BAMI-I 2024

Biannual Journal H1 2024

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Cover photo: *Volunteers team are inspecting the manhole in Switz City (Photo by Wei Liao)*

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Message from BAMI-I President

Dr. Tom Iseley

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

Why are States Requiring Water Utilities to Develop Asset Management Plans?

Every year significant funding passes through State agencies such as the SRF (State Revolving Funds) for water (wastewater, drinking water and storm water) projects. A comprehensive risk-based asset management plan (AMP) provides the guidance to ensure that this money will be invested on the right projects, doing the right things, at the right location and at the right time. EPA has provided resources for developing AMPs since the late 1990's including funding the grant to BAMI-I in 2006-2008 which led to the development of the CTAM Certification program, initially launched in 2010 and now has enrolled professionals from 16 countries. Nevertheless, there is still a reluctance for water utilities to undertake this endeavor. There are numerous reasons provided for this reluctance such as no money, no time, lack of resources, lack of awareness, lack of knowledge, etc.

Several States such as Indiana have passed legislation (SEA 272) requiring water utilities to develop AMPs to qualify for funding. From 2015 to 2019, Indiana conducted several studies through the Indiana Finance Authority (IFA) to better understand the needs of the water utilities in the State. These studies resulted in Guidelines being published in 2019. These IFA AMP Guidelines explain how the plans need to address the technical, managerial and financial issues related to developing and applying best business practices. These guidelines provide tools and templates to be utilized in developing the AMP. Even with these guidelines, water utilities have been slow to develop AMPs; so, the Governor signed Senate Bill in March 2022 which requires utilities to develop an AMP to qualify for funding.

As mentioned in Ms. Wei Liao's editorial, BAMI-I had the opportunity to work with a couple of organizations to develop an AMP for Switz City, IN. This was done on a volunteer basis for the purpose of being able to learn how to apply the IFA AMP Guidelines with the objective of developing a model, aids and tools which can be utilities by other utilities especially small water utilities. In the article on this project provided in this Journal, you will learn how the BAMI-I team working with the Purdue CEM UIT was able to utilize the CTAM educational materials and the IFA Guidelines to accomplish developing this AMP which address the 5 core components of AMP established by EPA over 20 years ago. These fundamental core components are: know the current state of the assets; levels of service; criticality; minimum life cycle costing; and financial management.

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- ASCE 38-22: Utility Investigation and Documentation Standard
- ASCE 75-22: Utility "As-Builting" and Utility Record Drawing Standard
- ASCE Subsurface Utility Engineering for Municipalities: Scope of Work and Pre-Qual Criteria
- EJCDC Contract Documents

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For more information and registration click here:
https://bami-i.com/utility-investigation-school/
For additional questions, please contact Wei Liao at
liao186@purdue.edu

Austin, Texas

Course Instructors:

James H. Anspach, PG (r), Dist.M.ASCE

National Academy of Construction
Chair, ASCE 38
2018 President – ASCE UESI
A.A. Professor – CCEE, Iowa State University
Chair – Utility Engineering and Surveying Certification Board

John P. Campbell, PE, SR/WA, M.ASCE

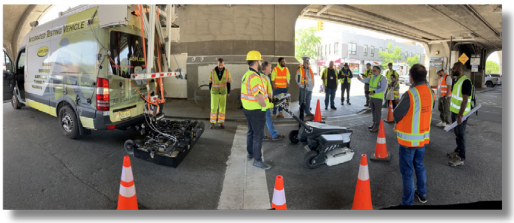
Plan of 2024 UIS

June - Nashville, TN

August - San Francisco, CA

November- Phoenix, AZ

December - Denver, CO



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Message from Journal editor

Ms. Wei Liao

PWAM

The practice of mandating an asset management plan (AMP) for project funding is gaining traction. Over seven states now legally require an AMP for funding approval, and twenty-four states promote the development of these plans among utilities through various programs. This paradigm shift emphasizes the growing recognition of effective asset management as foundational to securing financial support for infrastructure projects. In the past few years, we have been contacted by asset managers from different states in search of asset management resources for developing AMP. The urgency for such plans, especially among smaller utilities with limited resources, is becoming more apparent. This need inspired our 2023 initiative to voluntarily develop an AMP for Switz City, IN, an effort that not only highlights the increasing importance of structured asset management in securing funding but also underscores our commitment to supporting utilities in navigating these new requirements. This edition of the BAMI-I journal features an article on this project detailing the process, challenges, and insights gained. Don't miss out on this informative piece that sheds light on the evolving landscape of utility management and the critical role of asset management plans.

Bridging our 2023 initiative to develop an AMP for Switz City is consistent with broader industry trends. The American Business Water Coalition's recent report emphasizes the critical need for significantly increased federal investment in water infrastructure to protect public enterprises and local economies. Titled "10 Extreme Water Disasters in 10 Days" the report details the severe impacts of extreme water disasters across the United States from January 14 to January 23, due to failing water infrastructure in various regions including the Pacific Northwest, Midwest, Deep South, Mid-Atlantic, and New England. These failures led to business shutdowns and economic losses due to pipe burst, water shutoffs, and boil water advisories during extreme weather events. The disasters underscore the urgency of addressing water infrastructure, particularly the maintenance of hidden components like water mains and pipes, whose failures pose significant risks. Recognizing this, our focus intensifies on the stewardship of these critical, yet often overlooked, assets. We champion the cause for greater investment to fortify and modernize our water systems, emphasizing the pivotal role of underground infrastructure.

As BAMI-I, we aim to serve as a beacon for best practices in water asset management, leveraging our deep understanding of the complexities involved in maintaining and enhancing subterranean assets to guide and support stakeholders in securing a resilient water future. 2023 marked a year of significant achievements and relentless pursuit of progress for BAMI-I, culminating in the success of hosting our inaugural Global Buried Asset Management Congress (GBAMC). This milestone, a testament to the hard work and dedication of our team, sponsors, and speakers, has set a new benchmark for our organization. As we reflect on the past year's accomplishments within this issue, we also cast our gaze forward to the 2024 2nd GBAMC, whose theme will be "New Horizons in Asset Management". The 2024 GBAMC event promises to build on the discussions of the previous year, moving into a more practical phase. The congress will span three days. The agenda will include keynote speeches, panel discussions, exhibitions, and diverse learning and networking opportunities. We will have different tracks in the education program. The topics in the tracks will cover most of the aspects that you need to deeply understand when developing asset management programs. There will be a thematic focus on legislative changes across states, as the evolving legislative landscape and its impact on asset management become our focal point of attention. This is a critical barometer for the development of our industry. Additionally, we aim to contribute to the refinement of legislation, highlighting our commitment to positively influencing the legal framework that shapes our sector. We invite you to stay engaged with updates for the 2024 Congress and consider contributing your insights through speaking at our congress.

In addition to the 2023 Congress, BAMI-I has experienced many notable moments, which you will notice if you are following our LinkedIn account. This edition of BAMI-I Journal not only documents what the BAMI-I team is doing and will be doing, but also features articles contributed by industry subject matter experts. Please enjoy.

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Wei Liao,

liao186@purdue.edu

CTAM-100 At-a-Glance:
- Sharing Asset Management Knowledge Globally
- Asset Management Overview & Technologies
- Introduction to Appropriate Websites & Tools
- Risk Management
- Government Regulations
- Case Study Examples

CTAM-300 At-a-Glance:
- Organizational,Legal & Budgeting Considerations
- Developing Priorities & Key Performance Indicators
- Infrastructure Inspection, Mapping & RehabMethods
- Capacity, Management, Operation & Maintenance
- Asset Worth Value & Life-Cycle Analysis • Risk-Based Budgeting

CTAM-200 At-a-Glance:
- Underground Infrastructure Asset Management
- Advantages, Rewards, Obstacles & Planning
- AssetInventory, Organization Strategies & Tools
- Water & Wastewater Condition Assessment
- Data Content, Analysis, Sharing & Distribution

CTAM-400 At-a-Glance:
- Financial Challenges & Developing Strategies
- Accounting Principles, Reporting & Budgeting
- 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

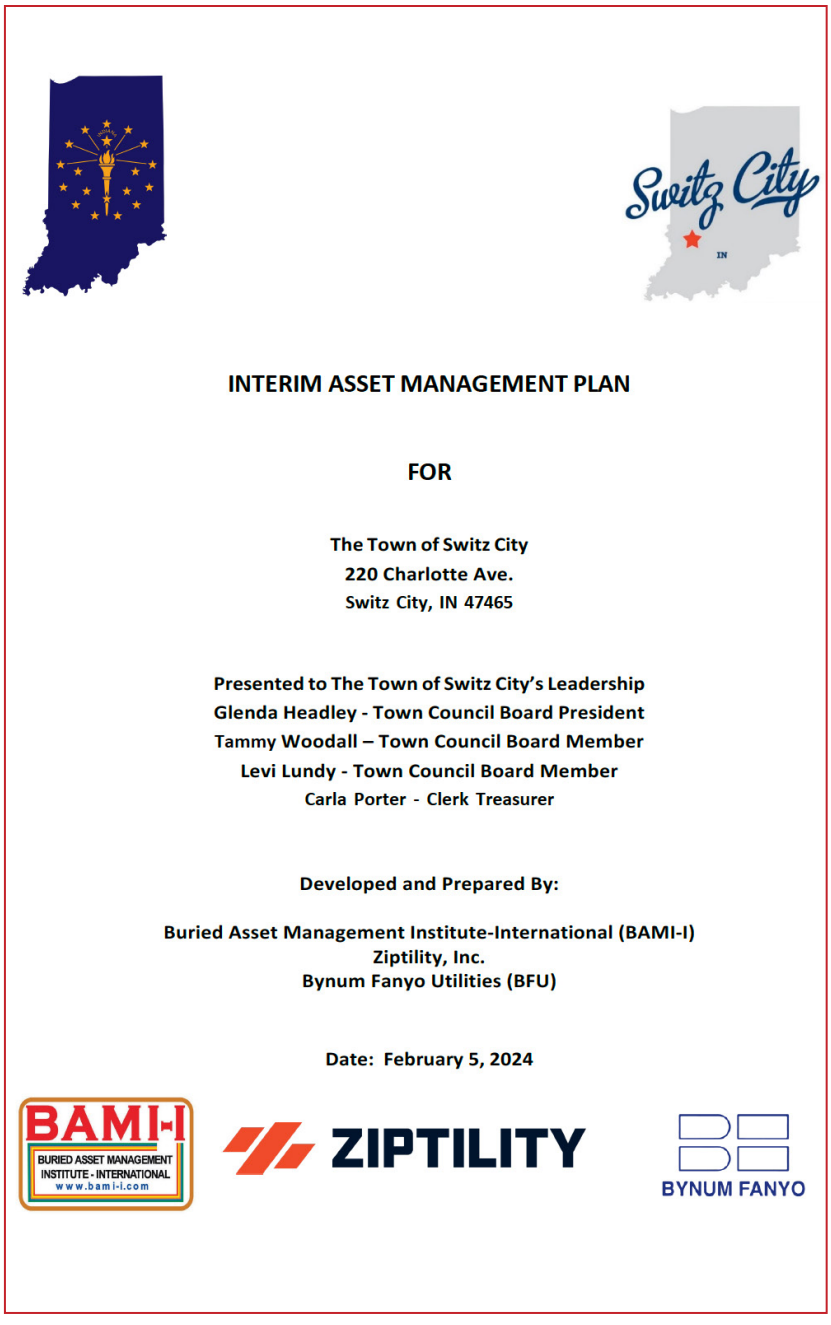
- Certificate of Completion – requires completion of each course
- Associate Water Asset Manager (AWAM)–requires completion of CTAM 100-400 and an application submitted to the BAMI-I Asset Management Certification Board
- Professional Water Asset Manager (PWAM) – requires completion of CTAM 100-400, 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.

Collaborative Milestone:

BAMI-I completed Interim Asset Management Plan Development for Switz City



INTERIM ASSET MANAGEMENT PLAN

FOR

The Town of Switz City
220 Charlotte Ave.
Switz City, IN 47465

Presented to The Town of Switz City's Leadership
Glenda Headley - Town Council Board President
Tammy Woodall – Town Council Board Member
Levi Lundy - Town Council Board Member
Carla Porter - Clerk Treasurer

Developed and Prepared By:

Buried Asset Management Institute-International (BAMI-I)
Ziptility, Inc.
Bynum Fanyo Utilities (BFU)

Date: February 5, 2024

February 5, 2024, marked a significant step in BAMI-I's journey toward developing the asset management plan for Switz City, Indiana, as the BAMI-I/ Purdue Underground Infrastructure Team (UIT) presented phase results to the Town Council of Switz City. The meeting, attended by key council members and our dedicated team, showcased the collaborative efforts invested in this project.

Background

Even though the Indiana Finance Authority (IFA) had published the Guidelines for developing an asset management plan (AMP) for water utilities in 2019, many water utilities, especially the smaller ones, were reluctant to embark on this endeavor for various reasons such as cost, staff requirements and/or just a lack of understanding. This changed with the passage of Indiana Senate Bill (S.B.) 272 which requires water utilities to have an approved AMP by June 30, 2023 to qualify for SRF (State Revolving Fund) loans or grants as well as other funding from State agencies.

Purdue University has a UIT in the CEM (Construction Engineering & Management) in the College of Engineering. The UIT provides technical and managerial support to BAMI-I (Buried Asset Management Institute-International), a non-profit organization established over 20 years ago in Atlanta's Department of Watershed Management. Through an EPA Grant BAMI-I has led the way in developing online and classroom AM courses as well as a 2-level certification program to assist water utilities.

As a result of conducting an Asset Management Workshop for the Alliance of Indiana Rural Water Association at their French Lick annual conference, BAMI-I was pleased to learn about the requirements of S.B. 272. This represents national leadership as Indiana joins other States such as Ohio in requiring that water utilities developing AMPs. AMPs provide accountability to funding agencies that the money being provided to water utilities is the right amount of funds being invested in the right projects at the right time.

As a result of conducting AM workshops at the Alliance conference in the Fall of 2022 in Fort Wayne, BAMI-I became acquainted with Ziptility, Inc. It was agreed that we needed to invest our efforts to learn more about developing AMPs utilizing the IFA Guidelines. It was suggested that we start with a small utility, and Switz City was selected. They are less than 300 population but has their own wastewater collection system, treatment plant and drinking water distribution system. They have no employees and utilize the contract services of Ziptility and Bynum Fanyo Utilities (BFU) to handle GIS mapping, data management operations and maintenance. These 3 organizations agreed to volunteer efforts and energy to develop an AMP for Switz City.

This volunteer effort has proven to be an excellent learning experience for the original 3 firms and a few other firms who joined our efforts as well as 22 Civil Engineering and Construction Management Technology graduate students at Purdue University in an Asset Management of Underground Infrastructure (AMUI) course taught by Dr. Tom Iseley. Switz City became the course project as the class was divided into 5 teams with each team required to develop an AMP. Each student went through that BAMI-I CTAM (Certification of Training for Asset Management) course and became certified as AWAM (Associate Water Asset Managers). It is important that we use every opportunity to develop the leaders for our water industry, and they must understand asset management as well as the advanced technology to assist. This includes data acquisition and analysis, location and mapping, as well as technical solutions such as trenchless technologies, etc.

The progress and meetings

During the development of the AMP for Switz City, significant progress was made through a series of strategic meetings and innovative approaches. The project team, comprising experts from BAMI-I, Ziptility, BFU and other key partners, focused on utilizing the IFA guidelines to create a comprehensive risk-based AMP that could serve as a benchmark for other small utilities. These meetings facilitated deep dives into the importance of AMP, adherence to IFA guidelines, and the concept of AMPs as living document crucial for efficient best practices.

It is also noted that conducting onsite manhole inspections and water treatment plant surveys was critical. These activities provided direct insights into the current state and challenges of the city's water infrastructure, allowing the team to identify specific areas requiring immediate attention and improvement.

The interim asset management plan for Switz City provides a comprehensive assessment and roadmap for improving the city's water and wastewater infrastructure. It includes a detailed evaluation of the infrastructure's current state, identifying critical issues like significant water loss through leaks and aging equipment. The plan outlines specific, actionable strategies to address these challenges, emphasizing the importance of updating and maintaining the infrastructure to meet current and future demands. It highlights the need for investment in both physical assets and technology to enhance efficiency, sustainability, and resilience. The AMP also discusses funding mechanisms, suggesting rate adjustments and exploring grants and loans to finance improvements.

Key data points include the systems' estimated replacement value and projected costs for immediate and long-term projects, underscoring the financial implications and benefits of the proposed strategies.

Contributions and Insights

Adam Hershberger, an EPA Water Specialist with the Alliance of Indiana Rural Water, worked closely with the town's board and utility operators, proposing the development of a comprehensive risk-based AMP to enhance decision-making regarding the utility infrastructure's maintenance, repair, and replacement. His efforts were instrumental in forming a volunteer group of subject experts to develop the AMP at no cost, overcoming financial barriers. Adam's initial contributions included assisting with the collection and documentation of asset data, preliminary condition assessments, and updating the town's GIS platform, laying the groundwork for an informed and strategic approach to asset management in Switz City.

George Kurz made a notable contribution to the project by conducting an in-depth Infiltration and Inflow (I/I) analysis. His work involved using operational data to assess the extent and impact of I/I on Switz City's wastewater system. Kurz's analysis provided essential insights into the cost implications of I/I, the potential for sewer rehabilitation, and the payback period of such initiatives. His expertise not only enriched the AMP development process but also offered valuable lessons on managing water assets more effectively.

Jeff Farmer played a significant role in the project, particularly in discussions around utility system diagrams, data management practices, and strategies for reducing energy consumption. His insights were crucial for enhancing the AMP's focus on operational efficiency and sustainability.

The Purdue UIT Team, led by Dr. Iseley, including Wei Liao and Mahnoush, was overseeing the entire initiative and authoring the final report. Their role entailed coordinating the project's various components, ensuring adherence to goals and guidelines, and synthesizing the collective efforts and findings into a comprehensive document. Their expertise and guidance were instrumental in driving the project to successful completion, ensuring that the Asset Management Plan was both thorough and actionable.

Educational Activities:

It is important that Purdue UIT use every opportunity to develop the leaders for our water industry, and the students must understand asset management as well as the advanced technology to assist. So, this project also included an experiential educational component, where findings and methodologies were shared with Purdue students and professionals through lectures and presentations. This not only contributed to the project's immediate goals but also helped in building a knowledgeable community around asset management practices. Purdue Asset Management For Underground Infrastructure (AMUI) course taught by Dr. Iseley, is designed for undergraduate juniors, seniors and graduate students interested in critical system management thinking, and who want to be equipped with the knowledge and skills to tackle. The fall 2023 semester featured a series of lectures by key figures, enriching the educational impact.Significant contributors included:

- Adam Hershberger who spent so much time assisting with meetings, field work and presenting a lecture on the information about the Switz City system in the AMUI course.
- George Kurz shared his knowledge through a lecture for AMUI, further disseminating his findings and reinforcing the project's educational impact.
- Ross Waugh, Waugh Infrastructure Management Limited, for participating as a keynote speaker in BAMI-I's Global Buried Asset Management Congress (GBAMC) and presenting a lecture on developing AMPs in the AMUI course.
- Other experts such as Kurt Wright, Gregory Baird, Smith F. Rangel,etc. Gave the lecture on different aspects of asset management in the AMUI course.

The 22 students in the AMUI course served on 5 teams to develop an AMP for Switz City. Students learned the organizational operation of utilities, developed asset management plans for infrastructure, and enhanced communication skills, preparing them for careers in infrastructure management and improvement.

Next Step

The next steps will focus on seeking funding to address the gaps in actual data support and completing the inventory

with accurate information. Based on the recommendation of the interim AMP, the immediate priority is to implement the Near Term (0-5 Year) Capital Improvement Projects, emphasizing completing the Asset Management planning and conducting thorough condition assessments, particularly for pipelines. Acknowledging the challenges in risk-based prioritization due to inadequate asset inventory, enhancing our inventory practices becomes crucial. This involves systematically gathering and updating asset data to ensure a more comprehensive and accurate asset management framework, thereby facilitating informed decision-making and prioritization of maintenance and improvement efforts.

Conclusion

The collaboration on the AMP for Switz City underscores the transformative power of community, expertise, and technology coming together to address complex infrastructure challenges. This initiative not only sets a benchmark for sustainable and efficient asset management but also exemplifies how strategic planning and collaborative efforts can significantly enhance public utilities' resilience and service delivery. As Switz City moves forward, the lessons learned and successes achieved through this project illuminate a path for other communities to follow, emphasizing the importance of innovation, partnership, and foresight in navigating the future of infrastructure management. At the same time, it's crucial to recognize the significant gap small, under-resourced communities face in implementing AMPs or infrastructure upgrade projects. This disparity highlights the necessity for government policies to lean towards supporting public utilities in these areas. Ensuring that people have access to safe, high-quality drinking water and clean wastewater disposal is fundamental. Thus, policy adjustments and targeted support are essential to bridge this gap, enabling these communities to manage and upgrade their infrastructure effectively, ensuring public health and environmental standards are met.

(Written by Wei Liao, Editor, BAMI-I journal)

Navigating the Complexities of SUE Certification

A Closer Look at Professional Liability and Expertise

In the realm of Subsurface Utility Engineering (SUE), a recent resurgence of interest in my older article, "Almost SUE is not SUE," has sparked a vital conversation about the qualifications and liabilities of professionals in this field. This discussion, fueled by insightful comments from readers, raises an essential question: should engineers and licensed surveyors be mandated to undergo specific training and experience before certifying SUE drawings?

Understanding the Liability in SUE

The core issue at stake is the extent of liability that a professional assumes when certifying SUE drawings. This liability spectrum can range from negligible to potentially limitless, contingent upon the accuracy and thoroughness of the subsurface utility data. If SUE technicians execute their tasks proficiently, ensuring comprehensive record review, accurate documentation, and use of appropriate technologies, the risk diminishes significantly.

However, the scenario becomes markedly different when professionals lack training, hands-on experience, or direct oversight of SUE projects. Without these, they are ill-equipped to conduct effective quality assurance and quality control, leading to a concerning knowledge gap.

Key Questions Raised

Tyler Bristow, GIS Specialist at Centerline Mapping, posed pertinent queries further highlighting this issue. He questions the current framework allowing licensed surveyors and engineers to certify SUE drawings without specific training in utility locating methods. "What does a licensed surveyor or engineer know about utility locating methods and how can we test them on this subject? There are zero questions regarding utility locating fundamentals or principles and practices on the FS and PS exams and likewise on the FE and PE exams I assume, so why do these two professions get to take the cake? I'm asking because there are surveyors and engineers who may know little about subsurface utilities and locating them, but they are allowed to stamp drawings because they have a license. Should they have to take and pass an SUE test before they can practice SUE, similar to having to take and pass the FE, FS, PE, and PS before they can practice engineering and surveying?". The absence of utility locating fundamentals in the FS, PS, FE, and PE exams raises doubts about their competence in handling SUE tasks, suggesting a need for a specialized SUE certification.

Bridging the Knowledge Gap: The Utility Investigation School (UIS)

Recognizing this educational void, Jim

Anspach, PG, Distinguished Member of ASCE, in collaboration with Dr. Tom Iseley of Purdue University and the Buried Asset Management Institute – International (BAMI-I), developed a curriculum aimed at addressing these concerns. The Utility Investigation School (UIS) has conducted over eighteen comprehensive training sessions, providing 40 hours of instruction to industry professionals. This training, while substantial, only begins to address the complexities of SUE.

The critical question remains: does completing the UIS Course sufficiently prepare a professional to certify SUE deliverables?

The Dual Roles of Engineers and Surveyors in SUE

Engineers and surveyors typically have limited knowledge regarding utility designating or location. While surveyors are adept at confirming the physical accuracy of visible elements, engineers excel in theorizing about unseen structures. Both professions, ideally, should comprehend the theories and methodologies underlying the placement of utility markers, such as electromagnetic, ground-penetrating radar (GPR), acoustic, and time-domain electromagnetics (TDEM) techniques. The UIS training significantly contributes to filling this knowledge gap, but is it adequate?

To help answer that question, Jim Anspach provided the following update: ASCE's Civil Engineering Certification Board, accredited by the Council of Engineering and Scientific Specialty Boards, has initiated a program for Board Certification of a Subsurface Utility Engineer. This certification will require a PE license, 10-20 years of experience, attainment of the Body of Knowledge specific to the practice, and a written exam. The Body of Knowledge will encompass pertinent aspects of geophysics, design and construction of utility systems, engineering survey, and utility conflict analysis and resolution. Specialty certification is a rigorous process, and the UIS schools, while highly relevant, will not contain all the elements of the BOK that is needed. It will help practitioners pass aspects of the written test.

Conclusion

The dialogue initiated by "Almost SUE is not SUE" underscores a critical issue in the field of SUE: the balance between professional qualification and liability. While the UIS offers a foundational step towards better-equipped professionals, the industry must ponder whether this is sufficient for the complex and risk-laden task of certifying SUE drawings. As the field evolves, so must the standards and training for those who hold the responsibility of ensuring the safety and accuracy of subsurface utility projects.

About The Authors

Greg Jeffries

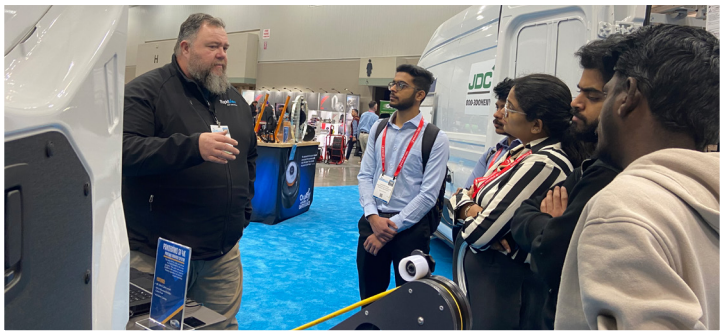
CUC, M. ASCE

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.

Jim Anspach

PG, Distinguished Member of ASCE

Jim specializes in subsurface utility engineering science, utility engineering science, mapping, coordination, corrosion, water & gas leakage detection and has spent over 40 years developing and leading the subsurface utility engineering profession and the utility engineering profession through development of standards and teaching.



From Classroom to Industry:

Purdue's Visionary Approach to Cultivating Underground Construction and Management Future Leaders

Over the last few years, Purdue CEM Underground Infrastructure Team (UIT) has intensively promoted underground construction and management careers among engineering students, integrating both undergraduate and graduate levels. This initiative includes a compulsory internship program, developing underground construction and management leaders, and benefits from the support of NASTT and UCA Student Chapters and from the industry sponsors, enhancing leadership abilities and engagement in underground development and management projects/events.

The developing underground construction and management future leaders program, supported by Professors Dulcy Abraham and Tom Iseley, has consistently facilitated student involvement in various projects and key industry events, demonstrating a commitment to hands-on learning:

- Conducted a field trip for 22 students to explore the 3RPORT CSO tunnel in Fort Wayne, IN.
- Organized delegations of 25 students to the 2022 UCT conference and 32 students to the 2023 UCT conference, respectively.

Most recently, on January 29, 2024, Purdue UIT led a 19-student group to the WWETT Show in Indianapolis, marking another significant engagement with the industry.

The WWETT Show, standing for Water & Wastewater Equipment, Treatment & Transport, is the premier annual event for professionals in the wastewater and environmental services industry. It features a comprehensive educational program, live demonstrations, networking opportunities, and an expansive expo floor showcasing the latest products and technologies. This event attracts a global audience, offering unique insights into industry trends and innovations.

The intention behind showcasing the impact of real-world experiences on student learning and leadership development is to illuminate how such experiences transcend conventional classroom education. Engaging directly with the industry through events like the WWETT Show allows students to apply theoretical knowledge in practical situations, enhancing their problem-solving and decision-making skills. This hands-on exposure not only broadens their understanding of the field but also cultivates leadership qualities by putting them in

real-world scenarios where they must navigate challenges, work collaboratively, and communicate effectively with professionals, thus preparing them for future leadership roles in their careers.

Reflecting on the transformative experiences at the WWETT Show, the students have shared their insights and encounters, offering a glimpse into the profound impact this event has had on their educational journey and professional outlook. Here are some of their testimonials, showcasing the knowledge gained and the invaluable interactions with industry professionals that have enriched their understanding and prepared them for future challenges in the environmental services sector.

"The WWETT show really changed how I see the water and wastewater treatment industry. It's not just about making connections and learning new things; it's also about seeing all the innovative ideas and feeling inspired about the work we do. If you're thinking about going, I'd recommend taking the time to plan and research. The unique opportunities and the lasting impact from the WWETT show make it a truly valuable experience." -Dharisha Shah

"It had been my first time attending such an event ever coming to America and I can say for sure that it has certainly enhanced my perspective of water and wastewater technologies. To describe briefly,attending this conference has provided me with valuable insights into the latest advancements, technologies, and best practices in the industry. I learned about cutting-edge equipment, treatment methods, and transportation solutions related to water and wastewater. "-Munawar, Muhammad Sunair

"My experience at WWETT was immensely valuable, and I'm grateful for the opportunity to attend. While my initial goal was to explore all facets of the event, I periodized interactons with companies specializing in pipeline assessment. Collaborating with peers like Tobi enriched the experience, bringing diverse perspectives to our discussions. I look forward to applying the insights gained from WWETT to my future endeavors in the field. " Shubhang Gaur

"This trip taught me a lot, one of the important things I was aware of is that technology is growing very fast, and a lot of assumptions and great ideas we have has been already realized in some way, the application of artificial intelligence is still growing in this industry and there are still a lot of things need to be achieved." -Sihan Zhou

"Beyond practical benefits, the WWETT show inspired me. The exchange of ideas and exploration of new technologies sparked enthusiasm and motivation in my work. Engaging with passionate individuals dedicated to improving water and wastewater treatment fostered long-term career satisfaction." - Dhairya Navinkumar Patel

"One of the standout benefits of the WWETT show was the unparalleled networking opportunities it presented." Vatsal Virbhadra Parekh

"The interactions beyond the four main companies we focused on highlighted the value of broad engagement within the industry. Whether delving deep into specific technologies or gaining a brief overview of a company's offerings, each conversation contributed to a richer, more nuanced understanding of the environmental services landscape. These encounters underscored the collaborative spirit of the industry, with companies eager to share their knowledge and expertise with the next generation of profes-

sionals."- Harsh Badole

Seeing so much positive feedback from students, Dr. Iseley said in his email to all the faculties in CEM:

> "When I return from one of these trips I usually say "never again" due to the amount of time and effort consumed in working out the details and making it happen. However, when I see the educational impact from reports like those attached and others I realize that it was worth it."

Sponsors can be assured that their support not only aids in the professional development of these students but also contributes to innovation and growth within the industry. By investing in these future leaders, sponsors gain visibility as key contributors to education and professional growth, fostering a positive brand image and establishing connections with the next generation of industry professionals. This partnership enhances their reputation as forward-thinking and committed to sustainable industry development, offering them an opportunity to be part of shaping the industry's future landscape.

Purdue UIT extends its deepest gratitude to the donors and sponsors, whose generous support has been pivotal in enabling these opportunities. UIT is planning to bring 20-30 students to 2024 UIC in Oklahoma City, OK. For those interested in contributing to the future of the industry leaders and ensuring the continuation of these impactful initiatives, please contact Tom Iseley at diseley@purdue.edu. Your support is crucial in shaping the careers of the next generation of professionals.

(Written by Wei Liao, Editor, BAMI-I journal)

It's important to acknowledge that past sponsorships have been instrumental in enabling students to participate in pivotal industry events like the WWETT Show. These sponsorships generously cover essential costs such as travel to and from the event location, accommodation during the conference, and registration fees, ensuring students can attend without financial burden.

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2023 UCT Conference Purdue Student Delegation Sponsors

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Flattening the investment peak of pressure pipelines with

'INSPECT BEFORE INVEST' APPROACH

Unprecedented replacement exercise

On a global scale water and wastewater pipelines are aging and reaching their theoretical end of lifetime. In the 50's, 60's and 70's vast lengths of pipelines have been installed to expand and modernize the drinking water distribution networks and the sewage water collection systems. The theoretical lifespans of these pipelines, contingent on materials and pressure classes, span from 50 to 80 years. This means that in current decades owners of underground assets are facing a need for investments in their networks of an unprecedented scale.

For many utilities, replacing their assets in a reactive manner has long been a safe way to keep up with aging of assets. However, now more and more utilities are getting aware of the replacement peak that is approaching, a reactive asset management is no longer a way to stay in control of annual underground asset investment plans.

One percent per year

Considering an optimistic average lifetime of 100 years, asset owners should ideally replace a minimum of 1% of their assets annually. However, two key factors contribute to elevating this necessary replacement rate. Firstly, pipe failure is not solely attributed to material degradation; external factors like differential settlement also play a significant role. Secondly, the 1% is an average number that was hardly ever met over the past decades. Now the replacement peak is approaching, an even higher replacement rate is required to catch up with the years of reactive management.

Understanding the necessity of suitable replacement rates is crucial. However, in the absence of a noticeable increase in failure rates within networks, identifying degraded pipelines and prioritizing assets for replacement becomes challenging. Relying on the anticipation of failure rates to rise is a risky and irresponsible strategy. Therefore, the proactive collection of more data becomes imperative to inform well-funded investment decisions.

The missing data piece

Water utilities can employ theoretical residual lifetime models incorporating factors such as age, material, soil type, and failure history to estimate the likelihood of failure. This allows them to prioritize extensive sets of pipelines approaching their technical lifetimes. By integrating theoretical technical lifetime data with external factors like above-ground activities (e.g., rural vs. urban) and assessing the pipeline's criticality in the network, asset managers can refine the prioritization for replacement. This targeted selection of pipelines is denoted as Critical Assets.

Given that asset age is a crucial parameter in the selection methodology for Critical Assets, the count of identified assets that need attention is steadily increasing at many utilities. Consequently, replace-

ment budgets are proving increasingly inadequate to address the growing number of aging pipelines. Conversely, it is widely acknowledged among owners of pressure pipelines that proactively replacing pipelines upon reaching theoretical lifetimes without technical condition validation often reveals that the majority of the pipe wall material remains in good to excellent condition.

The aforementioned contrast underscores the absence of a crucial element in the pipeline replacement puzzle. This missing piece is the validation of theoretical models through the assessment of the actual condition of the Critical Assets, allowing for a more refined prioritization of manageable volumes of pipelines.

Gathering asset condition data

While owners and operators of gravity sewers are accustomed to regular and structural assessments of their sewer systems, this remains a largely unexplored realm for most owners of pressurized pipes. Gravity sewers rely on hydraulic height differences, creating an unpressurized atmospheric system that allows for easy entry to deploy robots equipped with CCTV, radar, or other sensors. In contrast, pressurized pipeline systems present greater challenges for inspection, often requiring depressurization and/or dewatering to facilitate entry.

Pressurized systems can be categorized into the following primary functions:

1. Pressurized networks for the distribution and transportation of potable water from water production plants to households and other users. The larger pipelines (>200mm/8") are commonly referred to as water mains. Typical asset owners include drinking water utilities.
2. Pressurized networks or pipelines for the transmission of collected sewage from a collection pit to sewage treatment works. Larger diameter pipelines in this category are known as force mains or rising mains. The typical asset owners are municipalities, wastewater utilities, waterboards, or other local sewage water authorities.
3. Raw water mains responsible for pumping untreated water from its source (e.g., a river) to a user or treatment plant. These are typically owned by drinking water utilities or industrial users.
4. Effluent pipelines tasked with pumping treated wastewater towards a point of discharge. Common asset owners for this function include wastewater utilities, waterboards, or industrial plant owners.

Especially, the larger diameter (>200mm / 8") water mains and force mains rank higher on the scale of Critical Assets due to the significant consequences of pipe failure. For water mains, this includes substantial service interruptions and elevated repair costs. In the case of force mains, the stakes are even higher, with the potential for severe environmental risks in the event of a failure.

Acquaint is a SME business from the Netherlands that has developed an intelligent pig to assess the condition of potable water mains and force mains while still pressurized and without large service interruptions. The pigging principle has been used for many decades to clean pipelines where a foam plug is tightly-fit inserted into a pressurized pipeline. Water pressure propels the pig through the pipeline and effectively cleaning the inner pipe wall. Acquaint has customized these cleaning pigs and equipped them with a large set of sensors, allowing them to test a wide range of failure and aging mechanisms in both the pipeline and its joints while simultaneously recording the XYZ position (location and depth).

Acquaint's intelligent pigging technology, Acquarius, employs ultrasonic sound for the precise measurement of diverse failure mechanisms contingent upon the pipeline material. The technology exploits variations in sound velocity corresponding to different materials and levels of degradation. Through extensive research and collaboration with the academic water technology institute Wetsus, alongside several Dutch water utilities, Acquaint has achieved a notable precision of 0.45mm in identifying variations in wall thickness caused by corrosion in metals or sulfate attacks in sewers.

A distinctive attribute of Acquarius is its capacity to detect changes in material density, particularly relevant in instances such as the leaching of Asbestos Cement. This unique capability facilitates the accurate identification of leaching spots, including those as small as 15mm, with a precision of a few millimeters. This technological advancement provides a nuanced and precise approach to understanding pipeline conditions, contributing to a comprehensive assessment of their integrity.

Another common cause of pipe failure is the separation of couplings between pipe segments. Using the same ultrasonic signals and IMU output, Acquarius can measure the joint gap and compare it against applicable standards. Couplings can also shift out due to the settling of pipes on either side of the coupling or the lateral movement of the pipeline. This is respectively termed vertical and horizontal angular displacement, accurately determined by Acquarius with a precision of 0.25 degrees for each individual coupling passed.

In addition to these prevalent failure mechanisms, a single inspection run also examines the ovality of the pipeline (particularly relevant for plastics), deformation in the longitudinal direction, the presence of gas accumulations or debris, and, in the case of prestressed concrete pipes, fractures in the winding wires.

This complete condition assessment is accurately aligned with very precise location data based on GPS measurement. Wint an accuracy of 0,5 meters the exact location of the pipeline and the associated condition is reported.

Proven and independently validated technology.

The Ultrasound based Acquarius technology has been applied in more than 125 full scale commercial projects in both drinking water mains and sewer force mains. Also several independent validations of the technology have confirmed accurateness. Two examples are provided:

Firstly, under supervision of the Dutch Water Utility Brabant Water and in collaboration with Delft Technical University, Ultrasonic scans of asbestos cement pipelines have been compared with laboratory CT scans of the same pipeline samples.

The below graph is one extract of large set of results showing a strong overlap between the UT signal and validation by CT scans confirming practical applications, where inspections are conducted in field, ultrasound in combination with the unique leaching analysis patented by Ac-

AGING INFRASTRUCTURE

ASCE 2021 Report Card states:

- Water main break every two minutes, with an estimated six billion gallons of water loss daily.
- 16,000 Wastewater Treatment Plants functioning, on average, at 81% of their design capacity.
- 15% of Wastewater Treatment Plants have reached or exceeded capacity.

Now is the time to create a Proactive Asset Management Program utilizing Acquaint's Acquarius in-line inspection technology.

With on-board ultrasonic testing (UT) circumferential scanning sensors, hydrophones and internal mapping unit (IMU), the Acquarius is an ultra-flexible, configuration-friendly tool that provides wall thickness measurements, ID changes, precise pipe geometry, joint defects, leaks, air pockets, pipe ovality, delamination, AC leaching (degradation of asbestos cement), and plots XYZ coordinates of the entire alignment in a single run.

The comprehensive data-driven report helps asset managers set actionable decisions with known budgets for rehabilitation, while eliminating disruptive pipe breaks, and associated environmental and economic impacts.

Contact CPM Pipelines to learn how to proactively manage your valuable assets starting with an Acquarius inspection.

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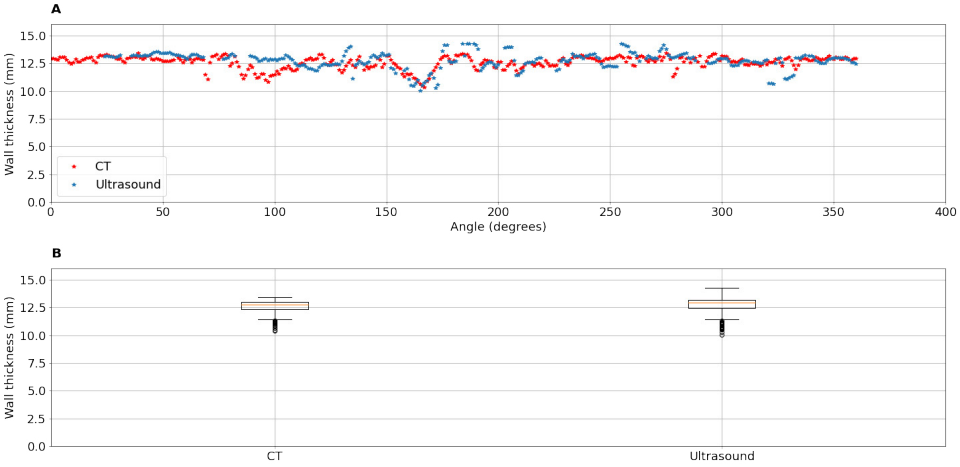
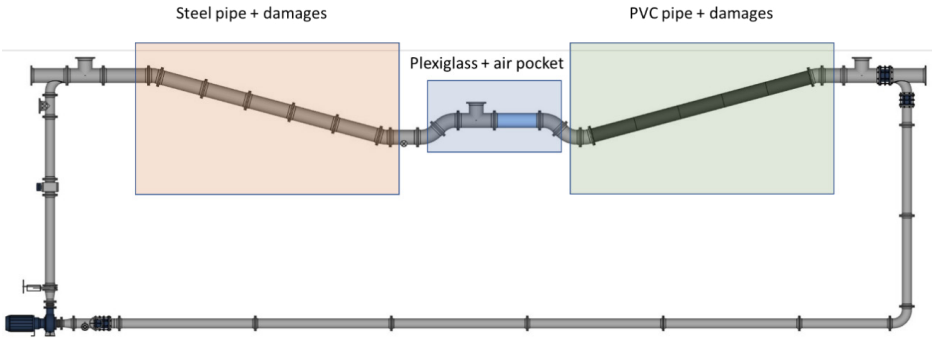


quaint, offers a viable and accurate technique for assessment of calcium leaching.

Secondly, in the summer of 2023 an European funded research project "Assessment of Inspection Tools for Rising Mains (AIR)" led by Co-UDLabs was delivered. Part of the project was an independent blind laboratory test in the facilities of the IKT institute in Gelsenkirchen, Germany.



In the test setup a broad range of artificial damages were created for the technology companies and universities to independently validate their technology. The setup was made from 2 main materials; steel and PVC. Each section was introduced with damages such as: pin holes, pipe deformation, decreased wall thickness, air pockets, outside surface scratches and leakages.

The independent lab research validated all qualitative claims of Acquaint's condition assessment technology (see table xx). As a next step, the research consortium is preparing a full-scale field validation on asbestos cement force mains to be carried out in 2024.

From inspection data to asset management information

Having reported on over 125 inline condition assessment projects for drinking water mains and force mains globally, Acquaint has undergone extensive development and modernization of data processing and asset condition information presentation. In collaboration with clients, an online GIS platform was devised to deliver pipeline condition data to asset owners. The following functional design parameters have demonstrated the highest value through this collaborative effort:

1. Dynamic granularity: the asset owner should be able to shift from high level, overall condition figures of the whole pipeline or pipeline sections all the way down to highly accurate and local anomalies and condition data of individual joints or pipe lengths.
2. Contextual enrichment: for the asset owner to interpret and evaluate data or understand root causes it is critical to view the pipeline in its context. Therefor presenting pipe condition data combined with information about above ground activities (e.g. road crossings, rural vs urban), soil type/risk of ground settling and the presence critical infrastructure is key for asset owners to make well-informed decisions.
3. Uniform safety factor: as asset management levels of expertise vary widely from utility to utility, asset owners appreciate a uniform way to express the risk of failure of a pipeline. Even though replacement decisions lay with the asset owner, a unform calculation will assist in valuing and assessing all individual condition and contextual parameters into a scale of safety.

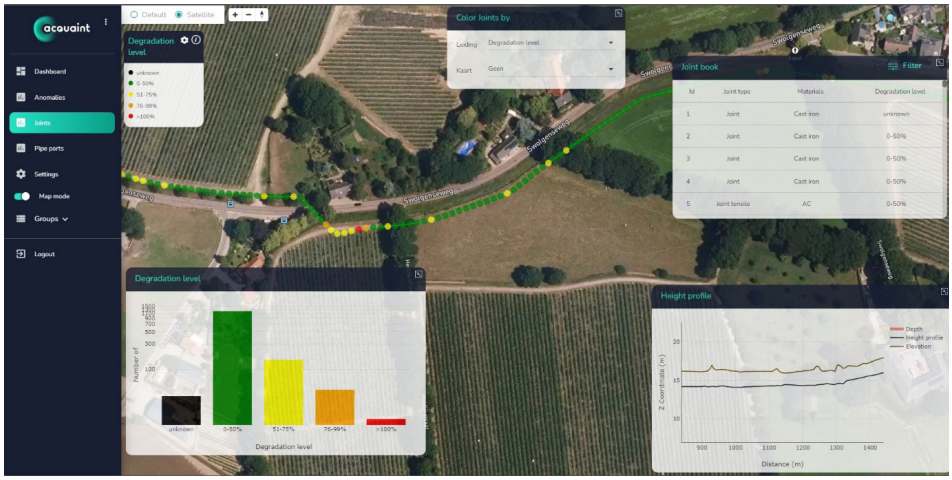
Aforementioned functional design parameters together with client input and years of experience have been used as input for the development and delivery of the Acquaint's Pipeline Inspection Dashboard that was launched early 2023 and received the prestigious Innovation award 2023 from the international Aquatech jury in November 2023. The dashboard is a custom-made GIS interface presenting the clients inspected pipelines and has several filters and lenses to look at the pipeline condition data, categorized under: anomalies, pipe segments, joint condition and safety factor.

All pipeline information can be combined with contextual data by enabling different GIS layers such as: satellite view, risk soil differential setting, agricultural crop plots and water protection zones. The latest addition to the Pipeline inspection dashboard is the Safety Factor, which is a multiplication factor applied to the calculated maximum load or stress that a construction can theoretically withstand. The safety factor is defined as the ratio between the ultimate strength of a material or construction and the maximum expected load or stress it will experience during its intended use. The stress in pipeline material is calculated using a model developed by the internationally recognized water research institute KWR: COMSIMA. In this model, internal pressure, vertical load due to various factors, and bending moments due to differential settlement are taken into account. Three safety factors will be visible:

1. Low Safety Factor: 97.5% of the calculated values are above this number.
2. Average Safety Factor: the average of the distribution.
3. High Safety Factor: 97.5% of the calculated values are below this number.

	ACQUAINT	Alternative suppliers (Rosen, Xylem)
Leaks through 3 mm hole	No	No
Leaks through 6 mm hole	Yes	Yes
Ovality in steel of 6%	Yes	No
Pinn hole in steel 7 mm	No	No
Wall loss outside 200x200x3mm in steel	Yes	Yes
Ovality in PVC of 3% or more	Yes	Partially (>6%)
Scratch external 1 x 3.4 x 500 mm in PVC	Yes	No
Scratch external 3 x 3.4 x 500 mm in PVC	Yes	No
Scratch external 5 x 3.4 x 500 mm in PVC	Yes	No
Scratch external 7 x 3.4 x 500 mm in PVC	Yes	No
Incrustation 400 x 90 x 15 mm	Yes	Yes
Several joint displacements	Yes	Partially
Air pockets	n/a	Yes

Depending on the impact of a failure, an asset manager can determine which of these values should be used to assess a pipeline section. Because many input parameters introduce uncertainty in the outcome of the safety factor, it is possible to analyze which input parameters most influence the uncertainty.



Inspect before invest

As the global pipeline replacement peak becomes increasingly evident, the "inspect-before-invest" strategy emerges as a pivotal approach to prioritize investments in critical pressure pipelines. Given that the costs for condition assessment of pressure pipelines are typically about 100 times lower than the outright replacement of the pipeline, the business case for inspecting before investing is inherently compelling. Inspection of pressure pipelines seldom necessitates complete replacement; in most instances, asset owners can significantly extend the theoretical residual lifetime of a pipeline by selectively replacing sections or employing rehabilitation techniques such as relining.

When inspections result in partial rehabilitation or maintenance interventions, thereby extending the pipeline's lifespan by several decades, the investment curve is flattened, and global networks undergo renewal in a faster and more efficient manner. Asset managers leveraging condition assessment data for their underground assets ensure that investments are directed precisely where and when needed. This strategic use of data contributes to a more targeted and cost-effective approach to maintaining and renewing underground pipeline networks.

About Acquaint BV

Acquaint is a Dutch SME business that spun out from the Wetsus water technology institute in 2014. Acquaint has developed several technologies based on ultrasound to assess the condition of pressure water pipelines. Current operational management: Erik Driessen CEO and Christine van der Valk CFO. Founders and non-executive directors: Rudy Dijkstra and Siemen van der Heide. More info on: acquaint.eu

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What is asset management anyway:

THE STRUGGLES OF A NEW CONCEPT

What is asset management, anyway? I have heard this question many times since assuming my role as Asset Manager of Goshen, Indiana. For Goshen, asset management was not only a new practice, but it was also a new concept. Goshen, Indiana is a municipality that has approximately 34,000 residents. Goshen's wastewater treatment plant treats 5 million gallons per day on average with a peak flow capacity of 12.5 million gallons per day, which is fed by approximately 148 miles of sanitary sewer pipe. Goshen's water system has two treatment plants with the ability to produce up to 9.1 million gallons of water per day, which supplies residents using approximately 198 miles of water main. As the Goshen was planning much needed improvements to the wastewater treatment facility, it was revealed the state of Indiana had started to implement mandatory asset management rules. While a finished asset management plan was not a requirement, cities needed to show that they were in the process of making an Asset Management Program (AMP) in order to receive State Revolving Funds (SRF) from the Indiana Finance Authority (IFA). Like many others, this left Goshen scrambling to ensure they meet the requirements and retain access to funding. Fortunately, the IFA left time between announcing the rules and implementing their effective date, providing such much-needed breathing room for the deadline. After evaluation of what will be needed for SRF applications, the Public Works team in Goshen decided it did not make sense to go through the motions without gaining useful insights to our infrastructure and shaping the best internal practices to improve levels of service. Creating a document solely to satisfy IFA requirements was not enough, and the city devised a plan. Public Works employees started with the wastewater treatment plant and developed a list of every asset that went into the facility. Assessments were performed on each component to determine the likelihood of failure, consequence of failure, and overall risk of failure for each of these components. A consultant also helped the city develop a rehabilitation and replacement planning system to plan linear replacement projects over the course of 20 years.

As Goshen was building out their asset management database, the thought of producing a document to solely satisfy IFA requirements was not enough. Goshen realized the benefits of having a fully dedicated asset management implementation across the city and decided to create an Asset Manager position. I assumed this newly created position as the first Asset Manager for the City of Goshen in March of 2023. The first few days of the new job were overwhelming. I initially

underestimated the amount of asset management that could be applied to an entire municipality, but I had to start somewhere. Many arguments could be made as to which aspect of asset management is most important, but one aspect stood out amongst the rest. The stakeholders. When working for a municipality, every citizen and business owner within your municipal limits is a stakeholder, and these stakeholders all share a common interest in wanting the highest level of service from their local officials. Many of these stakeholders are also ratepayers of the local utility. For this reason, the use of asset management to make necessary utility infrastructure improvements without affecting ratepayers was a top priority, and the IFA makes it possible to accomplish that goal. Maintaining access to SRF is essential, so I turned my attention towards IFA guidelines. Goshen had just gone through an expansion project at our wastewater treatment plant, so I needed to start on our sewer system's asset management program first before transitioning to water.

IFA guidance to satisfy the AMP requirements was straight forward and I quickly learned my end goal as I started pulling together information. Goshen's Public Works staff worked diligently on assessing vertical assets and compiled a robust inventory. Even though asset management was not a requirement yet, I found many aspects of the workflow which were already occurring at Goshen were in line with strong asset management practices. The IFA seeks to obtain lists of all assets that require replacement over the next 20 years alongside their estimated replacement costs. This was my first major struggle. Why replace something solely based on age when it is working efficiently with no failures? We used a composite rating system to determine the overall risk of failure of our assets based on condition, and this seems like a much more realistic insight into the condition of our asset inventory than the age of the assets alone. During the inaugural Global Buried Asset Management Congress, I was able to hear from industry leaders around the world, most of which shared the same theme, ignore age when making decisions for aging infrastructure. Focus on the infrastructure that is in the worst condition and let the assets that are working correctly continue to work correctly for now until they can be replaced also. However, compliance must be met, and a replacement list based on age was created. Since the list we created based on age does not help us internally as much as our initial list, we will have to maintain two individual sets of data moving forward. One based on condition, and one based on age. This should allow us to continue to satisfy state requirements while also keeping the necessary knowledge of our system to understand which components need priority attention.

Along with the utilities themselves, properties, buildings, and easements owned by the utility are all components a utility should be familiar with. Proper documentation of each was also a requirement in our AMP. Properties and buildings were pretty straightforward, but quickly compiling easements was going to be a struggle. 3 months of my initial asset management building process was spent using software linked directly to our county's Recorder's Office where I searched and compiled a list of utility easements throughout Goshen in which the City was the grantee. As documents were found, they were also inventoried and drawn into Goshen's Geographic Information System (GIS). Drawing all of these into GIS as I encountered them has already proven useful, and any legal descriptions that have been drawn in can pull the document instantly. Decision makers are able to determine legal rights to utility access directly from their computers while planning projects, working with developers, or even answering calls from the public. This provides us with both better knowledge as well as a faster response time when answering questions to stakeholders.

Despite any challenges I will face on my own, the City of Goshen will need to act together as a team to accomplish our needs. Gaining employee buy-in is the second major struggle I encountered as my position solidified into standard practices here in Goshen. Some colleagues were excited to see how much information asset management offered to ease decision making, while others looked at it as another regulation they have never had to follow before. The only thing I could do was try my best to reassure my colleagues that my intent was not to make their jobs more difficult. In fact, I aimed to make their jobs easier. It just took some time to reach those employees, and their help was needed to achieve our goals for the greater good of the City. I started this position less than a year ago at the beginning of March in 2023. As we make the transition into 2024, we are starting to feel like our foundation of asset management has been laid and we have a good base to build from. Hopefully after what feels like a very long 9 months, my colleagues will be able to start seeing the benefits of asset management and employee buy-in will become easier as we start to implement more processes and practices into even more areas of Goshen.

Communication is another major

struggle I face. It is not that employees do not communicate with each other. In fact, my colleagues do this very well throughout the city. The fact that data is not easily shared between departments is the communication struggle faced by many. The City's GIS Coordinator has been doing a great job of updating our online portal platform to make GIS data easily accessible. Applications for field workflows to simplify data collection and even dashboards intended for managerial data consumption have helped to improve analytics and decision making for the crews that utilize the GIS software. Work performed in the field is instantly accessible by those who need to understand what happened, and also helps to show just how efficient our field crews are accomplishing tasks. While our GIS system grows stronger, the City is also in the process of implementing a strategic management plan through which each department was interviewed to determine their data and technological needs. Through this process, we are able to identify the key components that need shared amongst departments through centralized data and can prioritize implementations of data as our GIS platform grows and we launch an enterprise asset management software. The shared data will allow for easier decision making, more knowledgeable decisions being made, and an overall increase in the level of service provided to stakeholders throughout our organization.

After my short journey so far, I feel like I have learned quite a bit, but there is so much I still do not know. If I have one piece of advice to offer anyone looking to start an asset management program it would be this. You're going to struggle, and that's okay. It will be tough to make decisions when the answers are not readily available. There is a great community out there filled with professionals that have likely encountered your issues before. Do not be afraid to reach out and ask advice on making decisions. Final decisions are often specific to your organization, and including your team will make these decisions easier. Do not try to implement practices on your own, but build out processes alongside your team. Reassess your newly implemented practices regularly and determine internally if some of the choices you have made are working, or if they need to be altered to better suit the workflow. If your choices are working well enough, there is a good chance you can apply the same practices to other aspects of your organization as well. If they are not working, tweak the formula and try again. If a practice does not work as intended, it is not a failure. You have gained knowledge even if it doesn't feel like it.

About the author

BOSTON SNYDER

Asset Manager
City of Goshen

The new 36-inch HDPE pipe replaces the corroded ductile iron pipe in the Sioux Falls, SD sewer system. Photo credit: Murphy Pipeline

COMPRESSION FIT HDPE PIPE

ANOTHER PROVEN PIPELINE REPLACEMENT METHOD

ASTM Standard Codifies Method for Gravity and Pressure Pipe for Both Water and Force Main Projects

SIOUX FALLS, S.D. - It wasn't a typical, normal sliplining job to replace a failing force main line here. The original ductile iron pipe had deformed and had severe ovality. Hydrogen sulfide gas from the sewage flow made sulfuric acid, which collected at the top of the metal pipe and destroyed it. It was thought that pulling through a new pipe wouldn't be possible as it would hang up on the deformed inner wall of the old pipe. Reducing the diameter was not possible -- the diameter of the new pipe needed to be as close to the old one to maintain the rate of flow. The solution provided by Murphy Pipeline Contractors (Jacksonville, FL) was to use high-density polyethylene (HDPE) pipe and compress it to fit, knowing that the thermoplastic pipe would naturally reform itself.

"This is one of the inherent attributes of HDPE pipe," stated Camille George Rubeiz, P.E., F. ASCE, co-chair, HDPE Municipal Advisory Board, and senior director of engineering for the Plastics Pipe Institute's (PPI) Municipal & Industrial Division. "As well as being corrosion proof, it is flexible and ductile to go through a special die on the job site that makes it possible to be pulled inside a host pipe even when the pipe is not round. In this case, the ovality would have no affect during installation and the HDPE pipe would form a tight compression fit within the old ductile iron pipe."

Established in 2008, the Municipal Advisory Board (MAB) serves as an

independent, non-commercial adviser to the Municipal & Industrial Division of PPI, the major North American trade association representing the plastic pipe industry. MAB-conducted Fusion Seminars enable students to learn from experts and receive hands-on training in the proper fusion and electrofusion methods for HDPE water piping systems.

In Sioux Falls, more than 8,700 feet of 36-inch ductile iron sewer force main was replaced with HDPE PE 4710, DR 21 pipe using Murphy's CompressionFit™ method, patent pending. The new pipe has a 100-psi operating and a 200-psi surge pressure rating, and is rated as a Class 6 solution in accordance with ASTM F3508. The sewer force main traversed under three city parks, along Covell Lake, through major commercial districts and under state highway SD 115. It was made and provided by WL Plastics (Fort Worth, TX), a member company of PPI.

Opened in 1985, the Sioux Falls system treats some 18 million gallons of wastewater daily. There are 900 miles of pipe in the system that conveys the wastewater to the city's treatment plant. There is a $215 million expansion plan underway that will increase the facility's capacity by 50 percent when completed in 2025.

"One of the questions we were asked was 'Can a 36-inch ductile iron sewer force main with severe ovality be replaced with HDPE pipe using CompressionFit?'", said HDPE pipe industry expert and consultant Harvey Svetlik, P.E. "The answer was an unequivocal 'yes'. Matter of fact, some other recent projects saw 54-inch diameter pipe with a three-inch wall thickness installed using the CompressionFit method. One of the principal things that this technology does is that it preserves the flow rate of the existing host pipeline and seals over holes and leaks, so you have a dual-wall composite pipeline. And the thicker HDPE pipe provides structural integrity."

Svetlik has more than 40 years of experience in the plastic pipe industry, specializing in polyethylene pipes and fittings. He is the inventor of the MJ Adapter, also known as the Harvey Adapter. An active member of PPI for 30 years, he is the author of numerous PPI technical notes, developer of ASTM/AWWA standards, and an inventor who holds 16 patents.

One of the most recent ASTM standards authored by Svetlik is ASTM F3508 for the installation of compressed fit shape memory polymer pipe. "ASTM F3508 codifies the specification of the material to use and deals with the shape memory characteristics of the material such as high-density polyethylene.

"With the CompressionFit technology, instead of elongating a rubber band and letting it recover as is done with Swagelining, they basically do a lot more of radial compression. Instead of stretching it and thinning the wall, they downsize it and radially thicken the wall, such that when it goes into place it enlarges in diameter, and the radial wall thickness stands as it expands out, like rolling out pie dough."

The developer of CompressionFit is Murphy Pipeline Contractors (Jacksonville, FL). "Most cities cannot afford to relocate and replace a 16-inch diameter or larger pipeline within their vast utility network," said Todd Grafenauer, education director for Murphy. "The result of the CompressionFit HDPE pipe lining technology is that a new HDPE pipe will be 'compressive fit' inside the existing host pipe. This lining offers remarkable value over other construction methods such as an increased flow rate over sliplining, we do an average pull distance of 2,000 feet with more than a 90 percent reduction in excavation and there's no new easement documentation needed. Plus, we simply follow the existing pipe path using GIS maps." Murphy is a member company of PPI and also part of the association's Municipal Advisory Board (MAB).

Governed by ASTM F3508, the CompressionFit HDPE pipe lining technology specifies an HDPE pipe with an outside diameter larger in size than the inside of the host pipe to be renewed. After the HDPE is butt fused to correspond to the pull distance, the pipe is pulled through a reduction die immediately before entering the host pipe. This reduces the HDPE pipe temporarily below the inside diameter of the host pipe allowing it to be inserted.

While the towing load keeps the HDPE under tension during the pull, the pipe remains in its reduced size. The HDPE remains fully elastic throughout the reduction and installation process. After installation, the pulling load is removed. The HDPE pipe expands until it is halted by the inside diameter of the host pipe. The effectively natural 'tight' or 'compression fit' is accepted as exchanging an existing failing pipeline with a composite pipe in its place.

"One of the things about the ASTM F3508," Svetlik explained, "is that it can be utilized not only for municipalities for gravity flow, but even more ideally for pressure pipes for water pipeline replacement, or force main replacement."

More information can be found at www.plasticpipe.org/municipalindustrial or www.plasticpipe.org/mabpubs

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.

Municipal Advisory Board Fusion Seminars

The MAB-NWTC Fusion Seminars include training on 4" DIPS high-density polyethylene (HDPE) water piping systems using both manual and hydraulic butt fusion procedures and electrofusion of couplers and saddles.

"This curriculum has been developed for HDPE utility employees such as Operators, Inspectors and Engineers with little to no prior experience in fusion," explained Greg Scoby, P.E., Chairman of the Municipal Advisory Board (MAB) Utility Committee and previously the Engineering Manager for the City of Palo Alto, CA. "In 2020 and 2021, MAB surveyed utilities in the US and Canada and every utility selected this training as their number one priority. As such, MAB, which is utility led and utility run, prioritized its projects and made this training the number one priority to continuously improve the installation of HDPE fusion and electrofusion joints."

The classes, both instructive and mostly hands-on, are taught by experts in the plastic pipe industry. Topics include standard electrofusion with couplers, standard electrofusion for saddles, manual butt fusion and instruction on using a hydraulic butt fusion machine. Attendees also learn about the MAB accepted standards and qualifications for water utility work.

"We heard many favorable comments from those who have attended our fusion classes," stated Camille George Rubeiz, P.E., F. ASCE, co-chair, Municipal Advisory Board, and senior director of engineering, Municipal and Industrial Division of PPI. "These have included, 'The destructive testing shows how good these fuses really hold up.' 'Very hands on and applicable to what needs to be done in the field.' 'The instructor is very knowledgeable and I did enjoy his class.' 'Sufficient hands-on training, real life demonstrations by instructors.' 'Enough equipment for everyone to participate.' I liked the practice time.' 'If you have any questions, the instructor helped clear the doubt, and I enjoyed being able to see how strong the pipe is and how well the fusion joint held up.' "

The class size is limited to 10 students. The course is currently being conducted at the Northeast Wisconsin Technical College in Green Bay, which has the facilities and equipment available for the group's use.

Upon successful completion of the required written, visual, and destructive testing, students receive a Certificate of Competency Completion Card from the college and a Qualification Card will be issued from the utility (owner) that has sponsored the trainee to attend the class.

To register or to find out more, scan:

2023 GLOBAL BURIED ASSET MANAGEMENT CONGRESS *RECAP*


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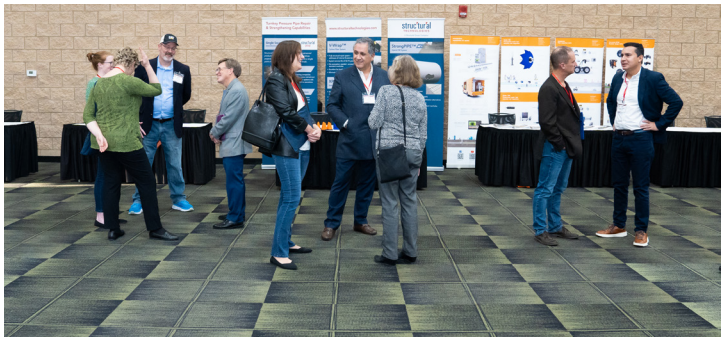

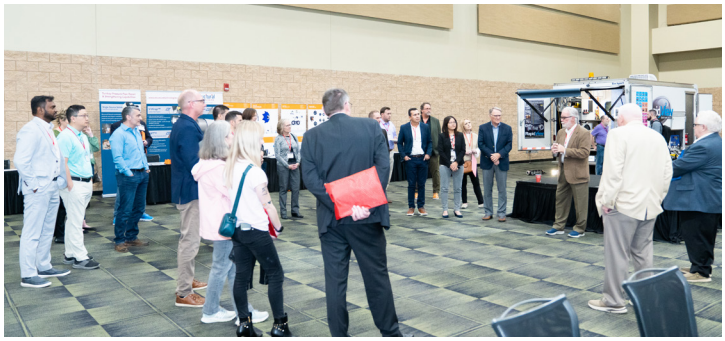

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Summaries of congress speeches

Author: Sihan Zhou, PhD student at Purdue University
Visit www.BAMI-I.com to watch the video recordings

WATER IS AFFORDABLE:

Not Investing in Water Makes It Unsustainable

Gregory Baird's presentation focuses on the intersection of water asset management, financial sustainability, and infrastructure investment. He emphasizes the importance of investing in water infrastructure to ensure affordability and sustainability, drawing on his experience in municipal finance and as a consultant. Baird highlights the crucial role of asset management as a decision framework, not just a financial discipline. He shares personal experiences from his time in city management, underscoring the challenges and successes in updating utility fees and managing large-scale assets and budgets.

Baird advocates for proactive asset management, stressing that neglect leads to higher costs and inefficiencies. He discusses the complexities of valuing water, noting public perception challenges and the need to educate about the true cost and value of water resources. Baird touches on various aspects of water management, including drought management, the importance of a reuse project, and the complexities of water rights and ownership.

He also delves into the technical and financial aspects of water system management, discussing lifecycle cost decision-making, long-term planning, and the need for integration in water planning. Baird emphasizes the importance of asset management in avoiding water conflicts and ensuring sustainable, high-quality water supply. He concludes by highlighting the need for better education and accountability in water management, especially among city officials and the public, to foster informed decision-making and sustainable practices.

GREG BARID
MPA, M.aff ASCE, AWAM
Principal Consultant, Global Advisory
Black & Veatch

Demystifying Asset Management to Improve Implementation

Heather Himmelberger's presentation, delivered with over 35 years of experience in the water and wastewater industry, focuses on the practical application and essential principles of asset management. She emphasizes that asset management should be a straightforward, thought-driven process rather than getting bogged down in technological complexities and sophisticated systems. Heather's approach advocates for returning to the basics of asset management to facilitate progress in the water and wastewater sector.

She identifies two fundamental aspects of asset management: the necessity to challenge traditional methods ("we've always done it this way") and the importance of using asset management as a problem-solving process. Her philosophy is that asset management should result in tangible benefits and improvements, not just be a theoretical exercise. Heather argues that real progress comes from questioning existing practices, making connections, and finding practical solutions.

Throughout her presentation, Heather shares real-world examples to illustrate her points. One such case involved a wastewater utility dealing with consistent sewer line blockages due to fats, oils, and grease. The traditional approach was monthly cleanings, which was both costly and inefficient. Heather encouraged looking at alternative solutions, such as fixing the line, which turned out to be more cost-effective in the long run. This example highlighted the importance of challenging routine practices and making decisions based on data and practical analysis.

Another key point Heather makes is about the distinction between operational and capital expenses in asset management. She notes that sometimes this division can hinder making efficient decisions. For instance, operational funds for regular maintenance could be better allocated to capital expenses for long-term solutions, leading to overall cost savings and efficiency improvements.

Heather also addresses the issue of buried assets, emphasizing the need for simplicity in managing assets that are not easily visible or accessible. She underscores the value of listening to what these assets, like pipes, are telling us through their performance and problems. By paying attention to patterns in pipe failures and repairs, utilities can make more informed decisions about maintenance, repairs, and replacements.

One of her concluding points is about the use of simple tools and approaches in asset management. She stresses that while advanced technologies and tools are beneficial, the core of asset management lies in thinking critically and making informed decisions. Asset management should be about using the best available data to guide actions, whether it involves detailed predictive analytics or straightforward observation and record-keeping.

In summary, Heather Himmelberger advocates for a pragmatic and thoughtful approach to asset management in the water and wastewater industry. Her emphasis is on problem-solving, questioning established practices, and making data-driven decisions to achieve tangible benefits and improvements in the management of water resources and infrastructure.

HEATHER HIMMELBERGER

Director
Southwest Environmental Finance Center
University of New Mexico

Consultation with communities on service levels, reflections on 21 years of experience in New Zealand

Ross Waugh's presentation at the GBAMC event explored asset management from the perspective of community engagement and consultation, drawing on his experiences in New Zealand. He emphasized the importance of meaningful dialogue with communities to understand and meet their expectations regarding levels of service in asset management.

Waugh discussed how New Zealand's unique geographical and demographic challenges had shaped its approach to asset management. He highlighted the role of the Maori culture in influencing a long-term, sustainable approach to managing assets, particularly in the context of water and wastewater systems.

A significant part of his talk was dedicated to the evolution of asset management in New Zealand, detailing how the country has embraced a consultation-driven approach. This approach, mandated by law, requires municipalities to engage with their communities on asset management plans and decisions. Waugh noted the shift from technical, data-heavy communication to more relatable, community-focused dialogues that emphasize service levels and practical impacts.

Through various case studies, Waugh illustrated the successes and challenges of this approach. He highlighted instances where effective community consultation led to successful project implementation and funding. In contrast, he also presented cases where a lack of proactive engagement resulted in challenges and setbacks, underscoring the need for early

Waugh concluded by stressing the value of clear, concise communication in asset management. He advocated for presenting complex technical information in an accessible format that resonates with the community, enabling informed decision-making and fostering public support for necessary infrastructure investments.

ROSS WAUGH

Director, Waugh Infrastructure Management Limited
Canterbury, New Zealan

Programs at the Metropolitan Water Reclamation District of Greater Chicago

Frederick Wu's presentation centered on the Metropolitan Water Reclamation District (MWRD) of Greater Chicago's sewer asset management program. He outlined the district's extensive area, covering both combined and separate sewer systems. Wu discussed the MWRD's historical evolution, its role in safeguarding Chicago's drinking water, and its governance structure.

A key focus was on MWRD's assets, especially the external ones, including their seven wastewater treatment plants. The Stickney plant, one of the largest globally, was a highlight. Wu also detailed the Tunnel and Reservoir Plan (TARP), a significant initiative to mitigate combined sewer overflow flooding, emphasizing the capacity of MWRD's tunnel system and reservoirs.

Wu elaborated on the evolution of MWRD's asset management strategies, beginning with the Interceptor Inspection and Rehabilitation Program (IRP) in 1991, aimed at evaluating and refurbishing the sewer system. This led to significant improvements, rehabilitating over 291,000 linear feet of sewers.

In 2013, MWRD introduced the Collection Asset Management Program (CAMP), integrating modern technologies and standards, including NASSCO standards and GIS. This program centralized management, adapted new technologies for inspections, and revised inspection cycles based on sewer condition, enhancing efficiency and cost-effectiveness.

Wu also discussed various trenchless methods for sewer rehabilitation and the importance of evolving technologies and methodologies in managing a large and diverse system. The integration of GIS for sewer and manhole inspections, which improved data management and rehabilitation planning, was also a critical part of the discussion.

Wu's presentation highlighted the complexity of managing a major urban sewer system and the significance of innovation and continuous adaptation in asset management.

FREDERICK WU

Senior Civil Engineer
Metropolitan Water Reclamation District of Greater Chicago

SUPPORTING GLWA'S PIPELINE MANAGEMENT:

Research Efforts and Insights Abstract

John Norton's presentation at the GBAMC event centered on the innovative practices in asset management and energy efficiency at the Great Lakes Water Authority (GLWA). He discussed GLWA's role in managing a significant portion of Michigan's water and wastewater treatment, emphasizing their status as one of the largest primary wastewater treatment facilities globally.

Norton detailed GLWA's approach to energy management, highlighting their substantial weekly electricity and natural gas usage. He mentioned engaging with companies like Xylem at industry events to explore potential energy-saving technologies and solutions. Norton also touched upon his interest in acoustics for pipeline assessment, reflecting his broader focus on utilizing advanced technologies for infrastructure management.

He shared anecdotes and examples from his work, including efforts in acoustic monitoring to distinguish between healthy and damaged pipes. Norton described the innovative approaches GLWA is exploring for pipeline assessment, such as using electromagnetic and acoustic methods to identify and address pipeline issues proactively.

Norton also discussed collaborations with universities and industry partners in research and development projects. He emphasized the importance of these collaborations in advancing GLWA's capabilities in asset management and infrastructure resilience. Norton's presentation underscored the significance of continuously seeking innovative solutions and embracing new technologies in the water and wastewater sector.

Norton concluded by reiterating the importance of data-driven decision-making and the need for utilities to remain open to new technologies and approaches in asset management. His talk highlighted the intricate balance between operational efficiency, technological innovation, and the need for sustainable management practices in the water industry.

JOHN W. NORTON

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

NEW PIPELINE TECHNOLOGIES

Accelerating Commercialization

The presentation was focusing on the forefront of pipeline technology innovation within the renewable energy sector. Here is a more detailed summary based on the sections of the presentation:

Introduction to Innovations: They begin with an overview of cutting-edge tubular composites and real-time pipeline monitoring systems, emphasizing advancements in material science and data analytics. These innovations are presented as solutions to improve pipeline safety, efficiency, and compliance with increasingly stringent regulatory standards.

The Energy Market and Hydrogen: The presentation shifts to market dynamics, stressing the pivotal role of hydrogen in the energy transition. It discusses the growing demand for hydrogen as a clean energy carrier and outlines the challenges and opportunities its adoption presents for traditional energy infrastructure.

Commercialization and Challenges: Peter and Cate delve into the commercialization of these technologies, discussing the barriers such as high capital costs, regulatory hurdles, and the critical need for strategic partnerships between technology developers, industry stakeholders, and regulators to accelerate market entry.

Advanced Asset Management: The conversation moves towards asset management strategies that incorporate the latest technologies for improved performance and regulatory compliance. They argue for the adoption of smart technologies in asset management to better anticipate maintenance needs, extend the lifespan of infrastructure components, and ensure environmental compliance.

Strategies for Transitioning to a Low-Carbon Economy: The presentation concludes with a forward-looking perspective on transitioning to a low-carbon economy. It highlights the necessity of innovation, collaboration across sectors, and regulatory support to overcome the technical and economic challenges of upgrading and managing energy infrastructure in a way that aligns with global sustainability goals.

Throughout, Peter and Cate emphasize the critical role of technological innovation and strategic planning in navigating the complex landscape of energy transition. They advocate for a holistic approach that balances technological advancements, market readiness, regulatory compliance, and the overarching goal of sustainability.

MICHAEL PETERS
Equity Member and the Team
Principal – BrainDrip, LLC
IQ4H2 Lab

WES CATE
Partner and Chief Business Development Officer for BrainDrip

ASSET CONDITION ASSESSMENT

Beyond Inspection to Understanding

Sangster then began his presentation on moving beyond pipeline inspection to true condition assessment. He emphasized that inspection alone is not enough - it provides data but assessment is needed to analyze and understand that data to make rehabilitation decisions. Sangster drew an analogy to going to the doctor - an ECG provides data but a cardiologist's assessment is needed to understand what it means.

Sangster explained that condition assessment follows a linear process starting with inspection to gather data, then assessment to analyze the data and understand problems and solutions. He stressed that assessment builds the bridge between inspection and decisions/actions. Sangster also noted that assessment relies on good inspection - a poor inspection means the rest of the structure won't stand.

Before inspection even occurs, Sangster recommended doing a data audit to understand what is already known about the pipeline from things like as-built drawings. Understanding the pipe material, age, diameter, pressure class, coatings, joints and other factors is important for selecting the right inspection technique and analyzing results. Operating conditions like flow, pressures, water chemistry and the external environment including soil conditions were also highlighted.

Sangster described three levels of investigation - general screening, invasive/disruptive, and destructive testing which is avoided if possible. Non-invasive techniques mentioned included leak detection, acoustic methods, electrical tests, and investigating soil/groundwater. More focused investigations could involve coupons, excavating at hotspots, and various internal inspection tools.

For sewers, Sangster said CCTV is most common but other techniques like sonar, lasers, ground penetrating radar, and pressure testing are available. Force mains are more complex due to varied internal conditions, and techniques from pressure pipes can be used along with investigating gas pockets. Sangster emphasized each pipe material has different failure modes and indicators requiring different inspection methods.

When assessing condition, Sangster stressed understanding failure modes and what indicators inspections can detect. For ferrous pipes, methods to determine corrosion timelines and remaining strength were described. Condition grading systems were also discussed, with PACP highlighted as an effective system. Risk matrices were presented as a way to consider likelihood and consequence of failure to prioritize remedial actions.

Sangster concluded by summarizing how the condition assessment process enables decisions on rehabilitation, repair or replacement through understanding risk and developing asset management plans. He emphasized the process is relatively simple if thought through systematically versus appearing complex.

During Q&A, Sangster noted emission limitations on rehabilitation methods vary by location and some techniques are unavailable in certain countries. He also clarified CCTV is usually sufficient for gravity sewers but other techniques may be needed for measurements, in sags, or if the pipe can't be emptied. Finally, Sangster explained risk levels from condition assessment are initially qualitative for prioritization, but can incorporate budget considerations.

TOM SANGSTER

Managing Director
Downley Consultant

BALANCING THE RISKS AND REWARDS OF

Delivery Methods for Underground and Trenchless Projects

Steven Kramer's presentation delves into various aspects of project delivery methods in the construction and engineering sectors, particularly focusing on tunneling and trenchless projects. He discusses the shift from traditional project delivery methods, such as Design-Bid-Build (DBB), to alternative methods like Design-Build (DB) and Public-Private Partnerships (P3s).

Kramer emphasizes the importance of choosing the right project delivery method based on the specific needs and risks of each project. He notes that while traditional methods allow owners to influence design and understand costs upfront, alternative delivery methods can offer benefits like reduced timeframes and a single point of responsibility for design and construction.

He discusses the concept of progressive design-build, a method gaining popularity due to its flexible and collaborative nature. This approach involves selecting a team based on qualifications and then collaboratively developing the project with the option to rebid or accept the price proposal.

Kramer also touches on the complexities and risks associated with large-scale projects, highlighting how risk management and contractual arrangements are crucial for successful project delivery. He mentions how some contractors and owners are exploring innovative contract structures, such as risk ladders, to balance risk and cost more effectively.

Throughout his talk, Kramer shares insights from his extensive experience, illustrating key points with examples of various projects. These include the Chattahoochee Tunnel in Atlanta, the parallel Thimble Shoal Tunnel in Virginia, and the extensive DC Clean Rivers Project. Each example serves to illustrate the practical applications and considerations of different delivery methods in real-world scenarios.

Kramer concludes by reiterating the need for flexibility in choosing delivery methods and the importance of adapting strategies to align with project-specific requirements. He encourages critical thinking about these methods and their application to ensure the most efficient, cost-effective, and successful project outcomes.

STEVEN KRAMER

Senior Vice President, COWI |
President 2022/2023, ASCE Utility Engineering & Surveying Institute

SUPPORTING GLWA'S PIPELINE MANAGEMENT:

Research Efforts and Insights Abstract

Dr. Iseley began the meeting by noting the positive discussions from the previous day and looking forward to the think tank portion. He shared some of his early career experiences that shaped his views on asset management.

Dr. Iseley discussed working with Steve Alby at EPA in the 1990s, when Alby authored an influential gap analysis report identifying the massive financial needs of water utilities to meet Clean Water Act requirements. This helped Alby recognize the need for a different approach beyond waiting for federal funding, as he was impressed by asset management practices in countries like New Zealand and Australia.

Dr. Iseley also discussed his early career doing facility planning for utilities in the 1970s. This involved extensive field investigations and data collection on sewer lines. However, he found utilities' existing paper maps and records were often inaccurate and incomplete. This reinforced the importance of accurate asset inventory and condition assessment.

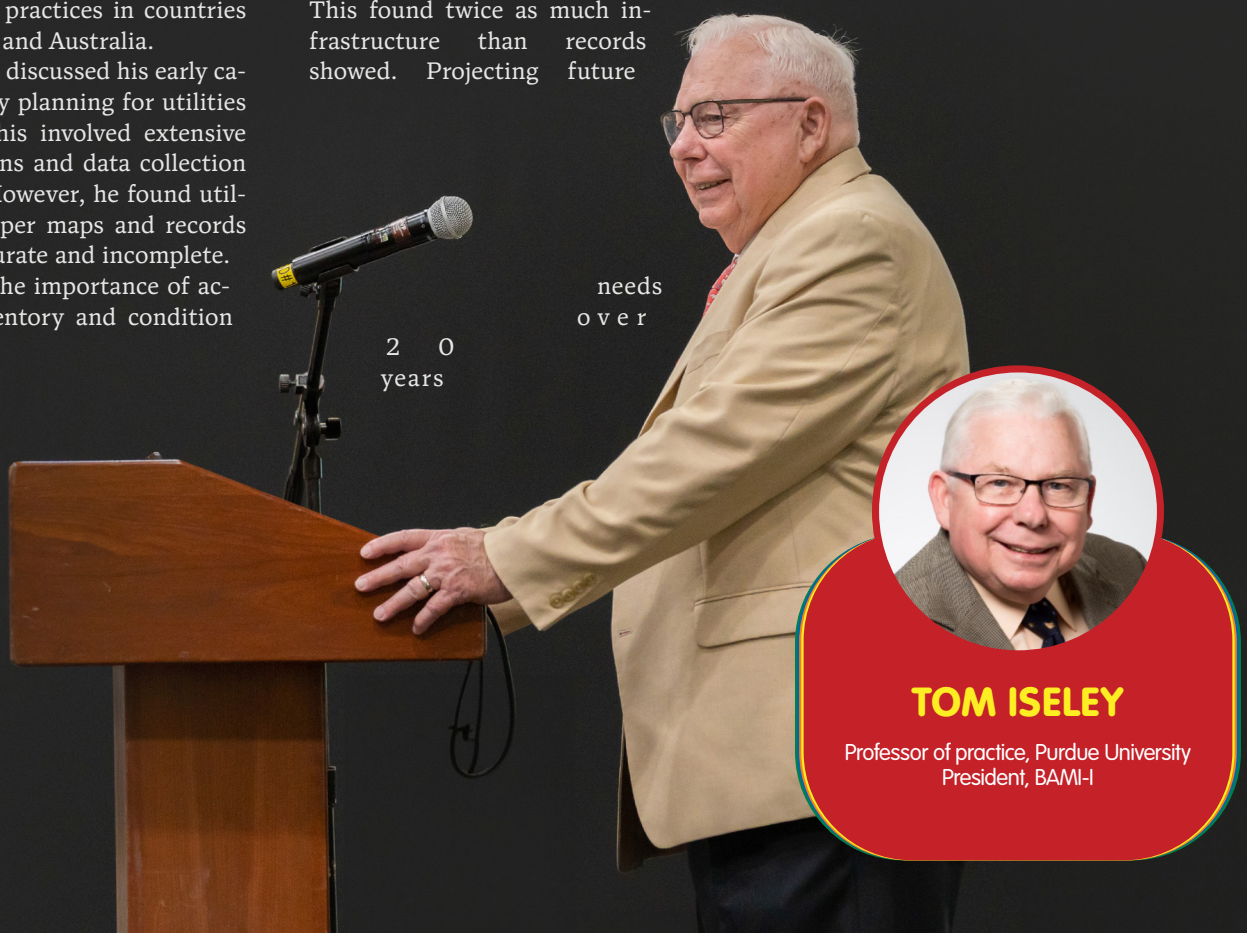
Dr. Iseley described Atlanta's experience inventorying their system through field investigations in the 1990s-2000s, finding significantly more infrastructure than records indicated. He emphasized the value of direct field work and communication with operations staff.

Dr. Iseley noted regulatory drivers like consent decrees catalyzed utilities to address needs after initial funding programs ended. He discussed early BAMMI efforts in the 2000s to research practices and develop online courses to introduce asset management fundamentals and plan development.

Dr. Iseley provided an example of developing North Carolina's first asset management plan for a small town through field investigations. This found twice as much infrastructure than records showed. Projecting future needs based on funding scenarios helped gain council support.

Dr. Iseley discussed experiences developing Swift City, Indiana's first plan through field work, again finding more infrastructure than indicated. Developing core values with stakeholders from the start was emphasized as important to gain program buy-in.

In closing, Dr. Iseley emphasized that asset management programs need to consider utilities' operational realities and competing priorities from regulatory compliance. The meeting helped identify challenges but more work is needed to help utilities recognize benefits amid other demands



TOM ISELEY

Professor of practice, Purdue University
President, BAMI-I

Panel Discussion

The Futures of Water Infrastructure

Dr. Iseley introduced the panel moderator Matthew Klein. Matthew then introduced the panelists - Mary Conley Eggert, Doug Youngblood, and George S. Hawkins. Mary discussed her headline about Gen Z leading the charge on water conservation and awareness through initiatives like “Just Add Water”. Doug discussed decentralized water treatment becoming more popular to give residents more control, with technologies making composting toilets more acceptable. George commented on how green infrastructure projects can supplement buried infrastructure by slowing stormwater flows. He also discussed the importance of water resources and how areas with abundant freshwater will have competitive advantages. When discussing the economic headlines, Mary talked about the circular water economy and initiatives to provide well water access globally. Doug discussed the challenges utilities may face with labor shortages and potentially augmenting

workforces with AI. George commented on revenue losses utilities have faced with changes in water usage patterns. In the environmental section, Doug discussed trenchless rehabilitation becoming more essential to avoid sewer overflows. Mary talked about opportunities for utilities to get involved in natural infrastructure restoration and monitoring. For the political headlines, George proposed the creation of a national water office to help coordinate solutions at larger scales. Mary’s headline was about preventing water wars through global cooperation. Doug’s ethical headline discussed potential union issues from increased AI use in construc-

tion. George expressed concerns about maintaining natural systems as solutions become more mechanized. One audience member asked about climate change funding for CSO projects potentially leading to more infrastructure that is difficult to sustain. Another discussed development impacts and the role new developments play in both solving and creating infrastructure problems.

key themes, insights, and discussions presented by the experts:

1. Introduction and Background: An overview of the panel discussion's purpose, participants, and the context of the debate on water infrastructure.

2. Expert Insights:

- Matt Klein's Views: Summary of Klein's perspectives on demographic changes and their impact on water systems.
- Mary Conley Eggert's Contributions: Eggert's insights on the role of AI and technology in water management.
- Doug Youngblood's Analysis: Youngblood's discussions on environmental conservation and its importance in water resource management.
- George Hawkins' Perspectives: Hawkins' viewpoints on the challenges posed by legal and political factors in water infrastructure.

3. Futuristic Scenarios: An overview of the futuristic scenarios discussed by the panelists and their implications for water infrastructure.

4. Audience Engagement: Summary of the audience's questions, concerns, and the panelists' responses, highlighting the engagement and interaction part of the panel.

5. Conclusion: A wrap-up of the key points made during the discussion, including a synthesis of the ideas presented and thoughts on future directions in water management.

GBAMC

The 2nd Global Buried Asset Management Congress

CONTINUING THE JOURNEY: BAMI-I SETS THE STAGE FOR THE SECOND GBAMC IN INDIANAPOLIS IN 2024

The Global Buried Asset Management Congress (GBAMC) has quickly established itself as a pivotal event in the asset management industry, providing a platform for professionals to share insights, innovations, and best practices. This congress facilitates vital discussions on the challenges and opportunities facing water asset management, driving the industry forward. Building on the achievements of the inaugural event, BAMI-I, in partnership with Purdue Construction Engineering and Management (CEM) and Southwest Environmental Financial Center (SWEFC), is excited to announce the second GBAMC, scheduled for November 14-16, 2024, in Indianapolis. This upcoming event aims to continue the tradition of fostering collaboration and advancement within the global asset management community.

At the 2023 GBAMC, a plethora of insights emerged from expert presentations, panel discussions, and think-tank interactions. Figures like Heather Himmelberger and George Hawkins underscored the need for hands-on, data-oriented strategies in managing water assets. Ross Waugh, John Norton, and others delved into community engagement, technological innovation, and sustainable practices across various sectors. The topics covered by other speakers encompass various aspects of water asset management, with an emphasis on buried asset management.

Building on this momentum, testimonials reflect the congress's success in fostering educational and networking avenues.

"When I arrived at the congress, the perceived authority held true. I was surrounded by some of the industry leaders in asset management. The other GBAMC attendees and speakers instantly took me in as a colleague and talked to me as if they had known me for years. Everyone revealed through conversation that they all knew each other, whether it was working on projects together, previously sharing insights with each other for years, or just simply becoming friends through the industry. It was at this moment that I knew I had found the core of buried asset management." Said by Boston Snyder, a asset manager from City of Goshen.

Oluwatobi Seun Osilaja, a young student at Purdue, said: Attending the Buried Asset Management Institute International (BAMI-I) 2023 Congress in Chicago was an extraordinary privilege, and I can't help but describe it as a truly enlightening experience. The keynote speaker's message on how aging infrastructures like water/wastewater utilities might be hidden from view but still have stories to tell, resonated deeply with me."

These reflections not only underline the event's role in bridging knowledge gaps and connecting professionals but also highlight the growing anticipation and positive influence on the asset management community, setting a precedent for the richness of future congresses in both content and professional growth.

Feedback from the inaugural congress has shaped a three-day agenda brimming with keynotes, panel discussions, exhibitions, and various learning and networking opportunities in the 2nd GBAMC. This year, GBAMC continues to delve into the expansive field of buried asset management, specifically honing in on asset management within the water and wastewater industry under the theme "New Horizon in Buried Asset Management." The congress will introduce significant initiatives like the Braindrip & IQ4H2 Scholarship Program for selected submissions and awards to honor major contributions in the buried asset management industry.

GBAMC's thought leaders will not only inspire but also offer detailed insights into the development and implementation of a comprehensive water and wastewater asset management program. It will emphasize the legislative trends across the United States, reflecting the impact of the evolving legal environment on the water asset management industry. Congress is committed to contributing to legislative improvements, underscoring its support for positively shaping the legal framework of the industry. Additional topics will include regulation compliance, risk management, financial planning and management, asset inventory management, condition assessment, maintenance and renewal strategies and solutions, emerging technologies and innovative solutions, capital planning, and project management. The congress encourages collaboration, knowledge sharing, and the advancement of industry practices, attracting a broad audience from seasoned professionals to newcomers and students, making it an essential event for anyone looking to impact the infrastructure asset management field.

GBAMC strives to transform professionals into pioneers. To get involved, register, or contribute to the upcoming GBAMC, interested individuals and organizations are encouraged to participate in the open call for papers, showcasing their expertise and innovations in asset management. Early bird registration incentives and group discounts are available to facilitate broader participation. Additionally, the congress offers unique sponsorship opportunities, ranging from general to special event sponsorships, providing a platform for sponsors to enhance their visibility and engagement with industry professionals. We warmly invite potential participants and sponsors to join us in making the 2nd GBAMC a hub of knowledge sharing and collaboration, making it a revolutionary event.

BAMI-I remains steadfast in its commitment to enhancing asset management practices, aiming to leverage the momentum from the first GBAMC to elevate the 2024 GBAMC. By incorporating feedback, introducing cutting-edge topics, and expanding interactive formats, BAMI-I is dedicated to fostering a more engaging and impactful experience in the second GBAMC. This approach not only reflects the organization's dedication to the field of asset management, but also its aspiration to cultivate a future where asset management is more integrated, innovative, and inclusive on a global scale.

If you have any questions for the congress, contact Wei Liao at liao186@purdue.edu

GBAMC
The 2nd Global Buried Asset Management Congress

Call For Papers

Timeline

Submission

Submit your abstract no later than May 1, 2024.

Confirmation

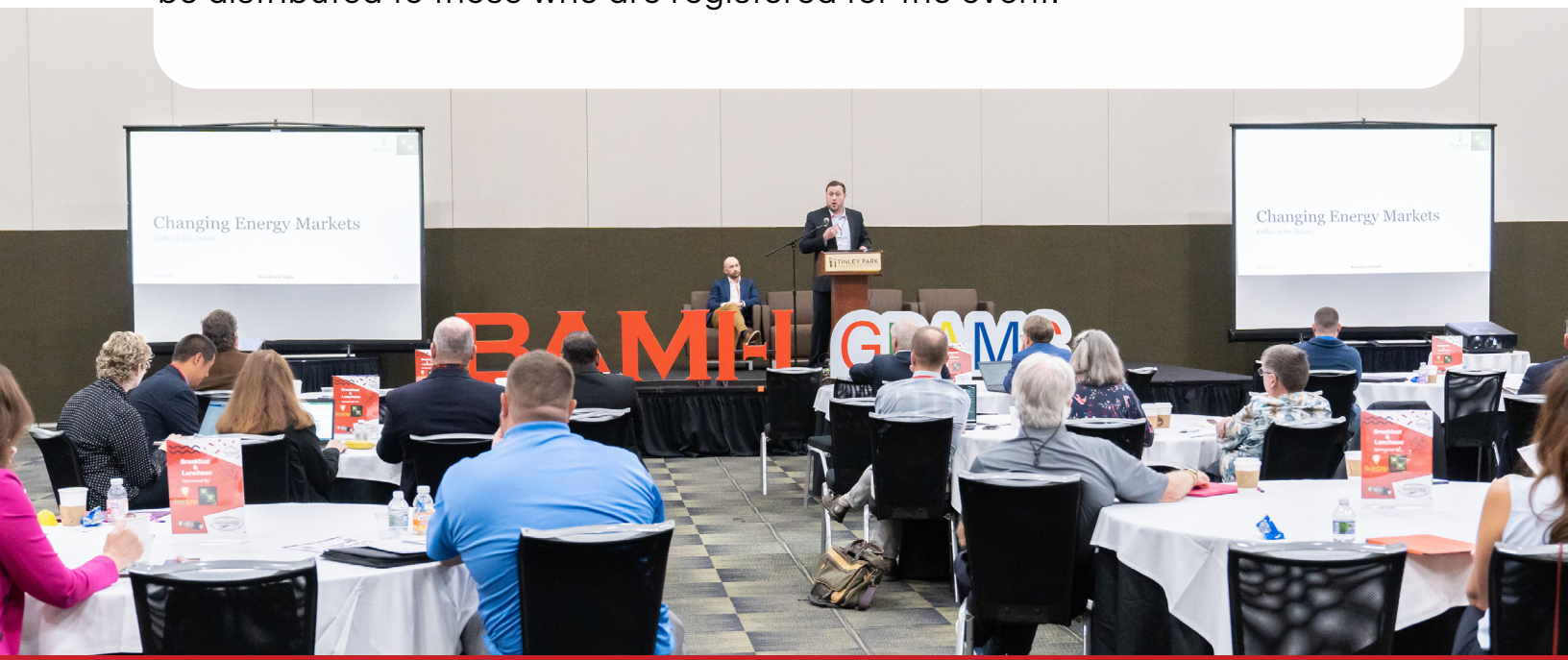
Presenters will receive confirmation no later than May 15, 2024

PPT

Required to submit a draft presentation PowerPoint no later than October 6, 2024

Submission Requirements

- Presentation's title and 50-100 word presentation description
- Presenter's name, title, and company/organization
- Photo of presenter
- 50-100 word presenter biography
- All content for presentations must be original.
- Presentations will be captured on video, and PDFs of the PowerPoint slides will be distributed to those who are registered for the event.



GBAMC
The 2nd Global Buried Asset Management Congress

Call For Papers

Topics of Interest

We are inviting submissions of case studies and insights from thought leaders on any of the subtopics listed below, aimed at enhancing water asset management and buried asset management:

Holistic Water Asset Management

- Sustainability and Environmental Management
- Regulatory Compliance and Risk Management
- Emergency Preparedness and Disaster Recovery
- Digital and Data Strategy
- Maintenance and Operations Strategy
- Financial and Investment Planning
- Economic and Rate Analysis
- Stakeholder and Customer Engagement
- Workforce and Capacity Development

Location and Mapping

- Asset Inventory
- Lead Service Line Inventory & Replacement/Lead And Copper Rule Compliance
- Subsurface Utility Engineering
- Application of Geographic Information Systems (GIS)
- 3D modeling of underground infrastructure
- Drones and remote sensing technologies
- Integration and standardization of map data
- Regional geospatial information and asset intelligence
- Cybersecurity and Data Protection

Pipeline Condition Assessment

- Pipe Material and Degradation Analysis
- Leak Detection and Location
- Inflow and Infiltration Studies
- Hydraulic Capacity Evaluation
- Structural Integrity Assessment
- Service Life Prediction
- Rehabilitation and Renewal Planning
- Asset Criticality and Risk Analysis
- Environmental Impact Assessment
- Regulatory Compliance Verification

Technical Solutions for Buried Assets.

- Repair, rehabilitation, and replacement strategies
- Trenchless Technology
- New materials technologies
- Smart pipeline management systems.
- Renewable energy pipeline
- Environmental Restoration Techniques
- Cost-Benefit Analysis and Budgeting
- Project Management and Quality Assurance

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Speaker Benefits

- Free Pass: Receive a complimentary congress pass for the 2024 GBAMC
- BrainDrip & IQ4H2 Scholarship:
Submissions from municipalities, engineering firms, as well as government and regulatory agencies, are eligible for scholarships
- Thought Leadership: Presenters will be acknowledged as contributors and add content to the Congress knowledge base.
- Networking: Network with peers across the globe.

2024 BrainDrip & IQ4H2 Sponsorship Program:
Recognize and motivate individuals to share their asset management practices by awarding 25 speakers who submit abstracts, are selected, and confirm acceptance. The scholarship covers their conference fees, including registration and accommodation, with a preference for speakers from municipalities, utilities, engineering consulting firms, and governmental/regulatory agencies.

Thank you

BrainDrip™
Patently True Innovations

"Where Grey Matter....."
IQ4H2™ Lab
Makes Green Matter"

GBAMC
The 2nd Global Buried Asset Management Congress

Call for Award Nominations

Honor outstanding contributions in water and buried asset management, including industry leaders, innovators, and organizations or individuals making significant sustainable development contributions. Awards include:

- Asset Management Innovator of the Year: Recognizes individuals for exceptional contributions in asset management technology innovation, process improvement, or new methods application, driving modernization and efficiency in buried asset management.
- Asset Management Champion of the Year: Granted to utilities or municipality exemplary in implementing asset management principles, significantly enhancing the vitality and performance of their organization. This organization stands out for its ability to drive change and foster a culture of continuous improvement in asset management practices.

Submit Your Abstracts and Nominations to : **liao186@purdue.edu**

We're inviting volunteers to join the BAMI-I awards committee. If you're interested in contributing, please reach out to us.

More Information :**+318 - 497 - 8288 / liao186@purdue.edu/ www. BAMI-I.com/**

SPONSORSHIP & EXHIBITION OPPORTUNITIES

GBAMC
The 2nd Global Buried Asset Management Congress

Congress rate structure:

Registration Fees	BAMI-I Member	$450
	Non-Member	$550
Sponsorship Opportunities	Premier	$10,000
	Platinum	$6,000
	Gold	$4,000
	Silver	$2,000
	Bronze	$1,000
Unique Sponsorship opportunities	Special Event (1 available)	$2,500
	Welcome Reception (1 available)	$2,500
	Luncheon (2 available)	$2,500
	Cookie/Snack Break	$1,000
	Hydration Station	$1,000
	Tabletop Exhibit	$1,500 / booth

2024 GBAMC Sponsors

Premier Sponsors

- **BrainDrip & IQ4H2**

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"Where Grey Matter....." IQ4 H2™ Lab Makes Green Matter"

Bronze Sponsors

- **PVC pipe association**

PVCPIPE association

Hydration Station
Sponsored by **Plastics Pipe Institute (M&I + MAB)**

PPI Plastics Pipe Institute MUNICIPAL & INDUSTRIAL

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Testimonials About GBAMC

Oluwatobi Seun Osilaja

Attending the Buried Asset Management Institute International (BAMI-I) 2023 Congress in Chicago was an extraordinary privilege, and I can't help but describe it as a truly enlightening experience. The keynote speaker's message on how aging infrastructures like water/wastewater utilities might be hidden from view but still have stories to tell, resonated deeply with me. It emphasized the importance of listening to these buried assets and recognizing their significance in everyday living!

Throughout the congress, I had the opportunity to explore current industry practices, emerging trends, and the exciting possibilities that the future holds for buried asset management. Interacting with key figures and thought leaders in this industry provided invaluable insights that have broadened my perspective.

I want to extend my heartfelt appreciation to Prof. Tom Iseley and the entire BAMI team Wei Liao, Saleh Behbahani, my colleagues Suyash Padhye, and Sihan Zhou for orchestrating such a remarkable event. BAMI-I's dedication to advancing the field of buried asset management is truly commendable, and I am grateful for the opportunity to be a part of this experience. BAMI-I (Buried Assets Management Institute-International) , Lyles School of Civil Engineering at Purdue and Purdue University - Construction Engineering and Management

In a world where infrastructure is often taken for granted, the BAMI-I Congress serves as a reminder that beneath our feet lie a wealth of untold stories and potential innovations. Individuals, researchers, stakeholders, organizations, government agencies, environmental groups, and the wider community should collaborate to ensure that these buried assets are not forgotten and that they remain functional throughout their life cycle, contributing positively to our future.

Boston Snyder, Asset Manager
Engineering Department, City of Goshen
204 East Jefferson Street, Suite 1 ● Goshen, IN 46528-3405

bostonsnyder@goshencity.com ● www.goshenindiana.org

To: Dr. Tom Iseley, BAMI-I President
Wei Liao, BAMI-I Executive Director
From: Boston Snyder, City of Goshen
RE: Global Buried Asset Management Congress
Date: October 6, 2023

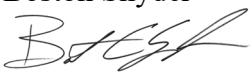
First and foremost, congratulations on successfully hosting the first annual BAMI-I Global Buried Asset Management Congress. I am the Asset Manager for the City of Goshen, a smaller city consisting of approximately 35,000 residents. Our utility manages wastewater, drinking water, and stormwater, for approximately 11,000 customers. I assumed the role of Asset Manager in February of 2023 in order to help the City of Goshen navigate their way into compliance with Indiana regulations. Any funding requested through the Indiana Finance Authority's State Revolving Fund for clean water or drinking water projects must have an asset management certification submitted during the time of application. Not only do we have to meet compliance, but we also want to provide the best level of service to our residents as possible. We cannot provide that if we do not know the condition of our assets. I needed to learn the regulations as soon as possible, but also wanted to learn from others in the asset management community. To have an event of such magnitude as the GBAMC within driving distance of a utility our size was truly a delight. My colleagues had the pleasure of meeting you at an event earlier in the year where they learned about the upcoming GBAMC. They returned from the event with nothing but good things to say about BAMI-I and the upcoming congress, so we could not pass up the opportunity to join during the GBAMC's inaugural year.

As I was signing up for the GBAMC, the names of the speakers carried great authority on the topic of asset management. This alone made me very excited to attend and learn their insights on a management practice that was brand new to myself and my organization. When I arrived at the congress, the perceived authority held true. I was surrounded by some of the industry leaders in asset management. The other GBAMC attendees and speakers instantly took me in as a colleague and talked to me as if they had known me for years. Everyone revealed through conversation that they all knew each other, whether it was working on projects together, previously sharing insights with each other for years, or just simply becoming friends through the industry. It was at this moment that I knew I had found the core of buried asset management. The cumulative years of experience in one location defined the very reason I was there myself. I needed to learn from this group. I needed to take in every ounce of information possible. I took as many notes as I could during the GBAMC, trying to retain as much information as possible that was being given to me. Every session represented asset management in one form or another, allowing me to easily correlate the presentations directly back to my own work. Heather Himmelberger expressing the importance of the core basics. Ross Waugh showing how easily the public can be involved with asset management. Dr. John Norton showing off emerging

technologies and research efforts. Even speakers like Frederick Wu and George Hawkins giving history of how much asset management has changed in just a short time. Each speaker shared valuable information that I will be able to apply to our functions in order to grow as an organization as well as a community as we progress further.

Again, I want to thank you for sharing information of BAMI-I and the GBAMC to my colleagues. Had that never occurred, I would not have attended, and I would not have met as many great people as I have since announcing my attendance. I can't wait to see how large this event grows as more states work asset management into their requirements. And who knows, maybe one day I will be considered an industry leader able to share my knowledge to the next round of asset management enthusiasts.

Sincerely,
Boston Snyder



BAMI-I AD INDEX

"What We Do **Now**, Will Profoundly Affect the Next Few Thousand Years…."

BrainDrip™

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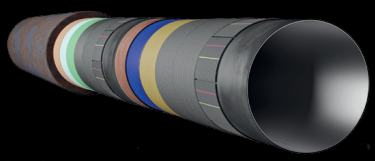
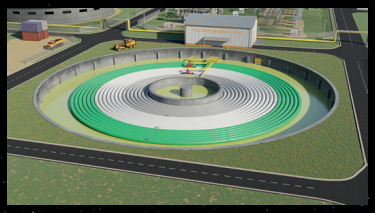
"Effectors of the **Now**"

Customizable Hydrogen Infrastructure Innovations – Resilience is our Brilliance

• Safe • Reliable • Scalable • Cost Effective



SG Liner – Pipeline Transition Liner for the Conveyance of Highly Compressed Hydrogen.



SG Coil – Localized Sub-Terra High Volume Storage of Highly Compressed Hydrogen.

BrainDrip's hydrogen transmission and storage systems are manufactured onsite with the state-of-the-art Mobile Onsite Factory and Autonomous Manufacturing Vehicle with the incorporation of our novel Innervated Tubular Composite and Micro-Rope Reinforcement, affording pressure ratings of up to 500 bar.

Please read our H2 View Introduces feature on Page 56

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

• BrainDriptech.com • info@braindriptech.com • (904) 799 1370

Jacksonville, FL/Pittsburg, PA USA