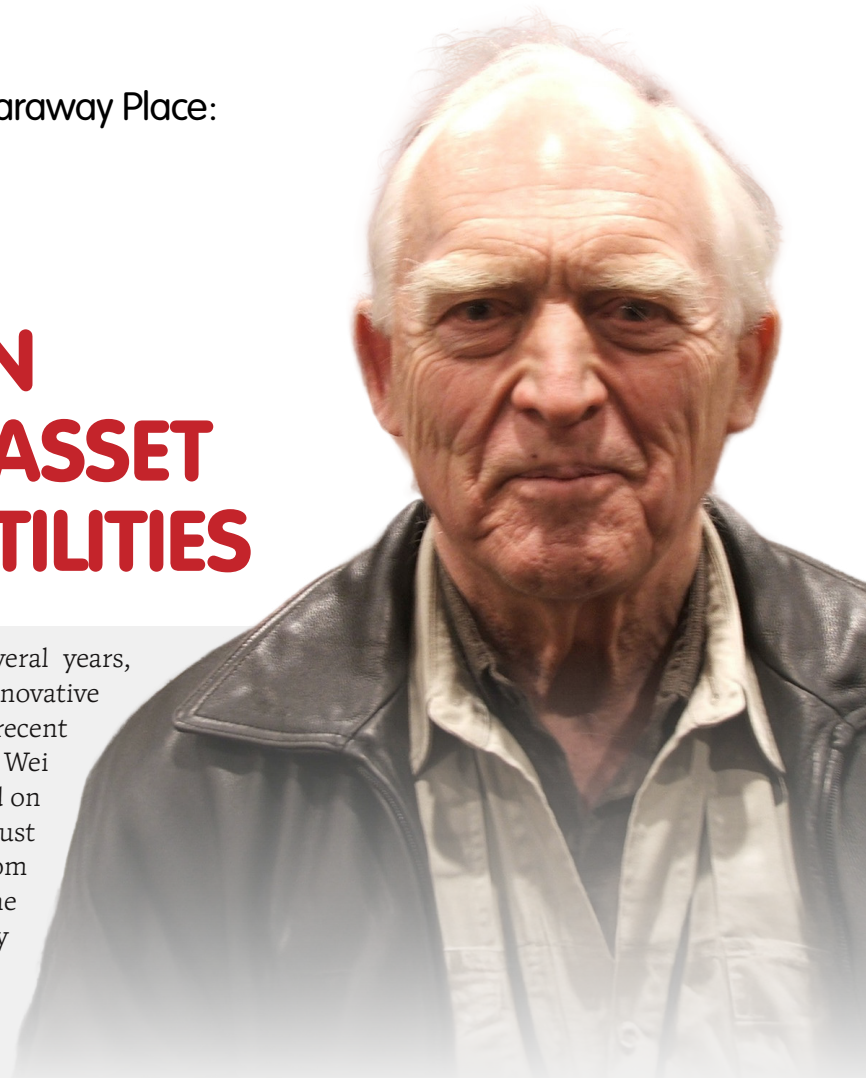
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Tom Iseley - [diseley@purdue.edu](mailto:diseley@purdue.edu)



A Little Butterfly Flapping Its Wings in a Faraway Place:

# THE STORY OF A RELENTLESS ENTREPRENEUR IN UNDERGROUND ASSET MANAGEMENT UTILITIES



**Author Note:** Wei Liao has known Lembit for several years, maintaining contact out of deep admiration for his innovative and entrepreneurial spirit. Upon learning of Lembit’s recent technology transfer deal to the Middle East and Africa, Wei reached out to capture his story. What follows is based on their conversation in December 2024, reflecting not just on Link Pipe’s legacy, but on the broader lessons from a lifetime dedicated to engineering innovation. The title “A Light Butterfly Flapping Its Wings in a Faraway Place” comes from a story Lembit once shared with Wei, symbolizing how small innovations can create lasting global impact.



**I**n the world of underground asset management, few names carry the weight of Lembit Maimets, a 98-year-old man whose career spans over four decades of engineering breakthroughs, business resilience, and industry-shaping innovations. From humble beginnings as a refugee to founding a pioneering infrastructure company, Link-Pipe, LLC, his story is one of persistence, ingenuity, and an unwavering commitment to long-term solutions.

“I left Government work because I thought I had reached the end of new challenging opportunities”

## The Beginning of a 44-Year Journey

Lembit recalls. With a mortgage on his house and an innovative pipe repair design

in hand, he launched into business. The early years tested his resolve - for the first nine years, while free from competition, he struggled with sales and market penetration.

1989 marked a turning point when Insituform’s patents expired, bringing “short liners” to the market. This competition, surprisingly, helped Link Pipe find its customer base. Facing a market of nearly 30,000 North American cities and towns, Lembit adopted what he calls a “shotgun approach” - sending letters and attending exhibitions to find potential customers.

## The Early Years of an Entrepreneur

While most professionals start thinking about retirement at 54, Lembit was just getting started. In 1980, he embarked on what would become a four-decade journey in underground infrastructure innovation, all stemming from a simple yet groundbreaking idea—repairing instead of replacing pipelines.

Entrepreneurship wasn’t a choice for Lembit - it was in his DNA. His business acumen emerged in unlikely circumstances: as being

in the displaced person camp in Germany after the war, he carved out opportunities trading Danish currency for German money. Later, after moving to Canada, he began consulting as early as his first year of engineering school. His career at the City of Toronto was marked by parallel entrepreneurial ventures. While maintaining his municipal role, he took on private consulting work, including winning a prestigious university building design competition. The project came to him after an architect rejected the proposed engineer. Lembit’s innovative design won approval, leading him to complete the entire project at his kitchen table - an early sign of his resourceful approach to engineering challenges.

## From Innovation to Enterprise

A pivotal moment came when a consulting company invited him to manage their automated post office projects. After completing this venture, he established his own consulting firm specializing in high-rise buildings. The true turning point arrived with an oil company’s proposal to extend their intake system. Recognizing the competitive land-

scape, Lembit developed an innovative solution: rather than replacement, he proposed recovering and extending the existing intake. While developing a sample, His wife noticed his prototype work and suggested patenting it - marking the beginning of Link Pipe.

However, securing a patent was only the first step. No manufacturer wanted to produce his innovative product. Instead of giving up, he began producing it himself—starting in his bedroom dresser, later expanding to rented manufacturing facilities. This period tested his resilience but also demonstrated his determination to bring innovation to market.

### Breaking into the Global Market

As Link Pipe’s production grew from a bedroom dresser to a rented facility, the company caught international attention. Japanese companies recognized the potential in Lembit’s technology, initially seeking to purchase the patent outright. Instead, he negotiated a strategic licensing deal for the Japanese market, maintaining long-term control over his innovation.

The following year brought bigger opportunities. Two Japanese companies, including Iseki Polytech, proposed a global joint venture. They provided capital investment while maintaining the Toronto headquarters, marking Link Pipe’s first major international expansion.

However, just as things were taking off, the Japanese economy collapsed, throwing the venture into turmoil. When Japanese representatives arrived to close the company, Lembit stood firm, declaring “over my dead body.” After three days of intense negotiations, he secured full control by agreeing to pay \$56,000 over six months.

This pivotal moment demonstrated both the risks and rewards of international partnerships. More importantly, it showcased that true entrepreneurship isn’t just about great ideas—it’s about navigating crises with strategic decisions. The company would continue independently until its closure in July, 2024, leaving a lasting legacy in global infrastructure innovation.

### A Commitment to Engineering Excellence

What set Lembit’s technology apart was its unmatched durability. While competitors designed 50-year solutions, his



stainless steel reinforcement system was built to last 100 years.

He worked with The Nickel Institute, who recommended a proven alloy dating back to 1918—the same material used in iconic structures like London’s Savoy Hotel canopy and New York’s Chrysler Building, both of which showed no degradation after 70 years.

“If I just make it a bit thicker, I can extend its lifespan by another century. Why settle for mediocrity?”

Despite this engineering breakthrough, municipal procurement officers often resisted. Many city engineers, fo-

cused on short-term budgets, responded dismissively:

“I retire in 15 years—I don’t care what happens after that.”

This short-term mindset became one of the biggest barriers to adoption, but Lembit refused to compromise on quality.

“I wanted it to have the most reliable product on the market, and it is. Small diameter Link-Pipe repairs will last at least 100 years. Large diameter ones, having thicker structural cores, can last several centuries.”

Despite creating technology that would “outlast all its present competitors,” mainstream adoption proved challenging, partly due to not having created industry standards.

### Building a Business Without Investors

Over 44 years, Lembit’s company, Link Pipe, worked with over 6,000 municipalities, with 500 repeat customers. His business philosophy was unconventional—he never took on investors.

“When you take an investor, they don’t understand what you’re doing. They interfere. I wanted to be in full control.”

While this approach kept the company smaller than it could have been, it also ensured complete autonomy in technical decisions.

He also prioritized his employees, fostering a loyal workforce. One of his key managers, originally from China, stayed



for 35 years, helping develop crucial improvement tools.

“Though legally it was my company, I felt it was truly theirs too. They made their living here, raised families, bought homes—the company provided everything they needed.”

### Industry Impact and Global Expansion

Beyond its flagship technology, Lembit secured over 100 patents, with 25 reaching full production. These innovations spanned multiple applications, from municipal pipeline rehabilitation to deep mining operations.

One standout project was a gold mine in Peru, where Link Pipe’s casing system operated successfully for 15 years under extreme conditions, proving its reliability beyond urban settings.

In the U.S., however, recently local protectionist policies created roadblocks. Despite free trade agreements like NAFTA, some municipalities insisted on buying only U.S.-made products, leading to missed contracts.

Recognizing the need for a new strategy, Lembit shifted focus to the Middle East and Africa, where governments valued technical expertise over bureaucracy. Today, his technology is being manufactured and implemented in Cairo, expanding its global footprint.

### A Lasting Legacy and Future Industry Trends

After 44 years, Link Pipe ceased North American operations in July 2024, marking the end of an era. But Lembit’s innovations live on through global technology transfers, ensuring his impact continues for generations.

Looking ahead, he believes the underground infrastructure industry is at a tipping point. Many early CIPP (Cured-in-Place Pipe) repairs are reaching their service limits, creating massive demand for durable solutions. Lembit sees significant opportunities in infrastructure renewal.

“Municipal budgets are shrinking, but infrastructure failures are accelerating. Only more durable solutions can prevent an economic crisis.”

Despite his incredible career, he acknowledges that success was a mix of skill, perseverance, and timing.

“With my current experience, I



wouldn’t start again. Too much luck was involved.”

His biggest lesson for new entrepreneurs?

“If you’re an engineer, partner with a business-minded person. You need both perspectives to truly succeed.”

Looking back, Lembit acknowledges both successes and missed opportunities. “I am not the businessman, I am a technological person,” he reflects candidly. A potential partnership with Larry Christ, whom he describes as “a good businessman,” might have led to greater growth. This highlights his key lesson: successful entrepreneurship requires balancing technical excellence with business acumen.

To new entrepreneurs, particularly immigrants, Lembit emphasizes global awareness: “Keep your eyes open and your ears listening.” He stresses the importance of understanding not just economics but global politics and technological trends. His journey demonstrates that success comes not just from technical innovation but from understanding market realities and maintaining adaptability in a changing world.

On patents, Lembit offers pragmatic advice: “Patents are nice, but enforcing them in court costs so much money that in the end, you don’t know whether you win or lose.” He suggests that complex

manufacturing processes requiring specific expertise offer better protection than legal documents.

### Innovation in Infrastructure Monitoring

Beyond pipe repair technology, Lembit envisioned a revolutionary monitoring system for infrastructure. “I had this way of putting sensors into the pipes, into the culverts and underground pipes,” he explains. These sensors would report conditions directly to a central office, eliminating manual inspection needs. Operators could monitor infrastructure conditions in real-time, with red lights alerting them to problem areas across entire provinces.

Despite its potential to save significant costs - Ontario alone has 23,000 culverts to monitor - the system faced a common challenge of technological innovation: workforce displacement. “What do you do with the inspectors? They will lose their jobs,” Lembit notes. This highlighted a broader challenge in modern technological change: unlike the gradual adoption of technologies like telephones, today’s rapid digital transformation leaves little time for workforce adaptation.

The monitoring system concept remains unrealized but illustrates Lembit’s continuous drive for innovation. While the technology exists - “electronic device-





es nowadays are products you can buy in the store” - implementing such systems requires navigating complex social and organizational challenges, not just technical ones.

### Transitioning to a New Chapter

As of July 31, 2024, Lembit officially left the trenchless underground business, selling his technology to his long-time customer, Byggings, in Egypt. While stepping away from an industry he helped shape, he was far from retiring.

Now, he has shifted focus to a new passion—product invention. He has already been recognized for his innovations, receiving a Platinum Medal in France’s Prix Eiffel 2024 and a Gold Medal at the WII-PA 2024 International Competition.

“I’m now in the business of developing new products in fields I find interesting. There seems to be no promise of money in it, but it’s interesting for an old fellow. Keeps the old brain doddering along.”

Even after leaving his company, his relentless curiosity and passion for invention continue to drive him forward.

### A Legacy Beyond Business

Today Lembit maintains an active lifestyle with daily exercise routines - 40 minutes in the morning and 25 minutes in the evening. His home resonates with family life as his grandson, a dentist, has moved in with his family. The presence of his Chinese heritage great-grandson adds another generation to the household, bringing new energy to his post-business life. Despite retiring from Link Pipe, he remains intellectually engaged, He has dabbled in AI-driven asset management and is currently writing a book titled “You Can Also Live 200” with assistance from

a university professor, exploring new frontiers while maintaining his lifelong commitment to longevity and durability.

### Final Thoughts: The Unfinished Journey of an Innovator

Lembit’s story is a masterclass in resilience, innovation, and business acumen. He transformed an industry, navigated economic downturns, and proved that real engineering is about solving problems, not just making profits.

As global infrastructure challenges grow, perhaps one day, his 100-year pipeline technology will get the recognition it truly deserves.

Until then, Lembit remains what he has always been—an innovator, a problem-solver, and a visionary ahead of his time.

Author Note: After the author sent the draft of this article to Lembit for review. He returned in more detail about his early life: “I have written over 200 articles about my life. I hope to turn them into a book before I reach 120.

After I was 6, my mother, a school principal, became a single mom with two sons.

I attended a boy’s school that followed the Jesuits’ educational ideas as they were translated into Tsarist Russian education.

At 17 I was drafted from school to the army because they needed cannon fodder.

I survived and, after the war, I ended up in West Germany, where I found seven other survivors of my unit of 340.

I finished my high school last year, 1946, and entered the Mining Academy of Clausthal studying metallurgy.

I was too hungry to continue, and when the opportunity to emigrate to Canada presented itself, I took notice and

arrived to emigrate to Canada; I took the option.

Coming to Canada, I was offered a contract to work as a laborer drilling rock for blasting for 10 months.

I wanted to make more money, so I worked as a carpenter on a housing project for a while. Then, I was fired for lacking tools.

Then, I went to work for a forest company to cut Ontario’s last 6-ft diameter white pines.

1949, I entered the University of Toronto to study Civil Engineering and graduated in 1956, having a family with two children.

After graduation, I started working in the Toronto Building Department, finally being in charge of the structural design of the New City Hall, which a Russian Engineer did. The architect was Finnish.

When the city hall was finished, I was offered a Director of Buildings position in a Toronto suburb. My task was to reorganize the department of a village that had turned into a city.

I used Lickert’s and Sloan’s ideas, using an open-office environment consisting of task groups with no group supervisors. This last one was my personal contribution.

In 1971, I was offered a position in charge of a new automated post office project. My design was one of three proposals required by the Works Department. Mine was accepted. Two plants were built in Toronto.

After this, I started consulting. This involved designing steel and concrete high-rise office and apartment buildings in Toronto and old-age apartments in Sault Saint Marie.

After the 1978 economic crash in Canada, the Government withdrew mortgage support, and many small consulting companies closed; so did I.

The opportunity came my way, and I was offered a job with the National Research Council, working on the Associate Committee of the National Building Code.

After a year and a half on this, I started Link-Pipe. “



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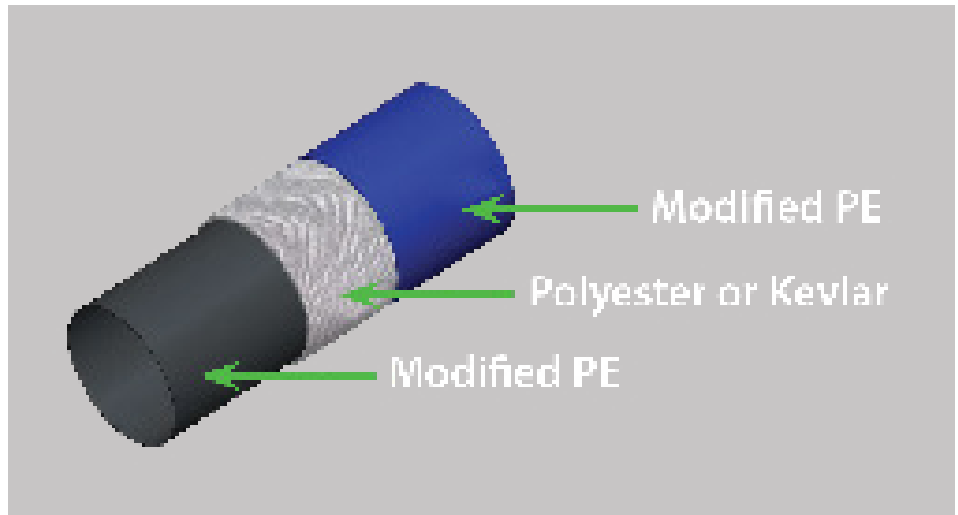
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CPM Pipelines and BulletLiner Systems Help Riverside Complete the Magnolia

# AVENUE SEWER FORCE MAIN PROJECT WITHIN BUDGET

**R**iverside is a city in and the county seat of Riverside County, California, in the Inland Empire metropolitan area about 50 miles southeast of Los Angeles. It is named for its location beside the Santa Ana River. Riverside was founded in the early 1870s. It is the birthplace of the California citrus industry.

The city owns and operates a sanitary sewer collection system consisting of over 830 miles of sewer lines ranging in size from 4 inches to over 50 inches in diameter with some more than 120 years old. There are 19 pump stations located throughout the city that range in size from 100 gallons per minute (gpm) up to 2,000 gpm providing service to those areas of geographic need. Treatment is provided at the Regional Water Quality Control Plant (RWQCP), which provides preliminary, primary, secondary, and tertiary treatment for a flow rated capacity of approximately 46 million gallons per day (mgd). In addition to wastewater from the City's collection system, the city also provides domestic and industrial wastewater treatment services for the Community Services Districts of Edgemont, Jurupa, and Rubidoux. The RWQCP comprises two treatment plants and a common tertiary



filtration plant, serving a population of almost 400,000 people. At the plant, wastewater is treated to tertiary levels before it is reused for irrigation or discharged to the Santa Ana River.

In 2024, the City of Riverside faced a significant challenge in rehabilitating a 2-mile-long, 24-inch concrete-lined and coated steel force main pipeline installed in the 1970s. The forcemain had experienced internal corrosion that affected its structur-

al integrity. Following a failure and major cleanup effort in the early 2000s, the pipeline was decommissioned and left out of service. The city constructed a redundant force main to maintain operations and decided to mothball the original pipeline due to concerns over further failures. However, increasing demands for system redundancy necessitated its rehabilitation.

The Magnolia Avenue Sewer Force Main Rehabilitation project focused on the repair and rehabilitation approximately 9,845 L.F. of an existing 24-inch Cement-Mortar Lined & Coated (CML&C) steel pipe with a cured-in-place pipe (CIPP) method via downstream inversion and closures at access pits on Magnolia Avenue. The project also included cleaning and closed-circuit television (CCTV) inspection of the pipeline before and after lining as well as all associated work necessary for a fully functional force main.

Municipal pipeline rehabilitation using a liner system generally offers significantly greater value compared to a total replacement. It is typically much less expensive, requires less permitting, causes minimal disruption to the community, and takes less time to complete. It can extend the life of existing infrastructure while still maintain-





ing functionality, making it a more cost-effective option for most situations where the pipeline is not severely damaged. Rehabilitation methods often cost 50-75% less than full pipe replacement, resulting in substantial savings. Because relining projects only have access pits and not open trenches the permitting requirements are much lower. This reduces time to completion, cost, and

increase expenses. Having to have water or gas service shut off for prolonged periods makes it hard for companies to go about their business as usual. There are also other factors to consider, including diverting traffic away from the area where the contractors are digging. Another factor with the dig and replace method is that surface restoration is also necessary.



complexity. Properly rehabilitated pipelines can have their lifespan extended by 50 years, delaying the need for complete replacement. Rehabilitation projects usually take less time to complete compared to full replacement, minimizing service disruptions. Project sections can be opened and closed within a day. The interruptions involved with the trenchless method are minimal. Businesses that require continuous access to utilities, such as restaurants, water parks, or manufacturing facilities, will benefit from this method. When using a Flexible Fabric Reinforced Pipe (FFRP) or CIPP pipelining for pressure applications, the restoration takes place from access pit to access pit. Digging to replace pipes will require more time, be more disruptive, and

Since the city had already constructed a separate force main pipeline to replace the existing one, they were aware of the cost and disruption implications. When it came to increasing capacity and redundancy in the area the obvious choice was to rehabilitate the existing pipe with a liner system.

CIPP is a trenchless method for repairing pipes that involves inserting a flexible liner into an existing pipe, inflating it, and then hardening it with heat or ultraviolet light. CIPP is suitable for repairing pipes that do not need to be upsized and can be completed in less time than other methods. CIPP was patented in 1977 and Insituform Technologies commercialized the patent and brought the technology to the United States shortly thereafter. Since its

inception, it is estimated that 50,000 km of cured-in-place pipe lining has been installed worldwide.

This technology is currently the most common method used in pipelining projects. The specifications used by the city in the bid process required contractors to bid using the CIPP solution. The bid proposals received exceeded the \$7 million budget by over 30%. Because the bids received were more than 30% over budget the bids were rejected, and an alternative solution was sought.

RCPM Pipelines proposed the BulletLiner System as an alternative solution to the city. CPM specializes in providing field inspection services for pipeline condition assessment projects and specialty pressure pipe rehabilitation systems and technologies. CPM provides services in a variety of industries including municipal water and wastewater, industrial, and power through sourcing methods that include direct to client, as well as collaboration with reputable contractors and many national consulting firms. CPM has executed thousands of projects throughout the United States. CPM strives to introduce and pioneer new technologies previously unavailable in the United States and diligently evaluates these technologies prior to introducing them to the client network. The BulletLiner System is an innovative, cost-efficient approach introduced to the U.S. by CPM Pipelines in 2013. It is a semi-structural Class 3 pipe FFRP rehabilitation system. It is NSF 61 approved and suitable for the transportation of various liquids including potable water, reclaimed water, wastewater, with drinking water approvals in numerous countries. It is a three layer product including an inner liner made of modified polyethylene (PE), an inner woven pressure layer of polyester or Kevlar and an outer jacket of modified PE. It can operate at pressures from 75psi to 300 psi. (Figure 1). It is a close fit liner and can be deployed in pipes from 2 inch to 54 inches in diameter. It can be used in many trenchless rehabilitation applications including gas and oil and works independent of the host pipe, or in conjunction with the host pipe dependent upon the specific project design parameters and pressure requirements. The BulletLiner System has been internationally proven for over 25 years. This method has been used to rehabilitate over 200 pipeline segments totaling over 1000 km of pipe length. The BulletLiner has a basic three step installation procedure; 1) fold the liner into a U-shape, 2) Pull the liner through the host pipe, and 3) expand the liner. (Figure 2a,b,c).



There is no connection between the pipe and liner, so the liner works independently from the pipe. The slightly rigid liner maintains a round shape inside the pipe even without pressure. It is flexible and can easily be pulled through 45 degree bends. (Figure 3). The liner is flexible, foldable, and light with the material strength of a steel pipeline. Due to the extreme flexibility, it opens up a variety of rehabilitation applications without having to trench and remove pipelines. Installation requires two small excavation pits or access points for rehabilitating a deteriorated section of pipe. (Figure 4). This reduces the conventional pipeline replacement noise, traffic disturbances,

time-consuming reconstruction as well as environmental and economic impacts to surrounding landscape and businesses. This system, designed for restoring the structural integrity of aging pipelines, offered several advantages over traditional methods, including requiring less access pits, streamlining installation and providing a similar solution to CIPP at a lower cost. Trenchless rehabilitation techniques require minimal excavation, reducing surface disruption and inconvenience to residents and businesses. FFRP systems can be pulled 2000 feet or more between access pits depending on size and geometry. (Figure 5). In some cases, when pipe is straight, it can be pulled up to

8000 feet. Minimizing access pits reduces costs and impact on the surrounding community and traffic.

This solution provides a budget-friendly, permanent rehabilitation to aging infrastructure with a 5-year material warranty, and 50-year design life at approximately one-third the cost of dig and replacement.

CPM introduced the city to the BulletLiner System and the city revised its specifications and bid documents to allow for the use of this technology. The project was rebid with the BulletLiner System specifications, and SAK Construction emerged as the sole bidder, meeting the City's budgetary and technical requirements. By reducing access pits from 20 to 11 and liner installations from 15 to 8, the BulletLiner System brought the project back within budget at \$6.75 million. Completed in late 2024 the project achieved a renewed pipeline with a 50-year design life with a 5-year warranty.

The City of Riverside has successfully modernized its sewer infrastructure and maintained redundancy while adopting an innovative, cost-effective solution. This project underscores Riverside's commitment to proactive asset management and positions the city as a leader in adopting new technologies to enhance utility performance.



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Paul Gagliardo is an independent consultant assisting and advising innovative water sector startup companies. He has held leadership positions in the water and wastewater business for over 30 years at the city of San Diego, American Water and multi-national consulting companies. Paul has been a judge for the Imagine H2O Accelerator since its inception in 2009. He is a registered engineer in the state of California and has a Master's Degree in Public Health. He is also the host of The Water Entrepreneur podcast.



# CPM PIPELINES AND BULLETLINER SYSTEMS HELP RIVERSIDE COMPLETE THE MAGNOLIA AVENUE SEWER FORCE MAIN PROJECT WITHIN BUDGET



By Paul Gagliardo  
MPH, PE | Gagliacqua Consulting



Riverside County, located 50 miles southeast of Los Angeles, is known for its role in the California citrus industry. Less known is the City of Riverside's extensive sanitary sewer system, which spans over 830 miles and serves nearly 400,000 residents. Wastewater is processed at the Regional Water Quality Control Plant (RWQCP), which provides advanced treatment and water reuse services.

In 2024, the city faced the challenge of rehabilitating a 2-mile, 24-inch force main installed in the 1970s. After internal corrosion led to its decommissioning, increasing system demands prompted its rehabilitation. The Magnolia Avenue Sewer Force Main Rehabilitation project aimed to repair 9,845 feet of deteriorated steel pipeline. While a cured-in-place pipe (CIPP) method was initially planned, high bid costs—exceeding the \$7 million budget by over 30%—required an alternative solution.



CPM Pipelines proposed the BulletLiner System, a cost-efficient, semi-structural FFRP rehabilitation method. Introduced in 2013 and internationally proven for over 25 years, this system uses a flexible, foldable liner, minimizing surface disruption and reducing installation costs. It required fewer access pits and brought the project within budget at \$6.75 million. SAK Construction became the sole bidder, meeting technical and financial requirements.

The completed project now features a 50-year design life and a 5-year warranty. By adopting innovative technology, Riverside modernized its sewer infrastructure efficiently, demonstrating leadership in proactive asset management and utility performance enhancement.



[www.bulletlinersystem.com](http://www.bulletlinersystem.com)

# CANNOT BE UPDATED AND REPLACED BASED ON 2-4% MHI



Let's take a snapshot of utility rates in the USA from a particular angle—as a percentage of Median Household Income (MHI).

Think of a charcuterie board for food for a gathering. No one would consider the charcuterie board as a full-course meal. Using that analogy, the information provided below is a charcuterie board of information about rates collected from the Internet. It is not a full-course meal; in other words, it is not intended to be considered an academic exercise or research project. Its value is to provide general information about how Americans perceive their utility bills.

Internet research was engaged near the end of 2024 for average monthly utility bills in the United States for various categories like water, sewer, electricity, natural gas, etc. A wide variety of sources were retrieved from the internet search engine. A decision was made to select only one source for average monthly utility bills to provide some type of statistical normality to the data. Also, only one source was used for the annual monthly income, and that was the United States Census Bureau. Readers can easily search these same sources for themselves, should they desire to do so.

The two chosen sources for the information in this Appendix are provided below.

This Old House website : [www.ThisOldHouse.com](http://www.ThisOldHouse.com) (By citing information from This Old House, the author is not rendering an opinion that the data is accurate. Rather, it was readily available information from the internet, and the source was considered to be reasonable. Therefore, it was used in the exercise below. The reader can learn more about the source through their website.)

The United States Census Bureau website <https://www.census.gov/library/publications/2024/demo/p60-282.html>

Some assumptions need to be made in this discussion. Again, this is not a scientific study. Therefore, assumptions and generalizations must be made. However, the reader will understand the context of these assumptions and generalizations and will be able to draw their own conclusions.

Assumptions in the use of the data are provided below.

- A “Theoretical Household” is set up below. The “Theoretical Household” uses various utilities, for which a

monthly bill was extracted from the website of This Old House. No level of granularity was provided regarding them. For example, an electric bill and a natural gas bill are shown on This Old House website; however, no details are given about these two bills. Are these two utility bills interrelated such that they are for a typical residence that uses both natural gas and electricity? The answer is not known. Figure 1 assumes that this is the case. Therefore, users of this information are made aware of the data's weaknesses.

- There is no indication on This Old House website regarding the average size of the residence connected to these utility bills.
- The salary is presented as an annual Median Household Income (MHI). Note that it is a median and not an average; however, the utility bills are an average across the board for U.S. citizens.
- The U. S. Census Bureau and This Old House are obviously not connected in any way. Therefore, it begs the question, “Is the average residence for which the monthly utility bills provided by This Old House website a residence where the MHI is the same as the median MHI?” The answer is not known. Figures 1, 2, and 3 assume that this is the case.
- A presupposition is made regarding the data utilized below: it is a reflection more of rural America than metropolitan areas like New York City, Chicago, or Los Angeles. The author has no data upon which to base this presupposition. The reader may choose to ignore this presupposition if they so choose.
- Despite the above, it is believed that the use of the data, as shown below, does provide some common sense information, although it may not be one hundred percent accurate.

No.	Category	Average Monthly Utility Bill	Source	Date
1	Sewer	\$71	Thisoldhouse.com	2024
2	Water	\$39	Thisoldhouse.com	2024
3	Gas <sup>1</sup>	\$80	Thisoldhouse.com	2024
4	Internet/Cable	\$118	Thisoldhouse.com	2024
5	Electric	\$135	Thisoldhouse.com	2024
6	Phone	\$166	Thisoldhouse.com	2024
<b>Total of above utility bills</b>		<b>\$610</b>	Thisoldhouse.com	2024

Figure 1: Average Monthly Utility Bills in the USA for a “Theoretical Household”

<sup>1</sup>It is assumed that this Old House website means natural gas

## A “Theoretical Household”

The “Theoretical Household” is set up below, showing the average monthly utility bills as derived from This Old House website.

The U.S. Census Bureau states that the annual Median Household Income (MHI) in the USA for the calendar year 2023 was \$80,610. Since the utility rates in Figure 1 are for the calendar year 2024, the MHI must be adjusted upward to represent the MHI for the calendar year 2024. Using a nominal CPI of 3%, the 2023 MHI was adjusted upward to \$83,028, which is \$6,919 per month.

## Outcomes: Percentage of MHI for Utility Bills

Category	Monthly Amount
All Utility Bills	\$610
Median Monthly Household Income (MHI)	\$6,919
All Utility Bills as a Percentage of MHI	8.81%
<b>All Utility Bills as a Percentage of MHI - Rounded Up</b>	<b>9%</b>

Figure 2: Percentage of All Monthly Utility Bills to MHI

Using the data mentioned above, Figure 2 shows that the total of all monthly utility bills for the “Theoretical Household” represents 8.81% of the monthly MHI, which rounds up to 9%.

Utilizing the same data, Figure 3

Category	Monthly Amount
Water & Sewer Bills Only	\$110
Median Monthly Household Income (MHI)	\$6,919
Water & Sewer Bills as a Percentage of MHI	1.59%
<b>Water &amp; Sewer Bills as a Percentage of MHI - Rounded Up</b>	<b>2%</b>

Figure 3: Percentage of Water and Sewer Monthly Utility Bills to MHI

shows that the percentage of monthly water and sewer bills for the “Theoretical Household” compared to the monthly MHI is 1.59%, which rounds up to 2%.

From the exercise above, it would appear that, on average, citizens of the United States, generally speaking, are used to paying around two percent of their monthly income for water and sewer service. This brings back memories of something that the EPA published in the mid-1990s.

### EPA and Rate Benchmarks

In February 1997, the Environmental Protection Agency published document EPA-832-B-97-004 titled “Combined Sewer Overflows—Guidance for Financial Capability Assessment and Schedule Development” (1997 Guidance). The purpose of the 1997 Guidance is presented below.

“The Combined Sewer Overflow Policy recognizes the need to address the relative importance of environmental and financial issues when developing an implementation schedule for Combined Sewer Overflow controls to be contained in the long-term control plans and the NPDES permit or other enforceable mechanism.”

EPA developed the 1997 Guidance to address the many Combined Sewer Overflows (CSOs) that existed in the USA at that time. One of the goals of the CWA was to reduce these CSOs. However, reducing them created a tremendous cost

burden on communities with combined sewers, and they were struggling to comply. Hence, the EPA provided local communities with information to determine their financial capability for compliance. Based on the 1997 Guidance, if a community found that they did not have the financial wherewithal to reduce the CSOs in the time frame directed by the CWA, the Regional EPA Administrators and State Agencies worked out a revised compliance schedule to ease the financial burden.

The 1997 Guidance provided a two-phased approach. Phase one was a residential indicator, while Phase two was a permittee financial indicator. A matrix could then be developed by comparing the residential indicator with the permittee financial indicator. From that matrix, a determination could be made regarding the community’s ability to afford CWA compliance.

Phase one, the residential indicator, was based on determining the cost per household (CPH) for compliance and dividing it by the median household income (MHI). The CPH included the utility’s annual wastewater system costs plus CSO compliance. The reader is directed to the 1997 Guidance for details about this indicator if they are interested; it is still available on the Internet. The

Financial Impact	Residential Indicator (CPH as % MHI)
Low	Less than 1.0 Percent of MHI
Mid-Range	1.0 – 2.0 Percent of MHI
High	Greater than 2.0 Percent of MHI

Figure 4: EPA’s Table for the Residential Indicator

table presented in Figure 4 is copied from the 1997 Guidance section regarding the residential indicator. Note the range of 1.0 and 2.0 Percent of MHI. Greater than 2.0 Percent of MHI is considered “High.”

In March 2024, the EPA published document EPA-800B2001, titled “Clean Water Act Financial Capability Assessment Guidance” (2024 Guidance). This document refers back to the 1997 Guidance but enhances and develops the concepts contained in it, as well as introducing other indicators such as the Lowest Quintile Poverty Indicator Score. It is interesting to note that the 2024 Guidance still uses the table shown in Figure 4, which is shown on page 9 of

that document. Twenty-seven years later, the range of 1.0 and 2.0 Percent of MHI remains. And greater than 2.0 Percent of MHI is considered “High.”

### EFC and Rate Benchmarks

There are several Environmental Finance Centers, or EFCs, across the United States which are affiliated with the EPA. They were established to assist communities with environmental finance issues. Their goal is to help local governments and organizations address and manage the financial aspects of environmental programs, such as water and wastewater infrastructure, stormwater management, and sustainable development. The EFCs provide a range of services, including technical assistance, training, and financial planning support. They work to enhance the ability of communities to develop and implement effective environmental programs by offering expertise and resources tailored to local needs. They have been conducting research and providing assistance to Local Government Units (LGUs) regarding Rate Setting and Asset Management for many years, focusing on small communities. There is an EFC located within the UNC School of Government <https://efc.sog.unc.edu/>. The UNC–EFC maintains a Rate Dashboard on its website. A screenshot of it is presented in Figure 5. The lower right corner presents a dial showing an indicator that is titled “Median Affordability.” This

indicator is based on the cost of annual water and sewer bills as a percentage of the Median Household Income. Figure 4 shows the water and sewer bills and the Median Affordability for a random North Carolina municipality. Here, in this case, its Median Affordability is 1.36% of MHI. It is interesting to note that the range for this municipality is between 1.0 and 2.0 percent MHI.

In discussing the Median Affordability dial with key representatives of UNC–EFC, they state that although it is presented on their Rate Dashboard as a dial starting with zero and ending with six percent, it is not intended to make any judgments as to whether a particular municipality’s Median Affordability is low, medium, or high. This dial is only



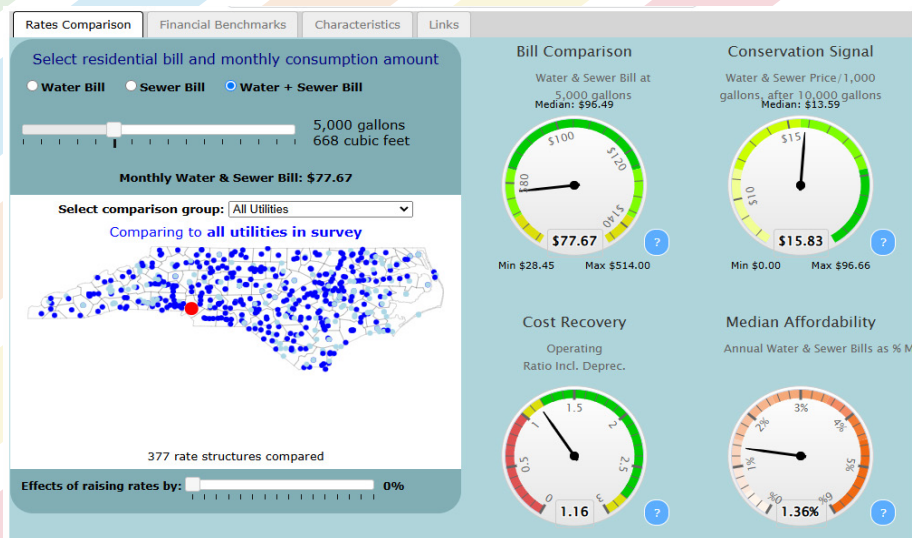


Figure 5: UNC-EFC Rate Dashboard

stating a value, and that is all. Thus, UNC-EFC does not render a determination regarding this indicator one way or the other. However, it is impossible to miss the image that the Median Affordability dial shows an increasingly darker color as the dial passes beyond 3% and that it stops at 6%.

### In the Water Industry Today

From the information that has been discussed, it appears that the average citizen in the United States is used to paying around two percent of the MHI for water and sewer service. It could be argued that it might be 2% for each or a total of 4%; however, that argument is countered by the table shown in Figure 3.

Whether it is 2% or 4%, this is not a reasonable expectation. Here is the reason why. The revenue generated from such rates will not be sufficient to repair, rehabilitate, or replace (RRR) the average utility’s aging infrastructure on its own. EPA stated in its Clean Watersheds Needs Survey, Report to Congress, April 2022, “The total nationwide reported clean water infrastructure needs identified as of January 1, 2022, were \$630.1 billion for the period between January 1, 2022, and December 31, 2041...” This translates to roughly \$33 billion per year. EPA stated in its 7th Drinking Water Infrastructure Needs Survey and Assessment Report to Congress, April 2023, “...a twenty-year capital improvement need of \$625 billion.” This translates to roughly \$31 billion per year. Added together, and without adjusting for inflation, this is a rough order of magnitude of around \$64 billion per year for water and wastewater infrastructure needs. Although there are other sources of information for the projected costs to update and improve

our nation’s water and wastewater infrastructure, we’ll stick with EPA’s projections in this discussion.

Despite Congress allocating billions of dollars for water and wastewater improvements in recent years, federal funding remains insufficient to close the annual gap. Bridging this shortfall is not feasible with water and sewer rates that hover around two to four percent of the median household income (MHI). This creates a paradox between the need for infrastructure investment and the affordability of water and sewer services.

Complicating the issue of rate affordability, there is no universally accepted metric in the U.S. for determining affordable water and sewer rates. Although EPA Guidance documents refer to it, they do not represent that a percentage of MHI is a universally accepted indicator. Similarly, the UNC-EFC refers to a percentage of MHI on their Rate Dashboard; however, it is only an indicator with no opinion regarding it. Dr. Manny Teodoro, a professor of public policy, management, and politics at the La Follette School of Public Affairs at the University of Wisconsin-Madison, is actively researching the issue of rate affordability. His work focuses on utility rate affordability and can be found on his website: [www.MannyTeodoro.com](http://www.MannyTeodoro.com). More research such as this is needed.

### Conclusions

The following salient points have been presented in this discussion.

- The average U.S. citizen appears to be used to paying around 2% of their MHI for water and sewer service.
- There is an annual multi-billion dollar funding gap in the U.S. for repairing, rehabilitating, and replacing water

and sewer infrastructure.

- Two to four percent of MHI is not sufficient to maintain aging water and sewer infrastructure.
- Federal and state grant funding programs in the U.S. are insufficient to make up the difference.
- There is no universally accepted metric in the U.S. for setting benchmarks for affordable water and sewer rates.
- There is a need to conduct in-depth research about the affordability of water and sewer rates for U.S. citizens.
- It would be helpful to develop a universally acceptable matrix to determine the affordability of water and sewer rates for U.S. citizens.
- A funding paradox exists in the U.S. between the need for infrastructure improvement and the affordability of water and sewer services; there are no simple solutions to this funding paradox.

Despite these somewhat discouraging factors, there is something that all municipalities can do. It may not solve the problem in and of itself; however, it is a key step in the right direction. And that is to develop and maintain an Asset Management Program. An Asset Management Program will highlight the needs in the community and provide a “go-to” source when funding becomes available through means such as grants, economic development opportunities, and other contributions. This enables the municipality to spend the right amount of money on the right thing at the right time.



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Mr. Wright’s experience with Asset Management began in 2012 with his membership in BAMI-I (Buried Asset Management Institute – International). Mr. Wright was the chief author of the Asset Management Plan for the town of Spindale, NC, which was approved by the state of North Carolina in 2013. He holds a certificate of completion for CTAM 100, 200, 300 & 400, is a Professional Water Asset Manager (PWAM), and contributed to the development of the CTAM 200 and 400 training manuals.

# The Importance of Protecting the Integrity of **SUBSURFACE UTILITY ENGINEERING (SUE)**

**I**n recent years, a troubling trend has emerged within the utility location industry. Numerous companies are presenting themselves as providers of Subsurface Utility Engineering (SUE) services, advertising their offerings across websites, vehicles, and trade show banners. They often make claims of expertise by referencing the ASCE 38-22 standard, detailing Quality Levels, and aligning themselves with various trade organizations. While these affiliations and references may create the appearance of legitimacy, a significant portion of these companies are not true SUE providers.



## **What is Subsurface Utility Engineering (SUE)?**

Subsurface Utility Engineering (SUE) is a specialized branch of civil engineering that focuses on accurately identifying, mapping, and managing subsurface utilities. The ASCE 38-22 standard governs this practice, providing guidelines for collecting and depicting utility data to enhance safety and reduce risks during construction projects. SUE involves a detailed process of data collection, including non-destructive methods such as vacuum excavation, and requires the involvement of licensed engineers, surveyors, and geologists to ensure the accuracy and reliability of the information provided.

## **The Problem of Misrepresentation**

Despite the critical role that SUE plays in infrastructure development and public safety, a number of companies are misusing the term “SUE” to market their services without adhering to the stringent professional and legal requirements it demands. Many of these companies operate

under the assumption that owning utility-locating equipment or using vacuum excavation trucks qualifies them to offer SUE services. True SUE providers are required to employ licensed engineers, surveyors, and geologists/geophysicists to oversee and validate the utility data they produce. Additionally, companies offering SUE (with very few exceptions) must possess certificates of authorization that legally allow them to provide engineering or surveying services. Without these key qualifications, a company is not performing SUE, no matter how convincingly they market their services.

## **Why This Matters**

The misrepresentation of SUE services is more than just a matter of false advertising—it can have serious consequences for public safety and project integrity. When companies that lack the proper licensing and expertise are hired for SUE, the data they produce may be inaccurate or incomplete, leading to potential hazards during construction. Utilities may be damaged, resulting in costly project delays, environmental harm, or even injury to workers and the public.

Moreover, in the event of a dispute, the utility data produced by these unqualified companies may not hold up in legal proceedings. Without the involvement of licensed engineers and surveyors, the information cannot be considered reliable under the standards of the ASCE 38-22, putting clients at legal risk.

## **Preserving the Integrity of the Industry**

It is essential for legitimate SUE providers and professionals to take a stand against this growing issue. By reporting companies that falsely claim to offer SUE services without the requisite qualifications and licenses, we can protect the public and preserve the integrity of the industry. Allowing unqualified companies to continue operating under the guise of SUE diminishes the value of the licenses and professional expertise that true SUE providers have worked hard to earn.

For clients and contractors seeking SUE services, it is crucial to verify that the companies they hire are properly licensed



and employ qualified professionals. Ensuring that a company has the necessary involvement of licensed engineers and surveyors is the only way to guarantee the accuracy and reliability of subsurface utility data.

As the demand for SUE services grows alongside the expansion of infrastructure projects, it is vital to uphold the standards of the profession. Misrepresentation by unqualified companies not only threatens the safety and success of construction projects but also undermines the reputation of the entire industry. By enforcing compliance with professional standards and reporting fraudulent practices, we can ensure that Subsurface Utility Engineering continues to play its crucial role in building a safer, more efficient future.



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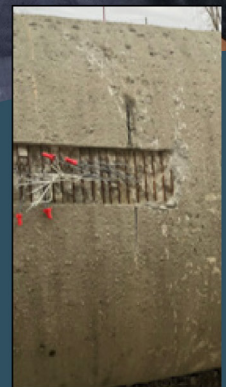
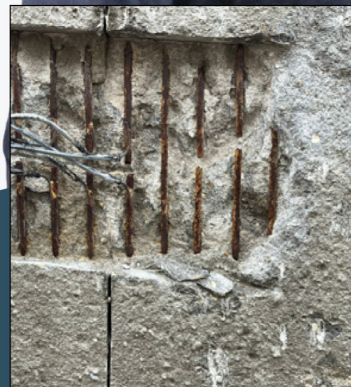
Mr. Jeffries is an industry veteran with over three decades of extensive experience with utilities, survey and construction; subsurface utility engineering; and utility location services. An established utility construction/construction management expert with a specialty in addressing utility location and avoidance issues. He is well-versed in all aspects of utility location, EM Theory, Vacuum Excavation and Ground Penetrating Radar. He oversees SUE/UC projects and pursuits throughout the southwestern United States and internationally in Saudi Arabia, Dubai and Pakistan.

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# The Critical Role of Quality Control in Subsurface Utility Engineering (SUE) and Utility Coordination

**S**ubsurface Utility Engineering (SUE) and Utility Coordination (UC) are indispensable components of modern infrastructure development, ensuring safe, efficient, and cost-effective utility management. These two disciplines work hand in hand to prevent conflicts, reduce risks, and streamline project delivery. Central to their success is Quality Control (QC)—a structured process that ensures accuracy, consistency, and reliability throughout every phase. Without robust QC protocols, projects are vulnerable to safety hazards, costly rework, and delays. This article explores the importance of QC across seven critical stages: information provided by others, project kick-off, field data collection, office production, utility coordination, project delivery, and overall SUE integration.

## 1. QC of Information Provided by Others

Both SUE and Utility Coordination rely heavily on accurate, external information, such as utility owner records, GIS data, and as-built drawings. This information forms the foundation for subsequent planning and design. However, a common challenge arises:

How many times are you, as a consultant, asked by your client to deliver a project at Quality Level B or Quality Level A based on another consultant's Quality Level D-B data?

This question underscores the critical importance of reliability and accountability in data provided by others. When foundational data lacks precision or comes from disparate sources, it introduces risks that ripple throughout the project.

## Incorporating ASCE 38-22 Standards

According to ASCE 38-22 (Section C4.1.6: Quality Assurance and Third Parties), there are often scenarios where third-party surveyors, excavators, or records researchers contribute to the project team. However, these contributors may not have a direct con-

tractual relationship with the SUE firm. In such cases, a Quality Assurance and Control Plan is essential to manage risks effectively.

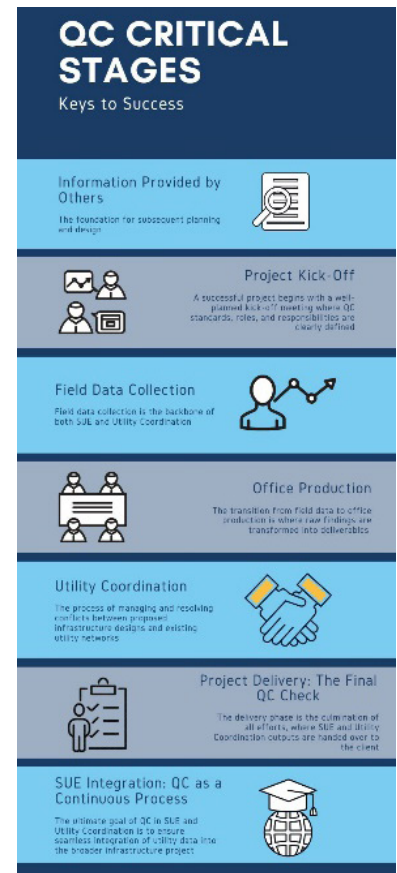
## Key points from ASCE 38-22 to consider:

- **Risk Allocation:** A quality assurance and control plan should clearly outline how risks will be apportioned for data or actions outside the SUE firm's direct control. This is particularly vital when assigning a Utility Quality Level or producing deliverables based on third-party input.
- **Accountability:** Establishing a plan ensures that all parties, whether contracted or indirectly involved, are held accountable for the quality and reliability of their contributions. This reduces the likelihood of disputes and provides clarity for project stakeholders.
- **Dependable Deliverables:** By implementing such a plan, the SUE team ensures that utility quality levels and deliverables meet the project's specified standards, despite the involvement of third parties.

## QC Practices for Incoming Data

- **Verification:** External data must be cross-checked with site inspections and reliable sources to identify inaccuracies or outdated information. Incorporating QC protocols as outlined by ASCE 38-22 helps bridge the gap when third-party data is involved.
- **Risk Mitigation:** Inadequate data introduces the risk of utility strikes, delays, and cost overruns. Robust QC ensures potential discrepancies are flagged early, minimizing downstream impacts, and protecting the project owner's interests.
- **Standardization:** Adhering to ASCE 38-22 guidelines, SUE firms can establish protocols to maintain consistent standards across all incoming data, ensuring reliability and accountability.

By leveraging the principles outlined in ASCE 38-22, SUE and Utility Coordination teams can effectively manage third-party contributions while maintaining the integrity of the project. These quality assurance measures establish a dependable foundation for successful project delivery, even when initial data quality varies.



## 2. Project Kick-Off: Establishing an All-In Approach for Success

A successful project begins with a well-planned kick-off meeting that embodies an all-in approach, where the professional in charge or engineer of record establishes direct responsible charge for the project, setting the tone for collaboration and accountability.

- **Shared Expectations:** Align all stakeholders, including the project team, on timelines, deliverables, and QC processes to ensure a unified and cohesive strategy.
- **Utility Coordination Integration:** Leverage the kick-off to gather input from utility owners and stakeholders, addressing their expectations and fostering streamlined coordination.
- **Scope Confirmation:** Validate the project scope, including SUE and coordination activities, ensuring alignment with the client's requirements, goals, and overall project objectives.

By emphasizing the leadership of the professional in charge and setting clear QC protocols, the kick-off meeting establishes a foundation of collaboration, efficiency, and precision, driving the project's success.

## 3. Field Data Collection: A Collaborative Foundation for Success

Field data collection is the backbone of SUE and Utility Coordination, requiring an all-in approach led by the professional, who maintains responsible charge while having a comprehensive understanding of the data collection process. The accuracy of field data is critical to utility mapping, coordination efforts, and overall project outcomes.

- **Equipment Calibration:** Ensuring tools like Ground Penetrating Radar (GPR) and electromagnetic locators are calibrated and functioning properly is fundamental to collecting reliable, high-quality data.
- **Verification Protocols:** Implementing a two-pass system for data collection and verification helps catch errors in the field, reducing downstream corrections.
- **Real-Time QC:** Advanced technologies enable teams to perform real-time quality checks, identifying and resolving inconsistencies on-site and minimizing the need for revisits.
- **Utility Stakeholder Input:** Coordinating field efforts with utility owners ensures findings are validated and asset locations are accurately confirmed.

By maintaining responsible charge and fostering collaboration across the project team, the professional ensures that field data is accurate, actionable, and provides a strong foundation for SUE deliverables and utility coordination plans.

#### 4. From Field Data to Deliverables (Office Production): A Collaborative Effort to Ensure Excellence

The transition from field data to office production is a critical phase where raw findings are transformed into deliverables such as utility maps, CAD drawings, and GIS models. This stage demands an all-in approach led by the professional in charge or engineer of record, who collaborates with the project team to maintain responsible charge and uphold the integrity of the outputs.

- **Data Validation:** Rigorous cross-checking of field data ensures consistency and accuracy, forming the foundation of reliable deliverables.
- **Utility Coordination Support:** Deliverables must include accurate utility information to facilitate coordination efforts, resolve conflicts, and support overall project success.
- **Peer Reviews:** QC protocols should integrate secondary reviews by qualified team members to identify and address potential oversights collaboratively.
- **Client-Focused Outputs:** Deliverables must be clear, user-friendly, and tailored to align with the client's goals and expectations.

Through a collaborative effort under the leadership of the professional in charge, QC at this stage ensures deliverables are precise, reliable, and effective for SUE and Utility Coordination, driving project success and client satisfaction.

#### 5. Utility Coordination: Preventing Conflicts and Enhancing Collaboration

Utility Coordination is the process of managing and resolving conflicts between proposed infrastructure designs and existing utility networks. It is an iterative process that demands rigorous QC at every step.

- **Conflict Identification:** QC ensures that potential conflicts between utilities and project designs are identified and accurately documented.
- **Stakeholder Communication:** Clear, consistent communication with utility owners is essential for resolving conflicts. QC processes help ensure that communication is timely, accurate, and well-documented.
- **Coordination Plans:** Develop and QC detailed plans to relocate or protect utilities as needed, ensuring they are feasible and cost-effective.
- **Compliance:** QC ensures that all coordination activities comply with local regulations, utility owner requirements, and project specifications.

Robust QC in Utility Coordination minimizes delays, reduces costs, and ensures successful integration of utility networks into the overall project design.

#### 6. Project Delivery: The Final QC Check with an All-In Approach

The delivery phase is the culmination of all project efforts, requiring an all-in approach led by the professional or engineer of record, through the final QC check. This ensures that SUE and Utility Coordination outputs are accurate, complete, and aligned with client needs.

- **Comprehensive Review:** Conduct a thorough review of all deliverables, including utility maps, reports, and coordination plans, to verify they meet contractual obligations and project requirements.
- **Documentation Completeness:** Provide clients with complete and organized documentation, including notes, metadata, and decision logs, ensuring long-term value and usability.
- **Client Presentation:** Deliver a clear, concise presentation of the project outputs, addressing client questions and ensuring full understanding of the deliverables.
- **Feedback Loop:** Gather post-delivery feedback to identify opportunities for improvement and enhance processes for future projects.

By maintaining responsible charge and prioritizing QC during project delivery, the project team ensures client expectations are not only met but exceeded, building trust and reinforcing credibility.

#### 7. SUE Integration: QC as a Continuous Process

The ultimate goal of Quality Control in SUE and Utility Coordination is to ensure seamless integration of utility data into the broader infrastructure project. This requires viewing QC as an ongoing process rather than a series of isolated checks.

- **Lifecycle Perspective:** QC must be maintained from initial data gathering

to project handoff, ensuring consistency and accuracy at every stage.

- **Continuous Improvement:** Regularly evaluate and update QC processes to incorporate innovative technologies, methods, and lessons learned.
- **Collaboration Across Disciplines:** QC is most effective when it is integrated across all project teams, including design, construction, and project management.

By embedding QC into the entire SUE and Utility Coordination lifecycle, teams create a framework for long-term success.

#### Conclusion: QC as the Cornerstone of SUE and Utility Coordination Success

Quality Control is the backbone of effective Subsurface Utility Engineering (SUE) and Utility Coordination (UC). It underpins every stage of a project, from verifying external information to aligning expectations during kick-off, ensuring accuracy in field data collection, transitioning seamlessly through office production, managing utility coordination, and delivering a complete and reliable project outcome.

Through an all-in approach, led by the professional or engineer of record maintaining responsible charge, QC helps to minimize uncertainty in the data, ensuring accuracy and consistency throughout the project lifecycle. This collaborative and continuous focus on quality reduces risks, enhances project outcomes, and builds trust and credibility with clients and stakeholders.

As infrastructure demands grow, the integration of rigorous QC processes into SUE and Utility Coordination will be essential for delivering projects that are efficient, cost-effective, and reliable. By embracing a culture of quality today, we can ensure projects are equipped to support the needs of communities with confidence and resilience well into the future.

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# NEW HDD HDPE MODEL SPECIFICATIONS AVAILABLE

Covers HDPE Water Pipelines Up to 60-Inch Diameter and 10,000-Foot-Long Pull

**I**RVING, TX – August 14, 2024 – A new document for small and large diameter high-density polyethylene (HDPE) PE4710 pressure water piping systems using horizontal directional drilling (HDD) is now available. MAB Model Specification for the Installation of PE4710 Water Service, Distribution, and Transmission Pipes by Horizontal Directional Drilling (MAB-11-2024) is available for free download at [www.plasticpipe.org/mabpubs](http://www.plasticpipe.org/mabpubs). It was developed by the Municipal Advisory Board (MAB), and published with the help of the members of the Plastics Pipe Institute, Inc. (PPI).

The new specification covers both Maxi-HDD and Mini-HDD applications:

- Maxi-HDD is used for large-diameter installations (24 inches and above), capable of pulling HDPE pipes up to 60 inches in diameter and 10,000 feet in length.
- Mini-HDD is suited for small-diameter pipes (12 inches or smaller), designed for shorter bore lengths of up to 600 feet.

The document provides a detailed framework for HDD installation, covering:

- Subsurface Investigation – Guidelines for understanding soil conditions and geological challenges.
- Equipment & Supporting Systems – Specifications for HDD rigs, drill heads, reamers, tracking systems, and drilling fluids.
- Safety & Environmental Best Practices – Ensuring compliance with OSHA standards and proper disposal of drilling fluids.
- Project Execution & Closeout – Best practices for reaming, pullback, as-built documentation, and final inspec-

tions.

- Bid Document Support – Pre-approved language that can be directly used in project specifications and procurement documents.

The combination of HDD and HDPE PE4710 offers multiple benefits for municipal water infrastructure:

- Minimized Environmental Impact – HDD avoids open-trench excavation, reducing surface disruption and environmental damage.
- Enhanced Durability – HDPE’s corrosion resistance and flexibility make it ideal for long-term water transmission.
- Cost Efficiency – Reduced maintenance and long service life lower overall operational costs.
- Increased Installation Speed – HDD allows for rapid deployment of water pipelines under rivers, roads, and urban infrastructure.

“This model specification is intended as a guide,” stated Camille George Rubeiz, P.E., F. ASCE, co-chair, MAB, and senior director of engineering for the PPI’s Municipal & Industrial Division. “It is ideal for engineers, users, contractors, and other interested parties to use in the design, con-



*Model Specification MAB-11-2024 provides guidance and instruction for water pressure mini- and maxi HDD installations using HDPE PE4710 pipe.*

struction, and installation of HDPE pressure water piping systems. The local utility or engineer may want to modify this model specification to adapt the document to local conditions, operations, and practices.”

The Municipal Advisory Board Task Group was led by industry consultant, Larry Slavin, Ph.D., president, Outside Consulting Services, Inc. (Rockaway, NJ). The new model specification was prepared by MAB members and associates as a service to the water industry. The MAB serves as an independent, non-commercial adviser to the

Municipal & Industrial (M&I) Division of the PPI, the major North American trade association representing the plastic pipe industry.

“We broke the document down into two parallel sections; one for large diameter and another for small diameter,” Slavin explained. “Both Maxi-HDD and Mini-HDD columns address the same topics with information specific to each. This was for reading ease and quick reference. I was very pleased to see the immense number of contributions, along with the cooperation of our Task Group that included academics, contractors, installers, and utility engineers. Only such a well-rounded group could have produced this very helpful document in fewer than seven months.”

PPI’s Rubeiz said, ““We would also like to thank those who provided their time and expertise to the project – Dr. Larry Slavin, TG Chair; Marisa Boyce, EBMUD, CA; Casey Haynes, Haynes E2, MO; Nelson Jacome, Miami Dade, FL; Kevin Miller, Miller Pipeline, IN; Dr. Mo Najafi, University of Texas; Jacob Nakano, City Utilities, MO; Masa Niya, MUD, NE; Mark Mikol, City of Austin, TX; Andrew Schipper, Ft Wayne, IN; Austyn Smedberg, Ft Wayne, IN; Howie Smith, City of Duluth, MN; and Cheryl Wilson, City of Tulsa, OK.”

The MAB-11-2024 specification aligns with evolving industry trends emphasizing trenchless technology, sustainability, and resilient water infrastructure. As more municipalities adopt HDD for water pipeline installations, standardized guidelines like MAB-11-2024 will play a crucial role in ensuring quality, efficiency, and long-term performance.

Additional information including Model Specification (MAB-7) for Midi-Horizontal Directional Drilling can be found at the MAB publications website.

### About PPI

The Plastics Pipe Institute, Inc. (PPI) is the major North American trade association representing the plastic pipe industry and is dedicated to promoting plastic as the materials of choice for pipe and conduit applications. PPI is the premier technical, engineering and industry knowledge resource publishing data for use in the development and design of plastic pipe and conduit systems. Additionally, PPI collaborates with industry organizations that set standards for manufacturing practices and installation methods.

### About the Municipal Advisory Board:

The mission of the Municipal Advisory Board (MAB) is to improve the design, installation, and operation of municipal HDPE water piping systems through the creation of partnerships among utilities, researchers, designers, contractors, and the HDPE industry. MAB serves as an independent, non-commercial adviser to the Municipal & Industrial Division of the Plastics Pipe Institute, Inc.

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# ELEVATING BURIED ASSET MANAGEMENT TO NEW HEIGHTS: KEY INSIGHTS FROM THE 2ND GLOBAL BURIED ASSET MANAGEMENT CONGRESS

**T**he 2024 Global Buried Asset Management Congress (GBAMC) was successfully held from November 14 to 16 at the Omni Severin Hotel in Indianapolis, Indiana. This year's congress saw a continued expansion in influence, attracting numerous municipal and utility organizations, researchers, and industry professionals from various countries and sectors to explore the future of buried asset management and innovative practices. The number of participants doubled compared to the first congress, exceeding 100 attendees, reflecting the industry's growing recognition and increasing engagement in asset management.

## BAMI-I Scholarship Program

This year's congress introduced the BAMI-I Scholarship Program, aimed at lowering financial barriers for municipal and utility professionals to attend, ensuring that more frontline workers could participate in this critical industry event. This initiative was generously sponsored by Braindrip, further supporting industry talent development.

As an innovator in hydrogen energy system development, asset inspection, asset management, risk assessment, and compliance management, Braindrip and its wholly-owned subsidiary IQ4H2 actively promote infrastructure modernization and sustainable asset management practices. This year, Braindrip sponsored 25 utility professionals, covering their full conference registration and hotel accommodation costs, providing more industry practitioners with access to the latest knowledge and opportunities for direct engagement with experts.

This sponsorship not only expanded the congress's influence but also provided invaluable learning and networking opportunities for industry professionals. Many scholarship recipients expressed that this opportunity gave them a deeper understanding of the latest developments



in asset management and inspired them to explore more efficient management strategies in their future work.

## Opening Ceremony

The congress was formally opened by BAMI-I Chairman Tom Iseley, followed by an opening prayer led by BAMI-I Chaplain Kurt Wright, adding a deeper spiritual dimension to the event. The technical agenda was then introduced, marking the beginning of three days of discussions on a broad range of buried asset management topics, fostering in-depth industry exchanges and collaborations.

## Key Presentations & Discussions

The congress invited more than 30 industry thought leaders to deliver keynote presentations and share insights on municipal infrastructure management, technological innovation, energy sustainability, and asset management policies. The speakers presented cutting-edge research and practical experiences, addressing the opportunities and challenges of buried asset management. Attendees widely agreed that the expert insights provided critical trend analyses and introduced new perspectives for real-world applications.

## Municipal Infrastructure Management Innovations

This session focused on innovative approaches to municipal infrastructure





management, including infrastructure funding strategies, rate adjustments for sustainable development, and the latest updates on wastewater asset management plans. Experts analyzed the current Inflow & Infiltration (I/I) challenges, providing data-driven insights and solutions, which sparked in-depth discussions among participants. Additionally, discussions covered the present and future of water and wastewater asset management.

### Technological Innovations & Applications

The congress explored the latest technological advancements in buried as-

set management, including:

- New asset management models
- Pressure pipeline assessment technologies
- Interagency research collaborations for solving complex technical challenges

Attendees were particularly interested in the practical applications of emerging technologies for pipeline assessment and maintenance, which became a central theme of the discussions.

### Energy & Sustainability

In the Energy & Sustainability ses-

sion, experts explored:

- Hydrogen energy system applications
- Energy trading and financing strategies
- The role of infrastructure in decarbonization efforts

Discussions revolved around the challenges and opportunities of adapting energy infrastructure for sustainability and climate resilience, with speakers sharing successful case studies of implementation.



## Innovative Practices & Policy Discussions

At the policy and practice level, the congress focused on:

- Regional water infrastructure strategies
- Asset management solutions for specialized environments
- Risk management strategies for underground and trenchless projects

By analyzing real-world case studies, attendees gained valuable insights into different regional approaches to underground asset management, providing a reference for future policy development and project execution.

## Fundamentals of Asset Management

This session provided a comprehensive discussion on asset management frameworks and practical applications, covering:

- The effectiveness of different management models
- Best practices in water audits
- The role of asset management in improving operational efficiency

The congress also showcased the latest research, including:

- Grant program impact evaluations
- Emerging technologies in asset management decision-making
- Digital defense strategies for water infrastructure

## Talent Development & Student Engagement

This year’s congress placed a strong emphasis on fostering the next

generation of buried asset management professionals. Purdue University organized a student team to participate, actively engaging in various discussions and gaining hands-on experience through volunteer work.

Students from diverse backgrounds, including civil engineering and construction management, played an active role in discussions and helped organize the event. Many students noted that expert presentations left a deep impression on them, and through direct interactions with industry leaders, they broadened their professional perspectives and gained a clearer understanding of the importance and future of buried asset management.

## Participant Feedback & Testimonials

The wide range of topics at this year’s conference attracted professionals from various fields, who shared their experiences and key takeaways after the event.

“I really enjoyed his time at the 2nd Annual BAMI-I (Buried Asset Management Institute-International) Congress last week. The long travel from NZ to America is always well worth my enjoyment of meeting colleagues, sharing insights and industry practice developments, and at being among the many wonderful people who work in this industry.... Well done to Tom Iseley, Wei Liao and BAMI-I (Buried Asset Management Institute-International) who put this conference together and continue to run it every year, you deserve all the applause for your hard work in providing incredible value and connection to our industry. Looking forward to what

2025 will bring for all of us!”— Ross Waugh

“The BAMI-I Scholarship Program allowed me to participate in this high-level industry exchange, where I learned many advanced asset management practices.” —**Tyler Hill**

“It was an honor to participate in a panel at the 2nd Global Buried Asset Management Congress this past week, where we discussed innovative decarbonization strategies and solutions for managing critical infrastructure that supports our communities.”

It was a fantastic opportunity to connect with industry leaders in the field of buried asset management. Achieving comprehensive underground asset management is clearly a collaborative team effort. Nothing feels more inspiring than being surrounded by such brilliant minds like Tom Isley, Wei Liao, John Norton, Olugbenga S. IBIKUNLE, Ali Nayeri, Johnson Raju and all asset management experts. —**Khem AryalKhem Aryal**

“Amidst a room of engineers and asset management professionals it was interesting to hear that asset management challenges in the utility sector are universal and not dependent on the size of the utility.

There’s still such a disconnect between the wet utilities and asset management. The gap is starting to close, but only because of outreach and education from groups like BAMI-I and rural water associations. It also helps that states are beginning to require asset management plans in order to tap into funds!” — **Josh Hawley**

The BAMI-I (Buried Asset Management Institute-International)

congress is not just an event; it's a movement towards advancing the buried asset management and water asset management industry and beyond. This year's congress, held at the Omni Severin Hotel in Indianapolis, Indiana showcased a wealth of knowledge transfer for the enhancement of delivering first-class water and wastewater management systems for customers all over the world. Sharing a snapshot of the speaker line-up. All are encouraged to attend to learn more about protecting one of our critical resources.... Water.

The Mahjee team attended and engaged with pillars in the industry. We stepped away from this conference with a deeper understanding of the needs and requirements of the industry. Looking forward to next year. – **The Mahjee**

“Attending the conference opened my eyes to much more than just asset management but also the importance of discussing issues and relating to others to help improve the way assets are managed and found. The speakers addressed both foundational principles and emerging trends, particularly focusing on the unique challenges and opportunities in underground infrastructure. The debate-style discussions encouraged audience participation, allowing ideas to be explored and developed as many people shared their experiences. Overall, I will remember the impactful ideas that were presented and will be inspired to find my own passions and challenges to solve, just as the guest speakers were.” – **Purdue Student: Carly Wilkerson**

“The Global Buried Asset Management Congress not only expanded my understanding of asset management but also highlighted the value of open discussions and collaboration in improving the management and discovery of assets.” “The main takeaway from the conference that I feel will impact me the most was seeing each and every group interact and share their ideas. Working with others to accomplish goals and meet deadlines will always be a part of my future career, and teamwork was a key highlight that multiple speakers touched on. The use of teamwork and coming together to share important ideas and discoveries was an important aspect of the conference as well.” – **Purdue Student : Daniel Ahrendt**

### Acknowledgments

This year's congress not only showcased the latest developments in buried asset management but also provided a platform for industry collaboration and knowledge exchange through various forums and discussions. The success of the **2nd Global Buried Asset Management Congress (GBAMC)** would not have been possible without the dedication and support of many individuals and organizations.

We extend our sincere gratitude to our sponsors, whose generous contributions made this event a success:

- **Premier Sponsors:** BrainDrip, Ace Pipe Cleaning (A Carylton Company)
- **Gold Sponsors:** Great Lakes

Water Authority (GLWA), NASSCO, World Trade Center Indianapolis

- **Bronze Sponsors/Exhibitors:** PVC Pipe Association, Plastics Pipe Institute (PPI) - Municipal & Industrial, Polymer Technologies USA, USG Water Solutions
- **Supporting Organizations:** Southwest Environmental Finance Center

We also greatly appreciate our **media partners, Benjamin Media and Underground Infrastructure**, for their support in promoting and covering the event, helping to extend its reach and impact within the industry.

A special thank you to the **industry experts and speakers** who shared their invaluable knowledge, insights, and experiences, helping to advance the discussion on buried asset management and shape the future of the industry.

Lastly, we deeply appreciate all **attendees and participants** for their engagement and contributions. Your enthusiasm, collaboration, and exchange of ideas made this congress a truly impactful and meaningful event.

We look forward to seeing you all at the **3rd Global Buried Asset Management Congress**, which will take place in **Indianapolis from November 12-14, 2025**, as we continue to drive innovation and progress in the field of buried asset management!



## Thank you to our sponsors & partners



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**BMC**

# Summaries of congress speeches

Author: Sihan Zhou, PhD student at Purdue University  
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## FUNDING THE FUTURE:

# Appropriate Rate Increases for Spindale, NC

**T**he Presentation focused on Spindale's wastewater utility, serving 4,300 residents, and its long-term financial sustainability. Key concerns included rising costs, debt service, and necessary capital projects totaling \$15 million.

### Financial & Demographic Challenges

Spindale's 2018 revenue exceeded expenses by 125%, but by 2019, borrowing for capital projects without rate adjustments led to expenses surpassing revenue. Inflation in electricity, chemicals, and construction further increased financial strain.

Demographic factors worsened affordability concerns:

- Population Decline - Unlike North Carolina's 9% growth,

Spindale's population shrank.

- Aging Residents - A growing senior population struggles with rate hikes.
- Slow Wage Growth - Local wage growth was 26% in 12 years, lagging behind the state's 40-45%.
- High Poverty & Unemployment - One-third of residents live below 200% of the poverty level.

### Future Projections & Solutions

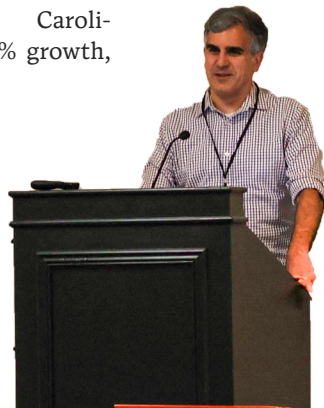
To break even, Spindale needs an 18% rate increase, but opportunities exist to ease the burden:

1. Bipartisan Infrastructure Law funding for grants and loan forgiveness.
2. A new large customer (Love's truck stop) increasing revenue.
3. Regional wastewater services, leveraging excess treatment capacity (3MGD, current ~600,000 GPD) to serve nearby communities.

### Conclusion

The presentation highlighted financial instability, affordability issues, and rate structure imbalances. Solutions focused on external funding and regional partnerships to ensure long-term sustainability.

Please visit [BAMI-I.com](http://BAMI-I.com) to watch the recorded video.



# Spindale Wastewater Collection, Conveyance, and Treatment System



Kurt Wright's presentation on the development and implementation of the Asset Management Plan (AMP) for Spindale, North Carolina, emphasizes teamwork and collaboration in tackling the town's infrastructure challenges. Once a thriving textile hub, Spindale experienced economic decline due to NAFTA policy shifts, leading to a transition toward a tourism-based economy. Despite maintaining its wastewater system—which includes a 3 million GPD treatment plant, 60 miles of pipe, and 1,200 manholes—the town faced ongoing issues with aging infrastructure, such as clay pipes and brick manholes, which led to infiltration and maintenance difficulties.

In 2012, Kurt sought grant funding for sewer replacements and recognized that an AMP could strengthen funding applications. He secured \$50,000 and developed the AMP, prioritizing a \$5 million rehabilitation of the 42-year-old wastewater plant. The updated AMP, incorporating findings from three Division of Water Infrastructure projects, now includes sewer assessments, smoke testing, and GIS updates, with a \$15 million long-term Capital Improvement Plan (CIP).

To address financial constraints, Spindale implemented a 10.18% rate increase, bringing monthly sewer bills to \$67.10, while combined water and sewer costs total \$122 per household. Wright emphasized how financial modeling ensured balanced rate adjustments while maintaining affordability. Concluding his presentation, he highlighted the AMP's role in enhancing infrastructure planning and financial stability, stressing the importance of ongoing collaboration and strategic investment in Spindale's future.

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**KURT WRIGHT**

Owner/President, SDG  
Engineering, Inc.

WHY ARE WE STILL TALKING ABOUT I/I?

# Answers From Statewide Studies



**G**eorge Kurz emphasizes that infiltration and inflow (I&I) is the most widespread issue in municipal sewer systems, surpassing other concerns such as root intrusion and pre-treatment failures. A major challenge is the lack of reliable methods to quantify I&I, unlike water leakage measurement in water systems. Kurz introduces a spreadsheet-based tool that enables operators to measure I&I using existing monthly operating reports (MORs) without requiring a licensed engineer.

Using Brentwood, Tennessee as a case study, he illustrates how excess water leads to sanitary sewer overflows (SSOs), backups, and treatment inefficiencies by causing flow fluctuations and diluting organic loads. He challenges the notion of simply expanding treatment capacity, citing a Tennessee study that demonstrates its ineffectiveness. Instead, he highlights the rising costs of chemicals and energy and the long-term damage to infrastructure. His statewide study in Tennessee reveals that nearly half of the total sewer flow consists of clear water, not wastewater, with I&I levels increasing 1% annually.

Kurz critiques the Clean Water Needs Survey, pointing out discrepancies between self-report-

ed data and his measured findings. He stresses that the success of I&I reduction projects should be evaluated through before-and-after measurement studies rather than the amount of pipe replaced. His analysis in Brentwood showed a 63% reduction in annual I&I and a 46% decrease in rainfall-dependent I&I after rehabilitation.

Despite challenges in accessing MOR data, Kurz manually processed 170,000 data points to compile his statewide study. He advocates for leveraging this existing data over voluntary surveys to gain a more accurate understanding of I&I. While he acknowledges modern AI solutions, he remains skeptical, favoring measurable, practical approaches. Ulti-

mately, Kurz underscores the need for consistent measurement methods, targeted rehabilitation strategies, and a data-driven approach to effectively manage I&I in municipal sewer systems.

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## PANEL 1: WATER AND WASTEWATER

# Asset Management in The US



Moderator: Heather Himmelberger, Director, Southwest Environmental Finance Center, University of New Mexico



Irene F. McSweeney, Chief of Operations, Boston Water & Sewer Commission



Calvin Clifton, Business Development & Recruiting Manager, Mattern & Craig



John Tuggle PE PS, Executive Director, Region 4 Planning and Development Council, West Virginia



The panel discussion focused on asset management practices in the United States. The moderator, Heather, introduced the topic, noting that asset management has been a passion of hers since the early 2000s, when the EPA first brought the concept from Australia and New Zealand to the US.

John Tubble, an engineer from West Virginia, discussed his role in a regional entity that facilitates and develops fiscal management of publicly funded infrastructure projects. Irene McSweeney, from the Boston Water and Sewer Commission, shared her experience transitioning from civil engineering to overseeing large sewer separation projects and operations. Calvin Clifton, a consultant from East Tennessee, spoke about his work in water loss reduction and business development.

A key focus of the discussion was the use of asset management in disaster recovery. Calvin Clifton described the devastating impact of recent hurricanes in North Carolina and Tennessee, emphasizing the importance of having asset management plans in place to identify system vulnerabilities, conduct rapid assessments, and secure funding for recovery efforts. John Tubble also shared his experience with a 2016 disaster in



West Virginia, highlighting the need for detailed information to justify financial requests to FEMA.

The panel also addressed the challenges of lead service line inventories, a requirement for all drinking water systems in the US. Irene McSweeney detailed the strategies Boston used to investigate and remove lead services, including door-to-door visits and the use of interns. She also discussed the funding mechanisms, such as grants and principal forgiveness, that helped the city fully fund the lead service line replacements.

The discussion touched on the broader challenges and opportunities in asset management, such as the universal

missing piece of data related to service lines. The panelists emphasized the importance of collecting inventory data as part of regular operations to prepare for future requirements. They also suggested that asset management should be a required part of the engineering curriculum to better prepare future professionals.

Throughout the discussion, the panelists shared their experiences, best practices, and the ongoing efforts to educate and prepare the next generation of engineers and infrastructure professionals in the field of asset management.

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THE INFINITY LOOP OF ASSET MANAGEMENT:

# Looking Back to Go Forward

**R**oss and Heather discuss the concept of an “infinity loop” in asset management, where looking to the past informs decisions about the future. They cover several key topics:

**Historical infrastructure:** Much of the water and wastewater infrastructure in the Western world was built in the 1950s-1970s, often with grant funding. Understanding when and why this infrastructure was built is important, as the world has changed significantly since then.

**Changing workforce and demand patterns:** The shift to remote work during COVID-19 has impacted water usage patterns, with residential usage

increasing while commercial/industrial usage decreases. This affects utility revenues and the need to adjust rates.

**Incremental investment vs. large projects:** Rather than waiting for major infrastructure failures and then doing large, costly projects, Ross and Heather emphasize the importance of steady, incremental investment to avoid spikes in costs and demand on limited resources.

**Workforce challenges:** They discuss the shortage of civil engineers and water operators, and the need for better training, recruitment, and retention programs to build the future workforce.

**Operator certification and innovation:** The current operator certification process is criticized for being overly focused on academic testing rather than

practical skills. Empowering operators to ask questions and implement data-driven solutions is seen as important.

**Subsidies and operations:** The speakers question the current model of heavily subsidizing new infrastructure construction while neglecting operations and maintenance, suggesting a more balanced approach could lead to greater efficiency.

Overall, the discussion highlights the need to learn from the past, adapt to changing conditions, and take a more proactive, incremental approach to managing water and wastewater infrastructure and the workforce.

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**HEATHER HIMMELBERGER**

Director, Southwest Environmental Finance Center, University of New Mexico



**ROSS WAUGH**

Director, Waugh Infrastructure Management



IMPLEMENTING ADVANCED TECHNOLOGIES AND ASSET MANAGEMENT TO

# Help Prioritize and Rehabilitate Critical Pressurized Pipeline Infrastructure



Mark Wade's presentation focused on the challenges facing water infrastructure and the importance of asset management strategies. He began by discussing the poor grades given to drinking water and wastewater systems in the ASCE infrastructure report card, highlighting the \$1 trillion backlog for water infrastructure replacement.

Wade emphasized the aging of buried water mains, with the average age projected to reach 50 years by 2050, exceeding the typical

year design life. He also addressed the issues surrounding asbestos-cement (AC) pipes, which are prevalent in states like Arizona and New Mexico, and the lack of immediate solutions.

Regarding asset management, Wade explained the traditional life cycle of managing pipeline infrastructure, which involves multiple rounds of condition assessment, prioritization, and funding requests. He advocated for a more streamlined approach using asset management principles to improve efficiency and decision-making.

Wade discussed the various tiers of tools and technologies available for data collection, from simple pressure monitoring to more advanced techniques like smart pigging and ground-penetrating radar. He stressed the importance of leak detection and the use of engineering students to conduct comprehensive system surveys.

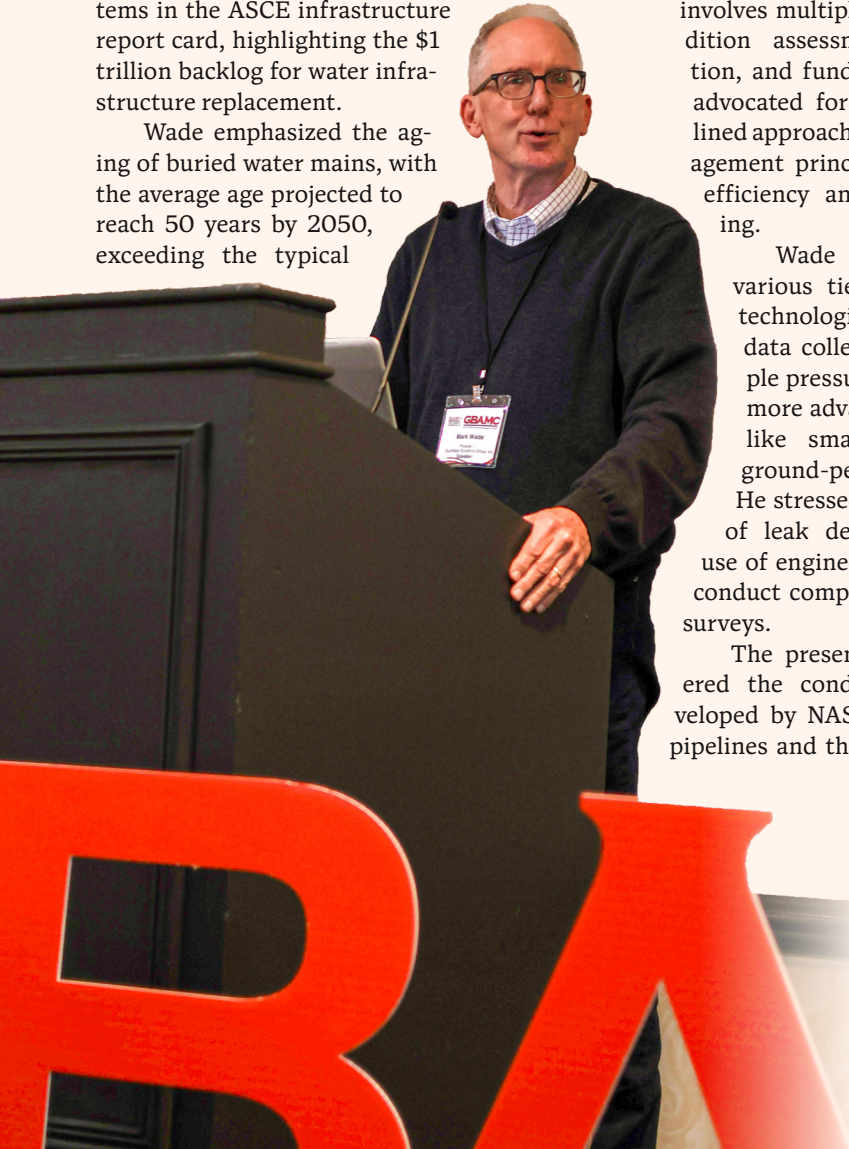
The presentation also covered the condition codes developed by NASCO for pressure pipelines and the use of risk ma-

trices to prioritize assets based on likelihood of failure and consequences. Wade highlighted the role of artificial neural networks in assessing asset condition and remaining useful life.

Finally, Wade encouraged attendees to explore the software platforms available for asset management and to consider attending conferences like the AWWA ACE to learn more about the latest tools and technologies.

He provided his contact information for further assistance and shared details about his previous presentations on this topic.

Please visit [BAMI-I.com](http://BAMI-I.com) to watch the recorded video



**MARK WADE**

President, BlueWater Solutions Group, Inc.

## THE CHALLENGES AND BENEFITS OF

# Utility Research Collaborations

**G**reat Lakes Water Authority (GLWA) is a large utility in Michigan that treats 40% of the state's water. John emphasizes the importance of utility collaboration for driving technological advancements in the public water sector. John explains that unlike private companies that compete based on product differentiation, water utilities operate in a very different market environment. Their primary decision criteria when selecting technologies are worker safety, permit compliance, and minimizing ecological impact - not cost or competitive advantage. This means utilities have limited incentive to invest in conventional R&D, as the typical drivers for technology diffusion (product optimization, market differentiation) don't apply. However, John argues that collaborative R&D efforts represent the best method for spreading innovations across the water sector. He provides several examples of successful collaborative projects GLWA has been involved in:

1. A Water Research Foundation project studying PCCP and PCC pipe failures, incorporating data and guidance from over 35 utilities.
2. Funding a workforce development program at Wayne State University, with participation from multiple utilities like DWSD.
3. Collaborative research on biosolids treatment via hydrothermal liquefaction, with a diverse group of utility partners.
4. Joint projects with utilities like Tarrant Regional Water District

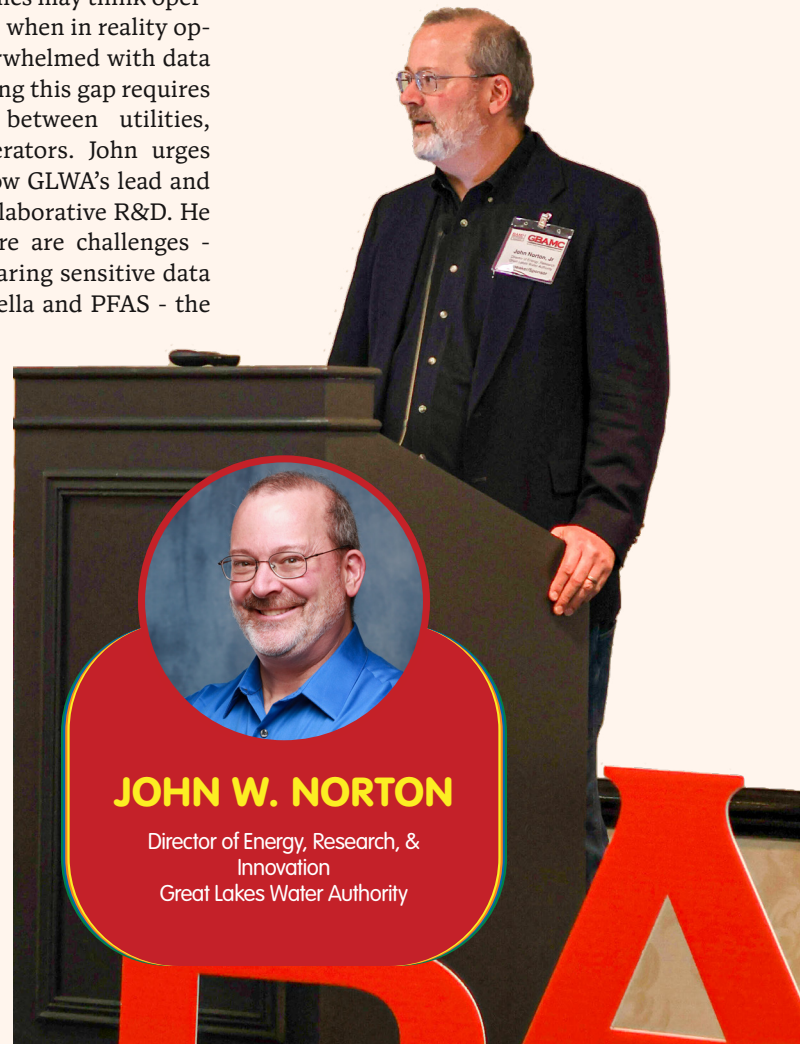
on potable water treatment and pipeline condition assessment technologies.

5. Co-authored research papers on topics like PFAS degradation, with multiple utility representatives as authors.

John emphasizes that these types of collaborative efforts are critical, as there is a major disconnect between academic research and the real-world needs of utility operators. Academics may think operators need more data, when in reality operators are often overwhelmed with data they don't use. Bridging this gap requires close collaboration between utilities, researchers, and operators. John urges other utilities to follow GLWA's lead and actively engage in collaborative R&D. He notes that while there are challenges - like concerns over sharing sensitive data on issues like Legionella and PFAS - the benefits of working together far outweigh the risks. By pooling resources and expertise, utilities can accelerate innovation and ensure new technologies meet their unique operational needs. In conclusion, John passionately advocates for greater utility collaboration, arguing it is "almost the only way that technology advances in our particular sector." He provides numer-

ous examples demonstrating how GLWA has successfully partnered with other water agencies, academics, and industry to drive progress on critical issues. John's message is clear: utilities must set aside competitive mindsets and work together if they want to solve the complex challenges facing the water industry.

Please visit [BAMI-I.com](http://BAMI-I.com) to watch the recorded video.




**JOHN W. NORTON**

Director of Energy, Research, & Innovation  
Great Lakes Water Authority

## PANEL 2:

# Energy Decarbonization Solutions



The panel brought together energy and infrastructure experts to discuss challenges and opportunities in the ongoing energy transition. Topics ranged from asset management and technology adoption to public perception and market dynamics. A key theme was the need for flexible infrastructure to adapt to an evolving energy landscape.

Mike Peters from Brain Drip emphasized repurposing existing assets like decommissioned gas pipelines for hydrogen, ammonia, and carbon dioxide transport. He argued that this adaptability is crucial for future-proofing investments. Corey Kreitzer, also from Brain Drip, stressed that the energy transition isn't a singular solution but a diversification of technologies. He highlighted the importance of storytelling to bridge gaps between engineers and business leaders.

Savannah Betancourt, founder of Carbon Solutions, underscored the role of public-private partnerships and bankable transactions in de-risking investments in emerging technologies. She suggested utilities could provide long-term contracts to stabilize financing. The panel also addressed public perception challenges, especially for complex technologies like carbon capture.

Greg Zeller, an attorney and former Attorney General, discussed community concerns and the difficulty of explaining safety measures. His Indiana project, using pet coke to produce anhydrous ammonia while sequestering carbon dioxide, faced environmental opposition despite its potential to decarbonize fertilizer production. He noted that many groups reject any fossil fuel involvement, even if it advances sustainability goals.

Natural gas's role as a transitional fuel was another focus. Peters and Betancourt discussed combining natural gas with carbon capture to create low-carbon energy. While the goal is a

fully renewable system, natural gas will remain vital in the near term, particularly for industrial heat and heavy transport.

The panel also explored the importance of data, measurement, and transparency in the energy transition. Betancourt highlighted blockchain-based platforms that can verify carbon intensity, opening new market opportunities for low-carbon alternatives.

Panelists emphasized moving beyond binary solutions and embracing a collaborative, multi-technology approach. Kreiser urged diversification in the energy mix to meet market needs efficiently. Overall, the discussion reinforced the importance of flexibility, collaboration, and exploring unconventional solutions to drive a sustainable and resilient energy future.

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**MICHAEL PETERS**

Equity Member and the Team  
Principal - BrainDrip, LLC  
IQ4H2 Lab

**CORY KREUTZER**

Technical director for IQ4H2, a  
subsidiary of Braindrip, LLC


**SAVANNA SPECIALE**

Principal and founder of Carbon  
Solutions, LLC

**GREG ZOELLER**

VP External Affairs, Wabash  
Valley Resources LLC

# Development of the Indiana Water Summit



**B**ill Blomquist's session explored the role of stakeholder engagement, strategic planning, and collaboration in Indiana's water management efforts. Centered on the Indiana Water Roadmap and Water Summit, the discussion highlighted bridging communication gaps between technical experts, policymakers, and the public to enhance water quality, infrastructure, and sustainability.

Blomquist emphasized the divide between technical communities and policymakers, noting that collaboration is essential for financing and executing water management initiatives. The Indiana Water Roadmap, developed by the White River Alliance, serves as a strategic framework addressing water quality, service delivery, and resource reliability. Initially a complex diagram illustrating interconnected water challenges, Roadmap 2.0 introduced sector-specific strategies, including wastewater treatment, drinking water systems, and flood management.

The Indiana Water Summit, launched in 2018, fosters interdisciplinary dialogue among stakeholders. Interactive engagement methods, such as physically mapping the roadmap and collecting real-time input, ensure inclusivity. Key priorities emerging from the summit include infrastructure upgrades, stormwater management, and equitable water access.

Challenges such as aging infrastructure, fragmented governance, and climate change impacts pose threats to Indiana's water systems. However, Blomquist sees opportunities in regional collaboration and policy integration. The roadmap and summit have influenced state policy, contributing to legislation on water management.

Key takeaways include using visual tools to clarify complex systems, ensuring inclusive engagement, adapting plans iteratively, promoting regional collaboration, and integrating policy with technical expertise. Blomquist encouraged replicating these initiatives in other regions, emphasizing that dialogue between stakeholders is crucial for sustainable water management, public health, and environmental resilience.

Please visit [BAMI-I.com](https://www.bami-i.com) to watch the recorded video




**BILL BLOMQUIST**

White River Alliance



# Challenges in Campus-Type Facilities



**C**ampus facilities, including universities, hospitals, and industrial parks, present unique challenges in managing underground utilities. Unlike urban infrastructures, their layouts are non-linear, and their assets—ranging from steam tunnels to specialized pipelines—are often undocumented or outdated.

## Complex Utility Systems

Many campuses operate centralized utility plants with interconnected pipelines for critical services such as internet, oxygen, nitrogen, and hazardous substances. Aging materials, including corrosion-resistant alloys and advanced plastics, further complicate maintenance and assessment.

## Key Challenges

Facility managers, typically trained in specific trades, often lack the engineering expertise needed for comprehensive asset management. Outdated GIS maps, inaccurate documentation, and evolving infrastructure lead to significant blind spots. Funding constraints also result in

reactive rather than proactive maintenance approaches.

## Emerging Technologies & Implementation Barriers

Advanced tools like multi-channel radar, 3D modeling, and AI-driven analytics offer potential solutions but remain underutilized due to training gaps and a lack of standardization. Even when adopted, these technologies often fail to integrate into daily operations.

## Future Directions

Addressing these challenges requires:

1. Enhanced Training – Equipping facility managers with modern asset management skills.
2. Investment in Technology – Allocating resources for advanced mapping and condition assessments.
3. Standardization & Documentation – Updating GIS records and implementing unified maintenance protocols.
4. Proactive Maintenance – Shifting from crisis response to preventive strategies.

5. Collaboration & Research – Encouraging partnerships between industry, academia, and facility managers.

By combining training, technology, and strategic planning, campuses can improve asset reliability, optimize operations, and ensure long-term sustainability.

Please visit [BAMI-I.com](http://BAMI-I.com) to watch the recorded video.




**JIM ANSAPCH**

Affiliate Assistant Professor,  
Iowa State University



# Goshen's Lead Service Line Inventory and Replacement Plan



**T**his presentation explores the City of Goshen's comprehensive approach to addressing lead service line inventories, integrating public outreach, regulatory compliance, predictive modeling, and infrastructure improvements. The initiative began in early 2023 when officials identified significant data gaps regarding service line materials. Faced with federal Lead and Copper Rule deadlines, Goshen sought funding to accelerate its inventory process and ensure water quality.

In June 2023, the city secured Type 1 and Type 2 grants from the Indiana Finance Authority (IFA), allocating funds to public education, outreach, and field data collection. However, initial outreach efforts faced challenges, with residents expressing concerns about door-to-door visits, compounded by misleading third-party marketing about water quality. To improve engagement, Goshen launched an online ArcGIS hub, allowing residents to self-report service line materials while also providing options for in-person inspections.

By October 2024, the city had received over 1,000 reports, significantly enhancing its dataset. However, evolving regulatory definitions of lead service lines introduced new challenges. While Goshen found no full lead lines, short lead connectors on galvanized pipes raised concerns. Despite mixed regulatory guidance, the city opted for proactive removal of all lead components, prioritizing public health.

To refine its inventory efforts, Goshen partnered with Conduit, a predictive modeling firm, to identify high-risk service lines efficiently. Additionally, fund-

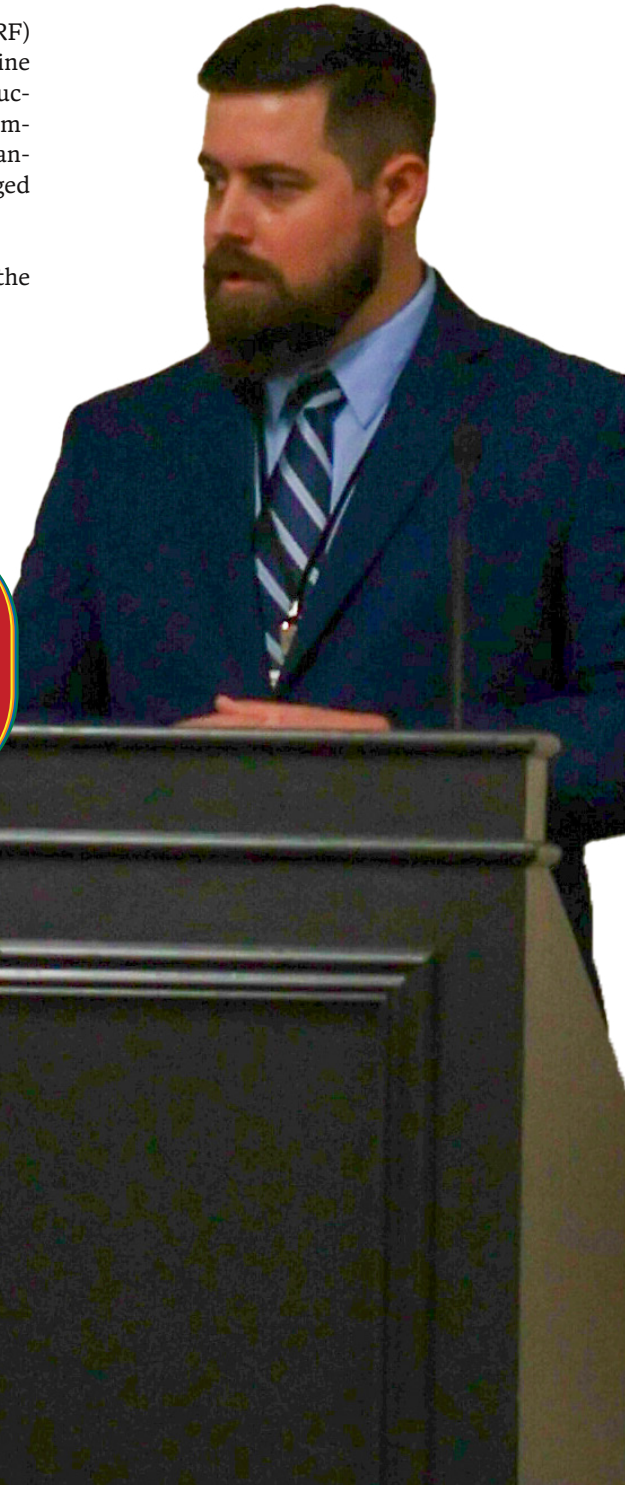
ing from the State Revolving Fund (SRF) enabled the city to integrate service line replacements with broader infrastructure upgrades, ensuring long-term improvements in water quality, asset management, and equity for disadvantaged communities.

Please visit [BAMI-I.com](http://BAMI-I.com) to watch the recorded video.




**BOSTON SNYDER**

Asset Manager, City of Goshen, IN



BALANCING THE RISKS AND REWARDS OF DELIVERY METHODS FOR

# Underground and Trenchless Projects



**S**teven Kramer's presentation delves into the shift from traditional underground construction methods to alternative delivery models. He explores why design-bid-build is giving way to more collaborative approaches like design-build, progressive design-build, and construction manager/general contractor (CMGC). Drawing from decades of experience, he reflects on his evolving perspective on these methods, acknowledging both their potential and pitfalls.

## Industry Trends and Challenges

Kramer highlights the growing complexity of underground projects, often exceeding \$500 million, and the impact of international contractors and the Infrastructure Investment and Jobs Act. Despite these advancements, challenges persist, including rising costs, supply chain disruptions, and difficulties in managing subcontractors. He cites a study from Travelers Insurance, revealing that many design-build contractors struggle to turn a profit on large projects.

## Delivery Methods and Their Impact

1. **Design-Build:** A single entity manages design and construction, promoting efficiency but often leading to underbidding and financial losses.
2. **Progressive Design-Build:** A qualification-based selection process allows for iterative cost estimation, reducing risk but potentially stifling innovation.
3. **CMGC:** The owner hires a contractor and engineer separately, minimizing financial risk but often leading to conservative designs.
4. **Public-Private Partnerships (P3s):** Private entities handle design, construction, and operations, as seen in

the successful Port of Miami Tunnel project.

## Lessons from Case Studies

Kramer shares insights from major projects, including the Howard Street Tunnel in Baltimore, DC Water's \$2.6 billion CSO Program, and the Port of Miami Tunnel, emphasizing adaptability and risk-sharing.

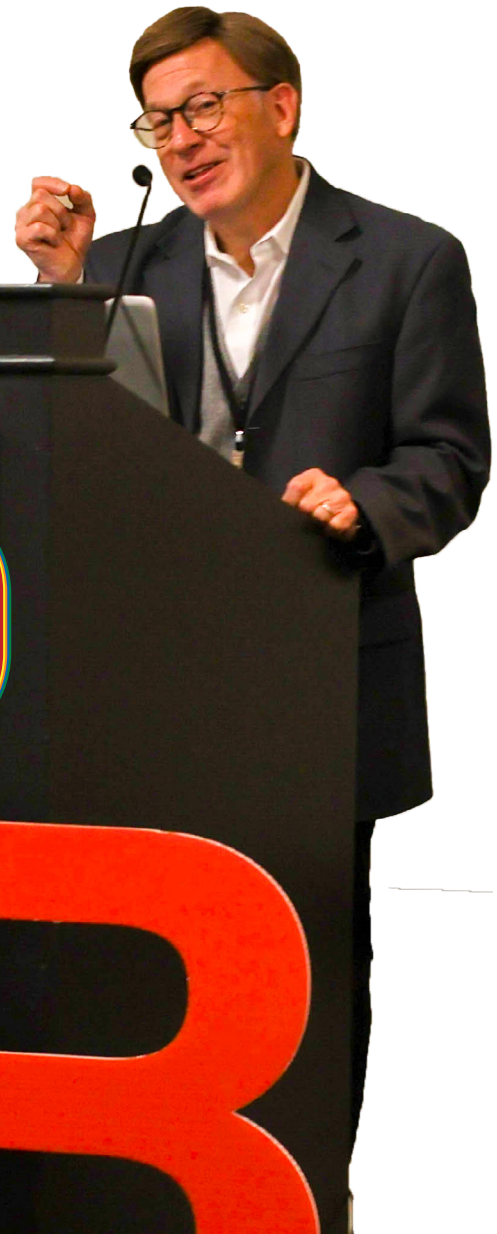
## Risk Management and Future Outlook

He stresses that effective risk management involves prioritization, early identification, and stakeholder collaboration. While alternative methods offer advantages, their success depends on

strategic implementation and balanced risk-sharing.

Kramer's insights underscore the need for innovation and thoughtful project delivery in underground construction.

Please visit [BAMI-I.com](http://BAMI-I.com) to watch the recorded video.



**STEVEN R. KRAMER**

PE, FASCE, Senior Vice  
President – COWI

## ASSET MANAGEMENT FUNDAMENTALS:

# Mapping, Inventory, and Beyond



his panel discussion focused on the evolving role of asset management in water and wastewater utilities,

with an emphasis on digital transformation, predictive analytics, and overcoming challenges in resource allocation, compliance, and decision-making. The session brought together experts from utility management, software development, and water quality platforms to share insights and best practices.

### Panelists and Their Expertise

- Josh Hawley (Zutility) – A former utility superintendent who now helps small utilities transition to digital asset management. His expertise lies in simplifying asset inventories and operational workflows through technology.
- Megan Glover (120 Water) – Leads a water compliance technology company specializing in regulatory adherence, particularly for lead and copper rule compliance.

- Leticia (Wicked Software) – Focuses on predictive analytics for sewer and stormwater systems, using data to optimize asset management and resource allocation.

The panel provided a well-rounded perspective on how digital tools, data-driven decision-making, and regulatory requirements are shaping the future of asset management in the water sector.

### Discussion Themes

The conversation covered key aspects of asset management, including:

- The Role of Asset Inventories – The foundation of effective asset management, particularly for smaller utilities with limited resources.
- Challenges in Implementation – Issues such as data quality, resistance to change, and financial constraints were explored, with panelists sharing solutions.
- Technology and Innovation – The potential of AI, predictive analytics, and digital platforms to streamline operations and improve long-term planning.

- Funding and Compliance – How regulations like the lead and copper rule and state revolving funds (SRF) are driving improvements in asset management.
- Stakeholder Engagement – The importance of involving field crews, decision-makers, and regulatory bodies to ensure the success of asset management initiatives.

The session underscored the need for proactive asset management strategies, the integration of modern technology, and a collaborative approach to overcoming industry challenges. Panelists provided valuable insights into how utilities, regardless of size, can improve efficiency, reduce risks, and enhance long-term sustainability through better asset management practices.

Please visit [BAMI-I.com](http://BAMI-I.com) to watch the recorded video.



**ROSS WAUGH**  
Director, Waugh Infrastructure Management

**JOSH HAWLEY**  
Utility Advocate | Solutions Consultant, Zipility



**MEGAN GLOVER**  
Cofounder and CEO, 120water

**LETICIA EBERLY**  
President, LMEC LLC



## STRATEGIC WATER AUDITS:

# Driving Sustainability and Efficiency in Utility Management



The presentation explores strategic water audits, water loss management, and challenges within Indiana's water utility sector. It covers legislative requirements, audit methodologies, data validation, technical assistance, and the future of asset management. The goal is to support Indiana's utilities, particularly in rural areas, in effectively managing water resources and reducing water loss.

Indiana's 2019 legislation mandates annual water loss audits, requiring validation by certified third-party validators every two years. The Indiana Department of Environmental Management (IDEM) classifies significant water losses—25%

or more annually—as a substantial deficiency, underscoring the importance of accurate audits. The presenters discuss the key components of water loss: real losses (physical leaks), apparent losses (metering inaccuracies and unauthorized consumption), and unbilled authorized consumption. These factors contribute to non-revenue water, a crucial metric in system performance.

Data collection is a major focus, with utilities gathering information on supply, consumption, and infrastructure. The team utilizes American Water Works Association (AWWA) software to standardize data and improve accuracy. Reports include key performance indicators like the Infrastructure Leakage Index (ILI)

and Data Validity Score, which help utilities assess efficiency and prioritize improvements.

Rural utilities face challenges such as limited resources, outdated infrastructure, and technical constraints. The Alliance of Indiana Rural Water (AIRW) provides training and support, helping utilities refine data collection, address leaks, and improve asset management. By fostering collaboration and leveraging water audit data, the team aims to drive long-term sustainability and efficiency in Indiana's water utilities.

Please visit [BAMI-I.com](http://BAMI-I.com) to watch the recorded video.



**ADAM  
HERSHBERGER**

EPA Water Specialist, Alliance  
of Indiana Rural Water

**LOREAN JOHNSTON**

Deputy Director, Alliance of  
Indiana Rural Water

# NC Grant Efficacy Study and Outcomes



The presentation, delivered by Justin Nolan of the UNC Environmental Finance Center, examines the effectiveness of two grant programs administered by North Carolina's Department of Environmental Quality (DEQ): the Asset Inventory and Assessment

(AIA) Grant and the Merger/Regionalization Feasibility (MRF) Grant. These programs aim to support small and dis-

tressed utilities in managing water infrastructure challenges.

## Purpose and Impact

The AIA grant, introduced in 2016, provides up to \$150,000 to help small towns develop asset management plans, inventory infrastructure, and prioritize improvements. Many of these communities lack the resources to maintain detailed records, making this grant crucial for long-term sustainability.

The MRF grant, offering \$50,000, encourages collaboration between utilities by funding feasibility studies on regional partnerships, shared resources, and system consolidation. This initiative helps utilities explore cooperative solutions, though implementation remains challenging.

## Key Findings

### 1. AIA Grant Outcomes

- Enabled towns to initiate

asset management planning and identify critical infrastructure needs.

- Plans are actively used and updated, though they often reveal significant funding gaps for necessary improvements.

### 2. MRF Grant Impact

- Fostered regionalization discussions and strengthened utility partnerships.
- Political and economic barriers, such as local autonomy concerns and infrastructure costs, hinder full regional integration.

### 3. Challenges and Next Steps

- Utilities struggle with securing additional funding to implement identified improvements.
- DEQ aims to integrate these grants into the Viable Utilities Program, providing more structured support for distressed systems.

## Conclusion

While the AIA and MRF grants have proven valuable in initiating planning efforts, their success depends on transitioning from strategy to implementation. DEQ is working to enhance support mechanisms, ensuring these programs drive long-term improvements in North Carolina's water infrastructure.

Please visit [BAMI-I.com](http://BAMI-I.com) to watch the recorded video.



**JUSTIN NOLAN**

Project Director, UNC  
Environmental Finance Center

UTILIZING NEW TECHNOLOGIES TO

# Make Better Asset Management Decisions



he presentation explores advancements in wastewater treatment, asset management, and infrastructure maintenance.

Through personal stories and technological innovations, Michell emphasizes creativity, problem-solving, and adaptability in engineering.

Reflecting on an early career challenge, Michell shares how they were tasked with designing a wastewater treatment plant just three days into their first job. This experience highlights the importance of resourcefulness, drawing inspiration from MacGyver to tackle complex problems with simple yet effective solutions. One example includes using a shop vacuum to clear debris from spillway drains, enabling crucial inspections.

The discussion moves into pipeline inspection advancements, particularly the Pipeline Assessment Certification Program (PACP) and high-definition video (HDTV) technology. While PACP provides a standardized assessment framework, Michell shares how integrating GoPro cameras significantly improved video quality, enhancing defect detection and AI-driven condition assessments. Multi-sensor inspections using laser and sonar technologies allow engineers to measure corrosion, deformation, and debris accumulation, creating detailed 3D models for targeted maintenance.

A particularly innovative approach involves using drones for smoke testing in sewer inspections. Traditionally, smoke testing reveals defects and illegal connections, but accessibility issues often pose challenges. By employing drones, engineers can inspect backyard easements and wooded areas efficiently while improving safety and privacy.

The presentation also highlights the value of Esri's Survey123, a tool that replaces paper-based field data collection with a digital solution, integrating GPS and photographic documentation.

Additionally, artificial intelligence is transforming asset management by automating defect detection in pipelines, reducing human error, and allowing for proactive maintenance.

Michell concludes by encouraging engineers to embrace innovation and leverage existing technologies creatively to drive progress and address infrastructure challenges effectively.

Please visit [BAMI-I.com](http://BAMI-I.com) to watch the recorded video.



**MICHELLE D. BEASON, PE**

Regional Manager/Principal Engineer, National Plant Services, Inc.

RESEARCH PROFESSOR AT UTAH STATE UNIVERSITY

# Associate Director at the Utah Water Research Laboratory



The Steven L. Barfuss presented findings from three extensive water main break studies conducted in 2012, 2018, and 2023. These studies analyzed break rates, pipe materials, and asset management practices across the U.S. and Canada, drawing data from nearly 7,500 utilities. The surveys covered 17.1% of the total pipe network, representing over 399,000 miles of infrastructure and serving 30.1% of the population.

The study categorized the U.S. and Canada into nine regions, highlighting variations in network size and population density. Region 5 (Texas and south-central states) had the largest pipe networks, while Region 1 (Pacific Northwest) had the smallest. Most participating utilities (92%) managed networks under 1,500 miles, aligning with EPA data and emphasizing the financial challenges of smaller utilities.

Common materials included asbestos cement (AC), cast iron (CI), ductile iron, and PVC. Between 2018 and 2023, AC and CI usage declined by 7.8%, correlating with increased PVC adoption. However, aging infrastructure remains a concern, with 33% of surveyed pipes over 50 years old. Break rates varied by material, with cast iron performing the worst and PVC the best. The 2023 study reported 11.1 breaks per 100 miles annually, down from 14 in 2018, indicating gradual improvements.

The study estimated 260,000 water main breaks per year, costing \$2.6 billion in repairs. Factors such as soil corrosivity, climate conditions, and pipe age influence failures. Key recommendations include increasing funding, transitioning to durable materials, enhancing

asset management, and mitigating soil corrosivity risks. Addressing the estimated \$452 billion funding gap is essential for ensuring long-term water system reliability.

Please visit [BAMI-I.com](http://BAMI-I.com) to watch the recorded video.



**STEVEN L. BARFUSS**

Utah State University



# Digital Defense for Hidden Infrastructure and Water Networks



his presentation explores the critical role of cybersecurity in protecting water utilities, SCADA systems, and broader municipal networks. It begins with humor to ease the audience into a serious topic, using a joke about computers having “unresolved issues” to highlight hidden vulnerabilities in IT and operational technology (OT) systems. The analogy of data leaks to water leaks further underscores the importance of proactive security measures.

The discussion differentiates IT systems,

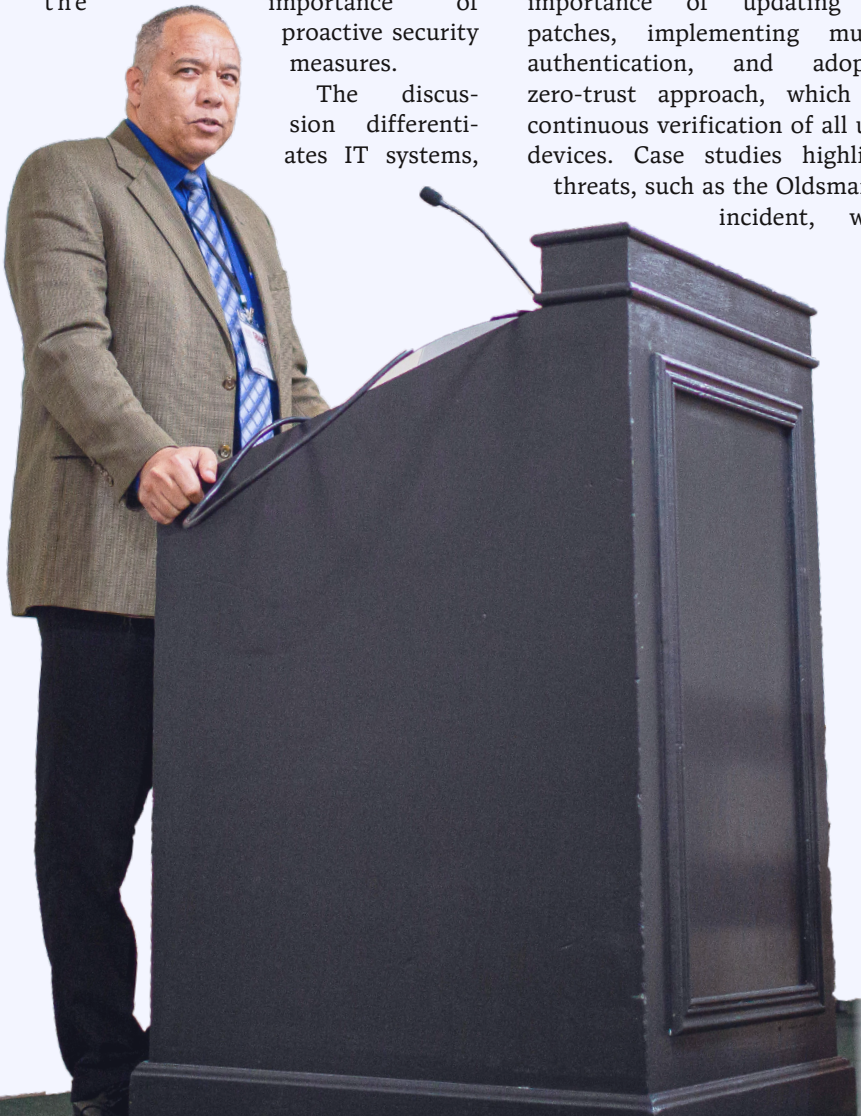
such as computers and servers, from OT systems, which control critical infrastructure like water treatment plants and pumps. A key concern is that while IT devices receive frequent updates, OT systems often remain unpatched, making them prime targets for cyberattacks. Examples include unsecured consumer routers with default credentials and high-profile breaches, such as the Target hack, where attackers infiltrated via an HVAC vendor’s network access.

The presentation stresses the importance of updating security patches, implementing multi-factor authentication, and adopting a zero-trust approach, which requires continuous verification of all users and devices. Case studies highlight real threats, such as the Oldsmar, Florida incident, where a

hacker attempted to alter chemical levels in a water supply.

Ransomware is another major concern, with statistics showing that even paying ransoms does not guarantee full data recovery. The session concludes by emphasizing that cybersecurity must be embedded into daily operations, from device procurement to network monitoring, ensuring resilience against evolving threats in critical infrastructure.


Please visit [BAMI-I.com](http://BAMI-I.com) to watch the recorded video.



**CALVIN LEVY**

Chief Technology Officer,  
Mahjee

# Luncheon Keynote Speech



**O**lugbenga Ibikunle, a technical expert and consultant, shares his transformative journey in the field of asset management. He describes how he initially struggled with the disconnect between the technical and business perspectives of his clients. As a highly qualified engineer, he realized that his clients were hiring him to address business problems, not just engineering challenges.

Ibikunle's breakthrough came when he identified asset management as the bridge connecting these two worlds. He delved into understanding the principles of asset management, including the ISO 55000 standards, which define it as balancing cost, opportunities, and risk to meet

organizational goals. This realization led Ibikunle to pursue an MBA, equipping him with the business vocabulary and mindset to effectively communicate with his clients.

Ibikunle emphasizes the importance of a business-centric approach in consulting, where he integrates asset management concepts into his proposals and deliverables. By demonstrating the impact of asset management

practices on the triple bottom line (profit, people, and planet), he has been able to gain the support and trust of senior management teams and clients.

Ibikunle also highlights the significance of staying informed about global trends in asset management, such as climate change, sustainability, technological advancements, and regulatory changes. He provides historical examples of asset management failures, underscoring that these were not purely technical problems but rather the result of poor asset management practices.

Ibikunle encourages the audience to shift their mindset and communication strategies to position asset management professionals as essential workers who contribute to the success of businesses and communities. He emphasizes the need to create a future where asset management is recognized as a critical component of sustainable development and business growth.

Please visit [BAMI-I.com](http://BAMI-I.com) to watch the recorded video.



**OLUGBENGA  
IBIKUNLE**

Co-Founder | Managing Principal  
| Author/Speaker | Teacher |  
Motivational Speaker | Mentor,  
Avodahtec

# TOM ISELEY COMMENTS ON INDUSTRY UNIVERSITY COOPERATION PROGRAMS (IUCP)



Two UIUCP dedicated to the underground infrastructure industry are the TTC (Trenchless Technology Center) at

Louisiana Tech University and CUIRE (Center for Underground Infrastructure Research and Education) at the University of Texas in Arlington. Both have stood the test of time and served the industry well. Our industry is blessed with the expanding number of higher education programs which have joined in providing awareness, training, testing, validation and research. This is a critical component as we seek to meet current and future challenges. It takes strong leadership to advance our industry. These leaders need a strong academic background coupled with exposure and experience in the industry. Numerous universities have established NASTT (North American Society for Trenchless Technology) and UCA (Underground Construction Association) student chapters. These are tremendous opportunities for industry professionals to assist the chapter advisors and student offers in maximizing their exposure to our industry and consider internships and co-op programs to provide maximum experience.

We are fortunate at Purdue to have strong NASTT and UCA student chapters. NASTT was established several years prior to COVID through the leadership of Professor Dulcy Abraham, and the UCA chapter was established after COVID with me serving as the faculty advisor. UCA is a division of SME. The Purdue chapter was the 3rd to be established. Working with student chapter members, we have been able to take students to conferences such as the WWETT, UIC, No-Dig, etc. We had a student delegation of 8 which assisted with the BAMI-I GBAMC (Global Buried Asset Management Congress). Continue reading to see what an impact to the students that just this one event had:

## 1. Carly Wilkerson

Networking experiences, and the importance of collaborative problem-solving.

I attended the Global Buried Asset Man-



agement Congress because I wanted to better understand asset management, particularly the benefits of asset management and the growth of the use of asset management over time. I was optimistic that the attendees and guest speakers would help me to understand the importance of asset management, but was more than impressed with the many ideas, issues, and passions that were discussed concerning the topic. The speakers addressed both foundational principles and emerging trends in asset management, with a particular focus on the unique challenges and opportunities in underground infrastructure. Attending the conference opened my eyes to much more than just asset management but also the importance of discussing issues and relating to others to help improve the way assets are managed and found. The presentations were the most important part of attending the asset management congress. There were multiple different presenters as well as multiple different styles of presentations. One style that I appreciated the most was the panel discussions. The debate styled discussion encouraged those in the audience to participate and be engaged. This was beneficial as the ideas that were being discussed continued to be explored and developed as many people had their opinions and experiences, they were willing to share. The debate and panel discussion I found to be the most interesting was the Energy Decarbonization Solutions moderated by John North with panelists Michael Peters, Cory Kreutzer, Savannah Speciale and Greg Zoeller. This panel discussed innovative approaches to energy decarbonization, focusing on cleaner energy, efficiency, and carbon emission reduction.

Topics include repurposing pipelines for cost-effective infrastructure adaptation, and the role of asset management in modernizing systems like pipelines and grids. The panel also touched on Health and Risk Monitoring Systems for Buried Asset Management to ensure infrastructure safety and environmental protection. This discussion took place on the first day I attended and had a lot of audience engagement as focusing on cleaner energy is becoming more important.

While I attended the conference, I was also given the chance to volunteer and help check guests in. This was another great opportunity to network and learn from industry leaders. It was eye opening to see how far guests had come from to share their ideas and experiences. My shift was on Saturday, so I had a chance to hear certain guests speak the day before. When I checked them in the following day, I made sure to ask questions if I had any about their presentations and get to them better on a more personal level. This was a great opportunity as I could compare where people were from and the challenges they faced pertaining to asset management and how their careers have brought them to this field. Each guest I met was more than willing to discuss their experiences. One guest in particular informed me that his passion took many years to find and build up. He gave me the advice to continue following and exploring ideas that interest me and to continue to be inspired by others. He also said it was important to listen to others' ideas because they could always help you better understand how to face your own challenges, which felt like a great summary of the conference and how each guest was listening to each other and helping each other with their challenges by sharing their own experiences. Overall, I will remember the impactful ideas that were presented and will be inspired to find my own passions and challenges to solve, just as the guests speakers were.

## 2. Drew Beveridge

The UCA/NASST chapter at Purdue University has offered many incredible extracurricular experiences, and the Global Bur-



ied Asset Management conference was no exception. The professors and executives have been exceptionally kind to organize our attendance at this conference. I was excited at the prospect of hearing professionals' thoughts on issues relevant to today's underground world, since having a broad understanding of numerous perspectives will make me a stronger asset to the world of Civil Engineering.

The technical presentations were very engaging and interesting, but what especially stood out to me were many of the human aspects of asset management. Hearing of how residents are often nervous to let inspectors into their homes, or how managers don't always see the value in asset management programs, or how small cybersecurity overlooks can pose serious threats to asset information, instilled in me the importance of developing asset management programs that are robust and can adapt to different people and ideas.

As an intern in asset management over the summer of 2024, I gathered and organized most of my work the way my bosses told me. I didn't understand how to think critically about why the company organized things a certain way, but this conference opened my eyes. I can now see the value in details I used to glance over or disregard. I believe that a number of the human issues facing asset management stem from this difficulty seeing the value of details and connections, so I believe that I can contribute to the world of asset management by helping others understand its importance too.

### 3. Daniel Ahrendt

I attended the Global Buried Asset Management Congress to gain a deeper understanding of asset management, particularly its benefits and how its use has evolved over time. I hoped the speakers and attendees would shed light on the importance of asset management, but I was thoroughly impressed by the wide range of ideas, challenges, and enthusiasm shared on the subject.

The speakers covered both core principles and emerging trends in asset management, focusing on the unique challenges and opportunities related to underground infrastructure. The conference not only expanded my understanding of asset management but also highlighted the value of open discussions and collaboration in improving the management and discovery of assets.



The speaker that I found to be the most impactful to my own learning was John Norton. John had a high amount of energy and was very engaging. He is the Director of Energy, Research, and Innovation at GLWA, a combined water and wastewater utility serving Southeast Michigan. GLWA provides more than 40% of the state's water and 30% of its wastewater treatment. Norton leads the organization's research initiatives aimed at improving and extending both linear and process infrastructure. His projects cover areas such as source water monitoring, water quality in distribution systems, and energy extraction from biosolids. John gave his presentation on the challenges and benefits of working together on research in the utility sector. I enjoyed how he discussed how part-

nering with utilities, universities, and businesses can lead to new ideas, better services, and solutions to important issues like water quality, efficiency, and the strength of infrastructure.

The main take-away from the conference that I feel will impact on me the most was seeing each and every group interact and share their ideas. Working with others to accomplish goals and meet deadlines will always be a part of my future career and teamwork was a key highlight that multiple speakers touched on. The use of teamwork and coming together to share important ideas and discoveries was an important aspect of the conference as well. Another takeaway that I will remember is respecting others and listening to their ideas. This was seen during the conference as the audience was actively engaged in each speaker's presentation. Not only were speakers presenting their ideas and being open about what they have seen or done, the audience felt encouraged to relate their ideas and you could tell they were actively listening because of what they shared.

### 4. Andi Flittner



I went to the Global Buried Asset Management Congress in order to learn more about asset management, namely its advantages and the ways in which its use has changed over time. I was genuinely amazed by the diverse range of perspectives, difficulties, and excitement expressed on the topic, even if I had hoped that the speakers and attendance would clarify the significance of asset management. The presenters addressed both fundamental ideas and new developments in asset management, with an emphasis on the particular difficulties and possibilities associated with subterranean infrastructure. My knowledge of asset management has grown as a result of the conference, which also made clear how important candid conversations



and teamwork are to better asset discovery and management.

Although each guest speaker had ideas and different topics to discuss with the audience, there was one main person that I felt was the most impactful for myself. This speaker was Michell Beason. Michell Beason received a BS in Civil Engineering from Purdue University, and is a registered Professional Engineer in California, Nevada,

Oregon, and Arizona; with over 30 years of water and wastewater asset management and construction experience.

She has worked as a Project Engineer Capitol Engineering (Indianapolis) and Black & Veatch (Kansas City), as an Asset Management Engineer with the East Bay Municipal Utility District, she owned her own Engineering & Construction firm for 5 years, and for the last 14 years has specialized in multi-sensor inspections and trenchless rehabilitation of sewer, storm, and water assets. In her presentation, she discussed four methods by which system owners can use new technology to better manage their systems. These included High Definition (HD) CCTV video to record pipeline defects, using multi-sensor inspection robots (using HDCCTV, LiDAR, sonar) to determine remaining useful life and when rehabilitation is necessary, using drones in sewer smoke testing, and how GIS applications are simplifying data collection in the field from handheld devices.

Michell's experience really showed throughout her presentation and it made me feel excited to start my own career and build my own confidence through experiences. She felt even more relatable as her career journey started with a civil engineering degree from Purdue University. I will forever be inspired by her passion for asset management and how she used her experiences in the field to think of ways to better develop a process for managing and assessing pipelines for companies to use and improve their quality of work. Overall the Global Buried Asset Management Congress showed me how important it is to continue to use your passions to improve old systems and help others by sharing these ideas. It is important to work with others and respect their ideas, which was easily seen throughout the conference.

### 5. Sihan Zhou

Attending GBAMC 2024 provided a unique opportunity to deepen my understanding of cutting-edge asset management practices and explore innovative solutions for infrastructure challenges, particularly in the water and wastewater sectors. As a researcher passionate about urban systems and sustainable infrastructure, the conference's focus on resilience, regulatory compliance, and finan-



cial sustainability aligned perfectly with my academic and professional goals – advancing the practice of pipeline condition assessments (PCA) in water and wastewater systems.

The insights gained from the presentation



“Utilizing New Technologies to Make Better Asset Management Decisions” by Michell Beason provided invaluable knowledge on advanced pipeline inspection technologies, which will greatly influence my academic endeavors. Learning about High Definition (HD) CCTV for detailed defect recording, multi-sensor inspection robots incorporating LiDAR and sonar for evaluating remaining useful life (RUL), and drones for sewer smoke testing has expanded my understanding of how utilizing the tools you have around you to transform into pipeline condition assessments. This approach strongly aligns with my advisor, Prof. Iseley's perspective, focusing on developing innovative PCA technologies by leveraging available tools and techniques to change industry practices to be the most cost-effective.

This knowledge will directly enhance my academic coursework, especially in urban informatics and smart cities, by integrating advanced pipeline inspection technologies into

case studies and project simulations. I plan to mentor peers by sharing these technological advancements, emphasizing their applications in sustainable urban infrastructure management. During internships, I will advocate for adopting tools like multi-sensor robots and GIS-based data collection to improve operational efficiency and decision-making. In my future career, these insights will guide me in designing innovative asset management strategies that leverage these advanced technologies to ensure the long-term reliability and sustainability of critical pipeline systems in urban environments.

### 6. Venkata Jaydheer Naidu Chapala (Jay)

The Global Buried Asset Management Congress (GBAMC) is more than just a conference, it's an unparalleled opportunity to engage with the underground construction and asset management industry at its finest. Not only does it showcase outstanding research presentations, but it also provides invaluable

time to grasp information from real-time scenarios and industry challenges.

Being part of the organizing team for GBAMC 2024, hosted in Indianapolis, has been an extraordinary experience. From attending presentations by top industry experts to networking with leading professionals, GBAMC offers a unique platform to bridge academic knowledge with practical insights.

I am incredibly grateful to Professor Tom Iseley and Liao Wei for trusting me with this opportunity. Through my involvement, I've gained invaluable organizational leadership and project management skills. Setting up the conference, hosting attendees, and interacting closely with industry professionals and professors were responsibilities that shaped my professional growth.

Starting as an attendee at GBAMC, I never imagined I would one day be part of its organizing team. This transition taught me the value of seeing the event from both perspec-

tives, learning as a participant and contributing to its success as an organizer. These experiences have been instrumental in developing my expertise and building connections that will last a lifetime.

GBAMC is not just about knowledge; it's about creating impactful relationships and gaining firsthand exposure to the real-world challenges in water, underground, and asset management. As someone who thrives on challenges, I find it exhilarating to immerse myself in these dynamic environments.

As I prepare to graduate from Purdue, I am eager to take the insights, skills, and relationships gained from GBAMC into my professional career, ready to tackle the complexities of the construction and asset management world head-on. Even after graduating from Purdue, I would gladly extend my support to BAMI and GBAMC because every time, it's new and as fresh as the morning dew on a spring day, brimming with possibilities and inspiration.

## 7. Bhavesh Kumar Sharma



### Why I Attended the GBAMC 2024

As a graduate student specializing in civil and environmental engineering, I attended the Global Buried Asset Management Congress (GBAMC) 2024 to gain insights into the latest advancements in buried asset management. The event provided a unique opportunity to engage with industry experts, explore cutting-edge technologies, and network with professionals dedicated to addressing challenges in infrastructure sustainability.

### Key Learnings from GBAMC 2024 Presentations

The conference featured several impactful presentations from industry leaders and researchers. A standout session by Dr. Tom Iseley, a pioneer in buried asset management, explored the development of strategic asset management plans (AMPs) to address aging infrastructure. His emphasis on proactive management and tools like GIS mapping was particularly enlightening. Another notable presentation demonstrated the integration of optical fiber sensors into pipe resins to monitor flow rate and pressure head, offering real-time data for condition assessments. This session highlighted innovations from companies specializing in pipeline technology and asset monitoring solutions.

### Engagement and Networking Opportunities

Engaging with industry professionals was a significant highlight of the event. Conversations with engineers implementing optical fiber technologies for buried pipelines provided valuable insights into their practical applications. Networking sessions also facilitated discussions about potential career paths, collaborative research opportunities, and trends in water and wastewater asset management. These interactions underscored the importance of building professional relationships to advance both academic and industry pursuits.

### Volunteer Opportunities

The conference offered unique volunteer opportunities to support event operations and engage directly with panelists and organizers. Participating in these activities allowed me to gain behind-the-scenes insights into the event's planning and execution, further enhancing my understanding of the buried asset management sector.

### Applications to Academic and Career Goals

Attending GBAMC 2024 has provided

valuable takeaways for my academic and professional journey:

1. **Academic Coursework:** The knowledge of advanced pipeline condition assessment methods, such as the use of optical fiber sensors, will inform future research projects and classroom discussions. Additionally, I will be taking an Asset Management course next semester under the guidance of Dr. Tom Iseley to further develop my understanding of this field.
2. **Expanded Perspectives:** Starting next semester, I will also be taking Construction Management courses to gain a broader perspective on infrastructure projects. These courses will help me analyze challenges from different angles, thereby enriching my approach to asset management.
3. **Mentorship:** Insights from the event will be shared with peers and younger students to promote awareness of asset management practices and career opportunities.
4. **Internship and Career Pathways:** Networking with industry leaders has expanded my professional connections and provided clarity on how to align my career goals with emerging trends in buried asset management.

The integration of case studies, technological innovations, and expert insights from GBAMC 2024 will significantly enhance my contributions to the field of civil and environmental engineering.

## 8. Sayali Chavan

Attending the 2nd Global Buried Asset Management Congress was a defining moment in my journey as a graduate student. It was an incredible opportunity to step out of the classroom and into a vibrant space



where academia met industry, offering me a fresh perspective on the critical role of buried asset management in modern infrastructure. The event was an inspiring mix of cutting-edge innovation, meaningful discussions, and invaluable networking, all of which reinforced the real-world impact of the concepts I study daily.

One of the most impactful sessions was Michell Beason's presentation on "Utilizing New Technologies to Make Better Asset Management Decisions." This session introduced revolutionary tools such as HD CCTV, multi-sensor robots, drones, and GIS, all of which are transforming how infrastructure is inspected and managed. Equally compelling was "Strategic Water Audits: Driving Sustainability and Efficiency in Utility Management" by Adam Hershberger and Chad Reynolds, which demonstrated how data-driven strategies can identify inefficiencies and foster long-term sustainability. The panel discussion on "Energy Decarbonization Solutions" was another highlight, presenting innovative ideas on transitioning to cleaner energy and modernizing infrastructure through cross-industry collaboration.

Volunteering at the congress added a

unique dimension to my experience, particularly through my role in technical support. Through this, I gained valuable experience in quickly troubleshooting issues, managing time effectively, and ensuring smooth event execution through communication and attention to detail. Additionally, engaging in discussions with industry leaders provided firsthand insights into groundbreaking projects and emerging technologies, whether it was exploring advancements in polymer technologies through discussion and polymer samples or delving into AI-driven threat detection and blockchain solutions for secure data management, the experience was both educational and inspiring.

This experience offered me practical knowledge, professional connections, and a deeper appreciation for the importance of asset management. The opportunity to discuss emerging technologies and strategies with professionals broadened my perspective and enriched my academic journey. It has inspired me to think beyond textbooks and equipped me with the tools and ideas that will shape my future in this exciting and essential field.

I would like to express my sincere gratitude to Professor Iseley, Professor Abra-

ham, and Wie for giving me the opportunity to volunteer and be a part of this meaningful event. Their support and encouragement enabled me to gain invaluable hands-on experience, interact with industry leaders, and contribute to the success of BAMI. I am truly grateful for this opportunity, which has significantly enhanced my academic and professional development.

infrastructure challenges and solutions but also expanded my professional network. The connections made during this event will have a profound impact on my future career development."

Special thanks to Purdue University's UCA and NASTT chapters and all the generous sponsors of this event, including Underground Infrastructure Magazine, CPM Pipelines, Midwest Mole, Ace Pipe Cleaning, Plastics Pipe Institute, Danby PVC Lining, Jim Siebert-Consultant, Boyer, InfoSense Inc., KMCE. Inc and US HYDRO VAC. Your support made this invaluable learning opportunity possible and provided a solid foundation for the students' professional development.



## The authoritative source of information on PVC water, sewer, and reclaimed water pipe.

The Uni-Bell PVC Pipe Association was founded in 1971 as a non-profit organization and serves the engineering, regulatory, public health, and standardization communities.

Our mission is to promote use of longer-life, lower-maintenance, corrosion-proof PVC pipe in water and wastewater systems – for real sustainability, strength, and long-term asset management. The Association offers free technical and engineering support for the design, installation, and application of PVC piping systems.

Uni-Bell PVC Pipe Association  
201 E. John Carpenter Freeway, Suite 750 | Irving, TX 75062  
[www.uni-bell.org](http://www.uni-bell.org)

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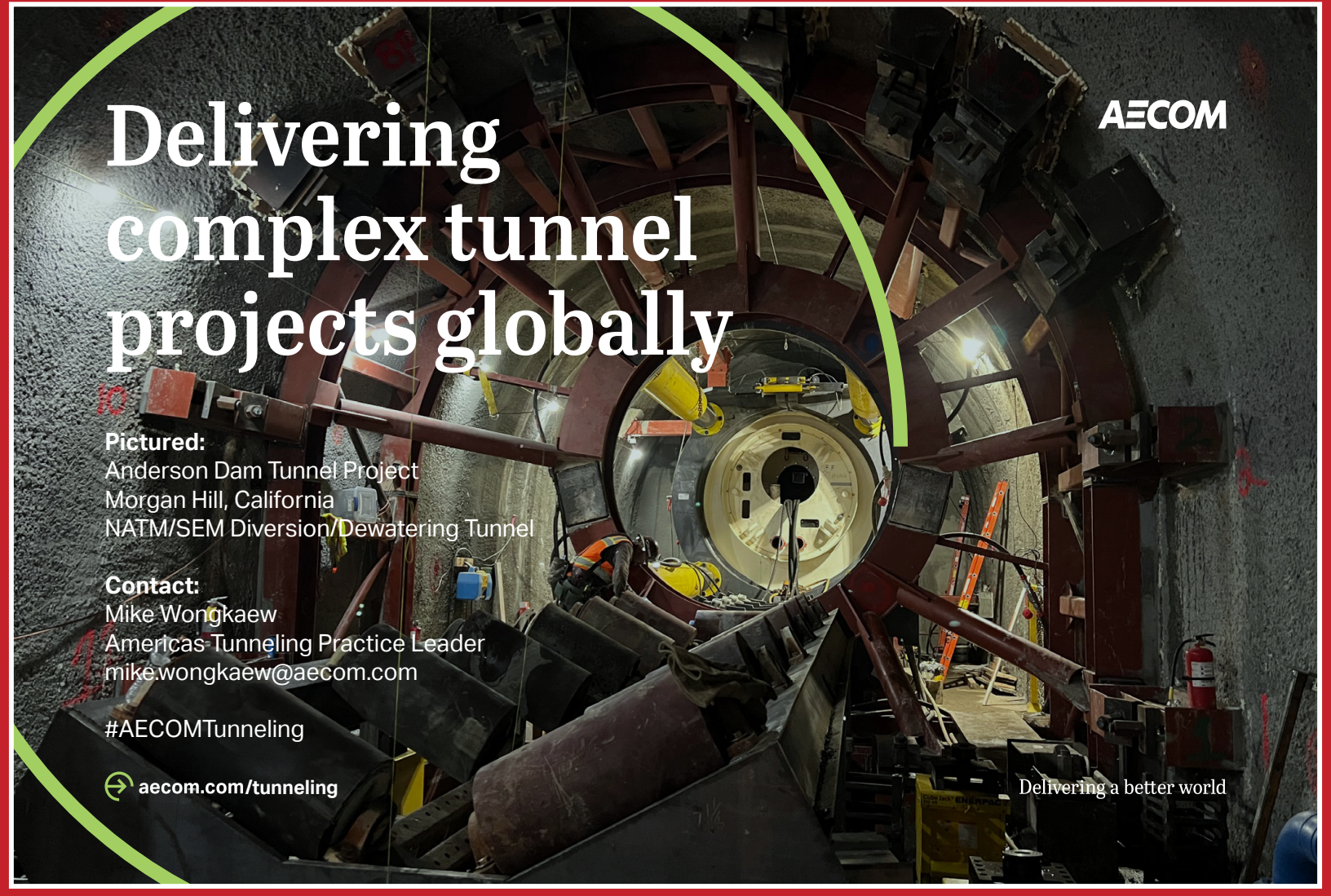
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# Delivering complex tunnel projects globally

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Anderson Dam Tunnel Project  
Morgan Hill, California  
NATM/SEM Diversion/Dewatering Tunnel

### **Contact:**

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[aecom.com/tunneling](http://aecom.com/tunneling)

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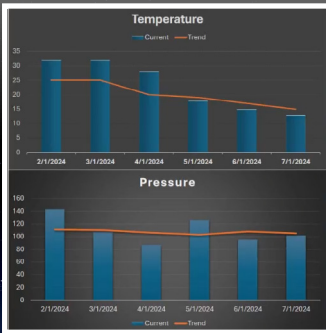
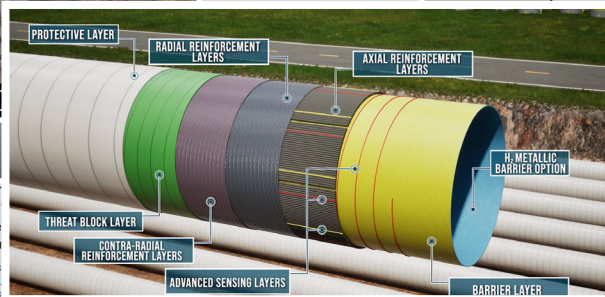
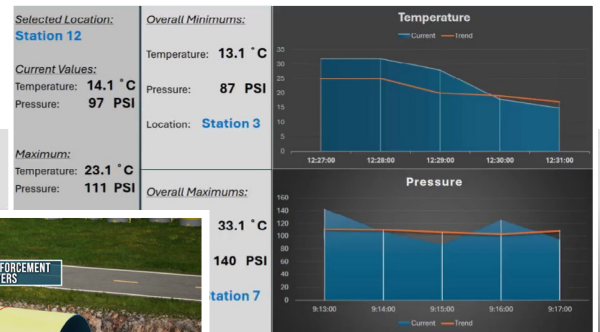
Transitioning the world's pipeline and storage infrastructure to meet the needs of existing and future markets.



## BrainDrip's Health and Risk Monitoring System: Asset Reliability, All the Time

A comprehensive asset management solution created through a combination of novel advanced sensors, asset instrumentation, and machine learning/artificial intelligence based software platforms. Purpose built for BrainDrip's pipeline liner solutions, and compatible with any composite liner system. Suitable for traditional buried asset types and deployable with polymer-based liner products, traditional steel pipes, and even tubular storage assets such as Type III - IV stationary ground storage. Superior performance to ensure that your buried asset remains in peak operating condition throughout its expected lifetime while minimizing or eliminating costly inspection practices and potential downtime.

EVENT --- [2024/03/04 17:21:34.072]



**Sample Event Log:**

- [2024/07/23 10:31:56.712]: Maximum Temperature Event, Alert Level: 1, Acknowledged: N
- [2024/07/10 12:24:58.491]: Maximum Pressure Event, Alert Level: 1, Acknowledged: N
- [2024/03/07 13:52:38.814]: Max Pressure Exceeded Event, Alert Level: 4, Acknowledged: Y
- [2024/03/04 17:21:34.072]: Third Party Disturbance, Alert Level: 4, Acknowledged: Y
- [2024/03/01 18:25:59.517]: Pressure Drop Event, Alert Level: 5, Acknowledged: Y
- [2024/02/26 22:33:00.781]: Max Temperature Event, Alert Level: 1, Acknowledged: N
- [2024/02/26 20:40:08.159]: Minimum Temperature Event, Alert Level: 1, Acknowledged: N

**Session Commands:**

```

Node Type: Hybrid
IP Routing Enabled: No
VMS Proxy Enabled: No
DNS Suffix Search List: Lan
Ethernet adapter Ethernet 2:
Media State: Media disconnected
Connection-specific DNS Suffix:
Description: ASIX USB to Gigabit Ethernet Family Adapt
Physical Address: 80-40-18-56-19-8A
Dhcp Enabled: No
Autocconfiguration Enabled: Yes
Wireless LAN adapter Local Area Connection 1:
Media State: Media disconnected
Connection-specific DNS Suffix:
Description: Microsoft Wi-Fi Direct Virtual Adapter
Physical Address: 80-1C-F8-08-08-C0
Dhcp Enabled: Yes
Autocconfiguration Enabled: Yes
Wireless LAN adapter Local Area Connection 2:
  
```

**Active Job:**

Job Number: 33708  
 Allotted Time: 72 Hours  
 Remaining Time: 13:37:12.376

**Job Description:**

Investigate pressure anomaly at Station 3. Nightly reoccurrence of low-pressure event.

Buttons: Logout, Request Assistance, Pause Work, Switch Users

Are you ready to find out more about BrainDrip revolutionary innovations?

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