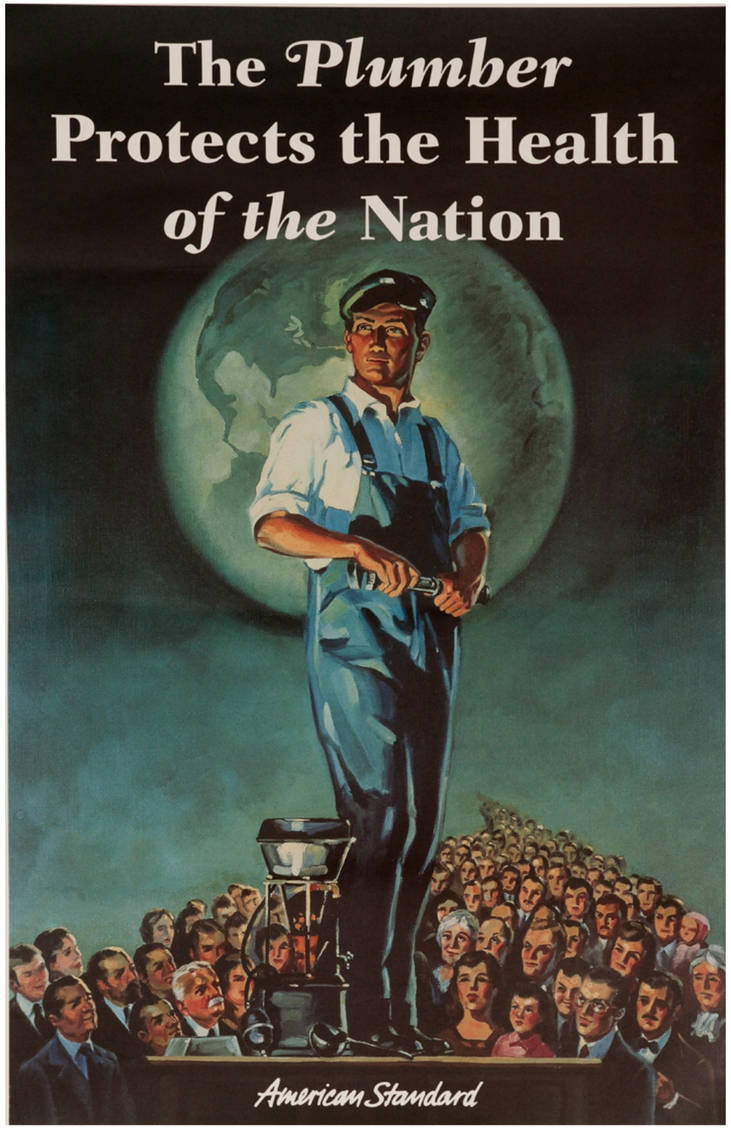
THE UNITED STATES
OF AMERICA

World Plumbing Council (WPC) United Association Instructor Training Program Scholarship 2024

Lucy Mawer



Introduction

(Above - Lucy Mawer, Raymond Boyd)

I am grateful to the World Plumbing Council (WPC) and the United Association (UA) for awarding me the Instructor Training Program Scholarship 2024. This unique professional development opportunity allowed me to expand my technical knowledge, observe best practices in plumbing instruction, and exchange ideas with colleagues from across the globe.

PLUMBERS • UNION • PIPEFITTERS • SERVICE TECHS • STEAMFITTERS • SPRINKLERFITTERS
Founded 1889

WORLD PLUMBING COUNCIL

United Association

(Above: Lucy Mawer outside the UA head office in Annapolis, Maryland)

The UA is a North American trade union representing workers in the plumbing, pipefitting, sprinkler fitting, HVACR (heating, ventilation, air-conditioning & refrigeration) service, welding and pipelining trades.

It was founded in 1889 to bring together local unions of plumbers, steam-fitters, gas-fitters and related trades. Representing approximately 392,000 Plumbers, Pipefitters, Sprinkler Fitters, HVACR Service Technicians, Welders and Pipeliners working in the construction industry throughout North America.

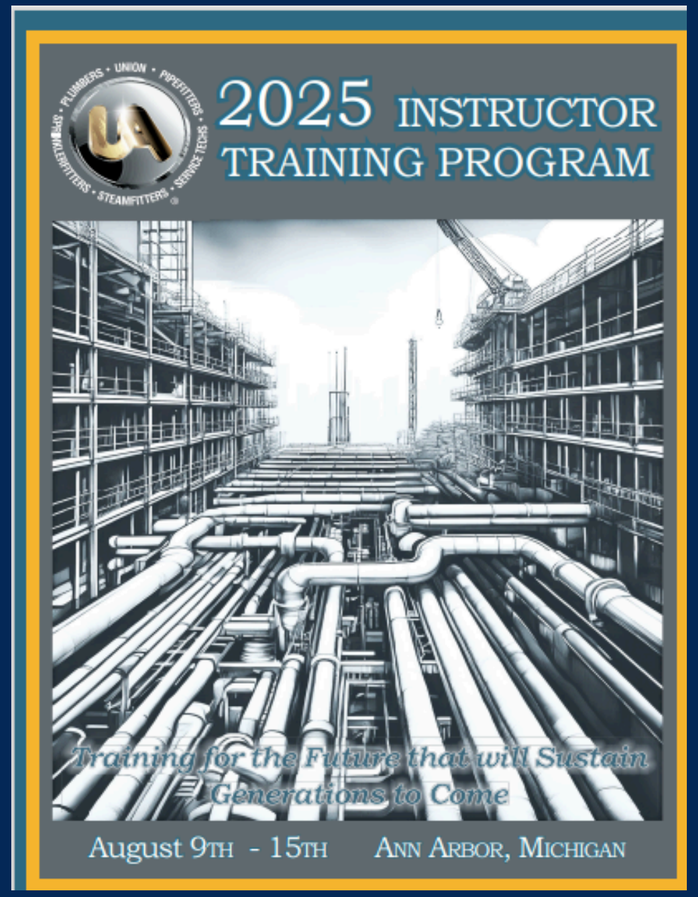
Built on Excellence

UA 2025 Instructor Training Program

I had the pleasure of attending the UA plumbers union training for plumbing tutors that belonged to several locals across America, Australia and Ireland.

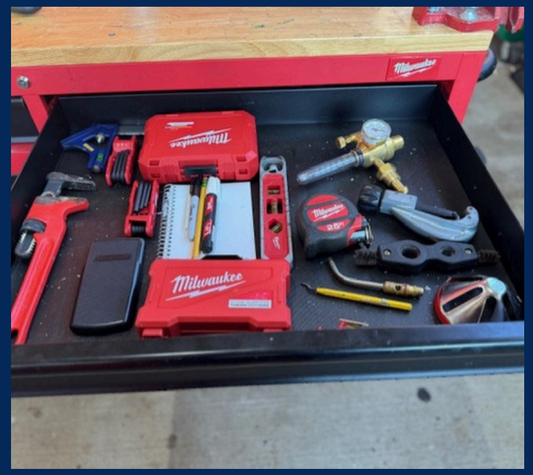
The Instructor Training Program for instructors of journeyworkers and apprentices is designed to:

- Increase UA instructors' proficiency of instructional techniques and materials.
- Acquaint instructors with the philosophy and principles of education, especially trade, industrial, and technical education.
- Provide learning experiences in the principles and the fundamentals of the applied knowledge subjects.
- Expand the understanding of our instructors in the technical aspects of the crafts and convey information to the instructors about the latest developments in this area.



Sunday 10th August

I toured the facilities at the United Association's training centre and met Raymond Boyd, Director of Education and Training, along with his team and many others who played an important role in the week's events. I also had the opportunity to visit the location where several apprentices were participating in the skills competitions for plumbing, sprinkler fitting, pipe fitting and welding.



(Each apprentice has brand new tools to use supplied by Milwaukee)

(Apprentice taking part in the plumbing installation competition)

UA Training Trailers

I toured the training trailers, which were fully equipped mobile classrooms and workshops available for hire by local organisations. These trailers serve as mobile learning centers for trades or equipment that may not be accessible locally. The range included trailers for plumbing, fitting and welding, as well as heating, ventilation, and air conditioning (HVAC). Each unit was fitted with state-of-the-art equipment for hands-on maintenance and fault-finding exercises. The pipe fitting, welding, heating, cooling, and ventilation systems were all fully operational. Tutors were also receiving training on how to set up and use the trailers effectively to enhance their teaching programs.

(Medical gas, sprinkler systems and sanitiation bays on the trailers)

Plumbing service demostration training trailer

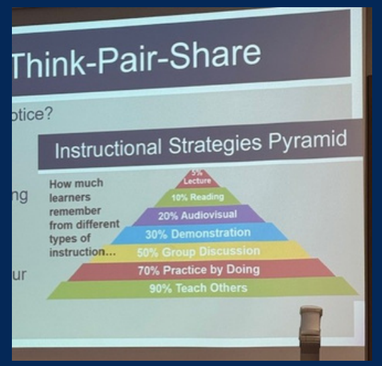
(Left - W/C and waste, showers, hot water cylinder and tap installations and maintenance bays)

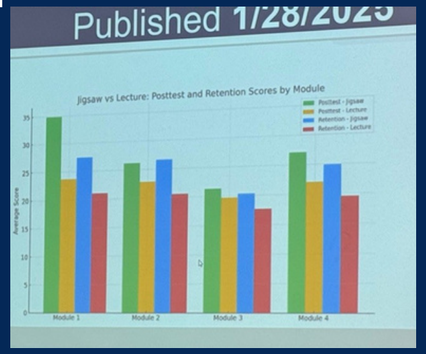
(Above - Video to show Pump comparison of a sewage ejector and submersible pump)

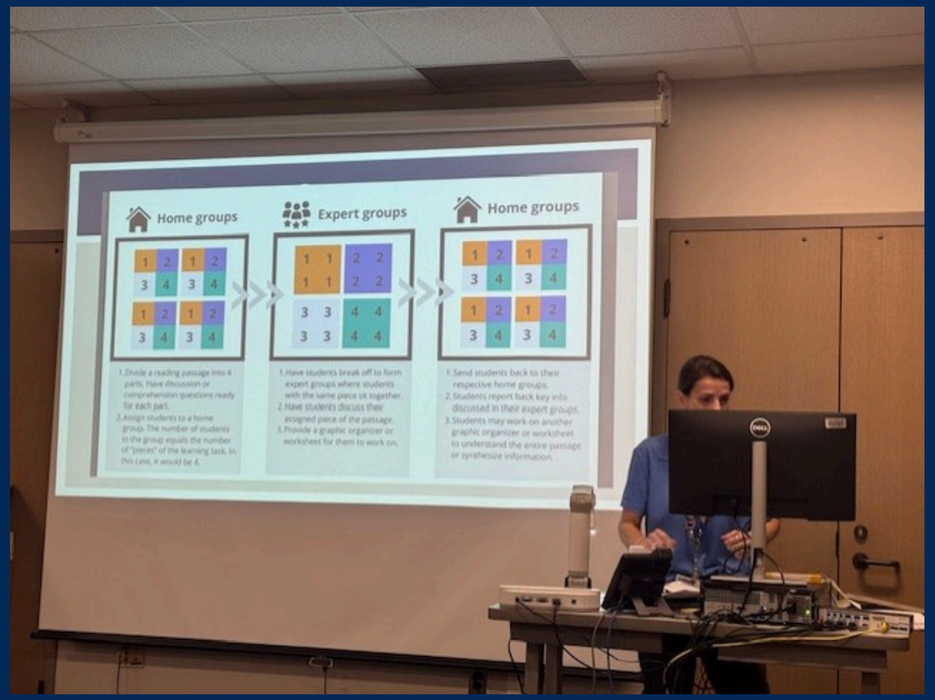
Heating, Plumbing, Ventilation, Air-Conditioning and Refrigeration

Monday 11th August

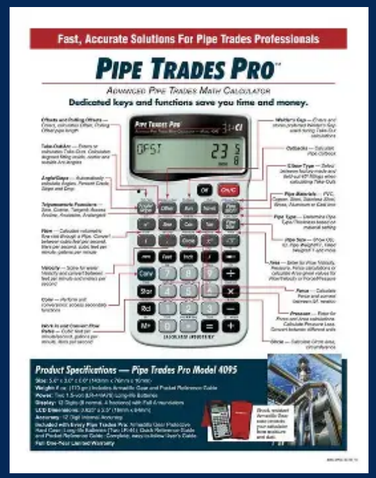
I participated in an intermediate-level Teaching and Learning class, which provided an excellent opportunity to further develop and refine my instructional skills. During the session, I learned about the Jigsaw teaching method and how to effectively apply it in my own teaching practice upon returning home. The class also offered a valuable chance to engage with fellow tutors, share experiences, and exchange ideas about industry-based teaching strategies and knowledge. The session was well-structured and engaging throughout the four hours. Additionally, I was able to refresh my understanding of Bloom's Taxonomy—a concept I had not revisited since my initial teacher training over 12 years ago







In the afternoon, I participated in an applied mathematics session focused on plumbing, where I learned how to calculate equations related to safely and effectively lifting heavy loads—such as positioning large fabricated iron pipework into place. I also learnt how to use and apply the Pipe Trades Pro Calculator in to system design.



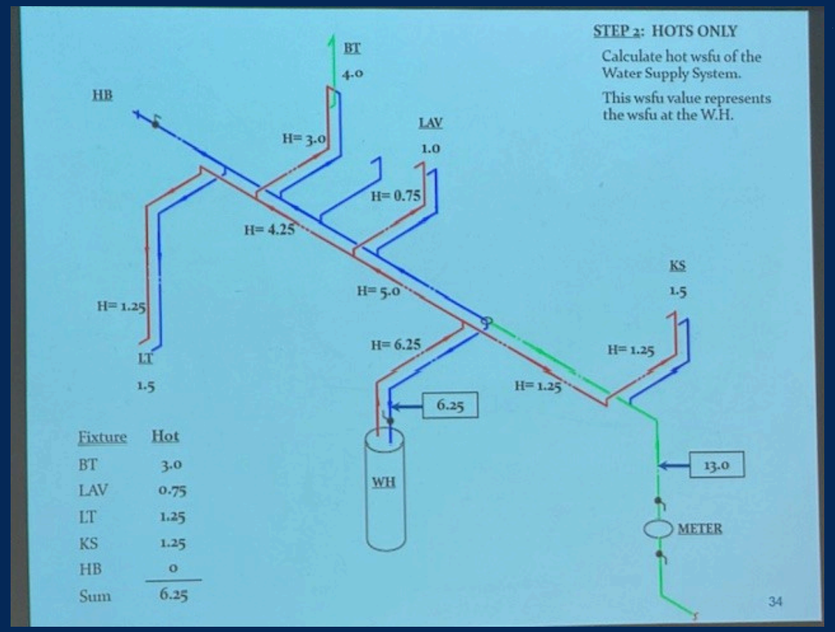
The annual UA Block Party in downtown Ann Arbor held on Monday 11th Aug is a highlight of the United Association's Instructor Training Program week. Held on Main Street between Liberty and William, the event features live music, outdoor dining, and a festive community atmosphere. Organised with support from Destination Ann Arbor and Washtenaw Community College, the Block Party brings together plumbing and pipefitting instructors, apprentices, and industry professionals for an evening of networking and celebration. The event draws hundreds of attendees and contributes significantly to the local economy.

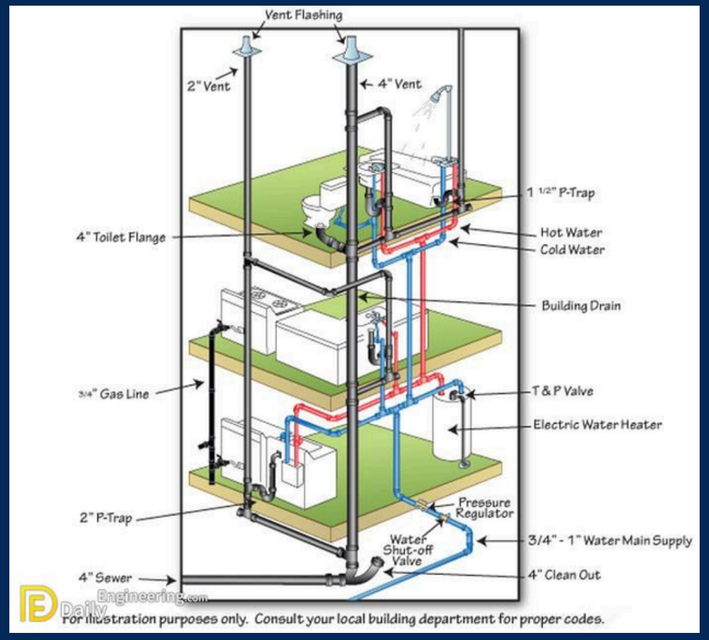
DESTINATION ANN ARBOR

(Above - Artie Klock, training coordinator NY Local 1, Lucy Mawer and Tom Bigley)

Tuesday 12th August

In the morning I took part in a Plumbing Planning Class where tutors explored effective methods for teaching and embedding the principles of pipe sizing in hot and cold water systems. The session highlighted that the fundamental principles used in the American plumbing code are very similar to those outlined in UK British Standards, making the learning highly relevant and transferable across both systems.





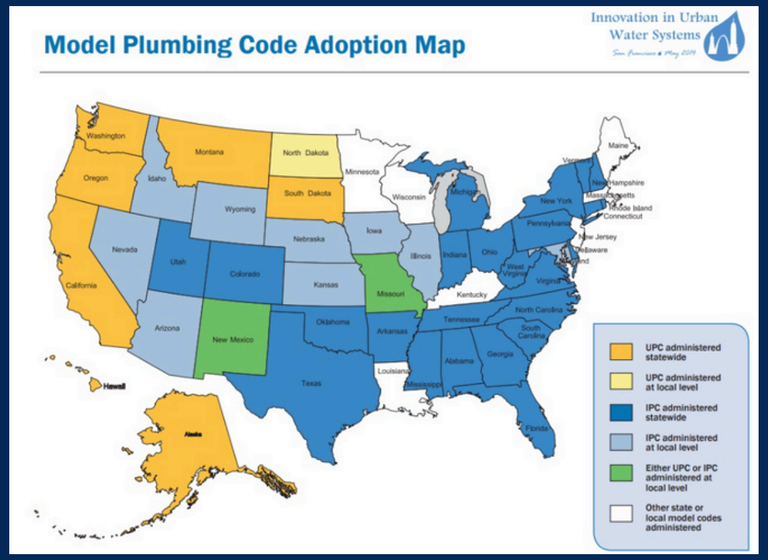
HAMMERHEAD®
TRENCHLESS

In the afternoon I had the opportunity to take part in a pipe-work class where we explored the process of resin pipe-lining using UV light, led by HammerHead Trenchless. Tutors learned how the company's cutting-edge system works — for example, how pipe liners are impregnated with resin and then cured in-place by exposure to LED/UV light rather than relying on hot water or steam.

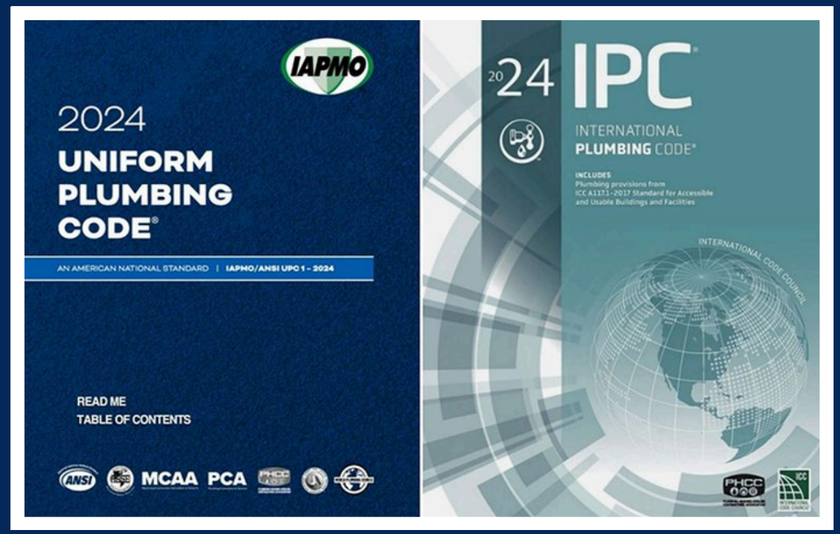
Overall, it was a valuable class: tutors gained first-hand awareness of how to invite such a company back to their local training centres to demonstrate the lining process to apprentices, thereby embedding a modern trenchless pipe-rehabilitation technique into the curriculum.

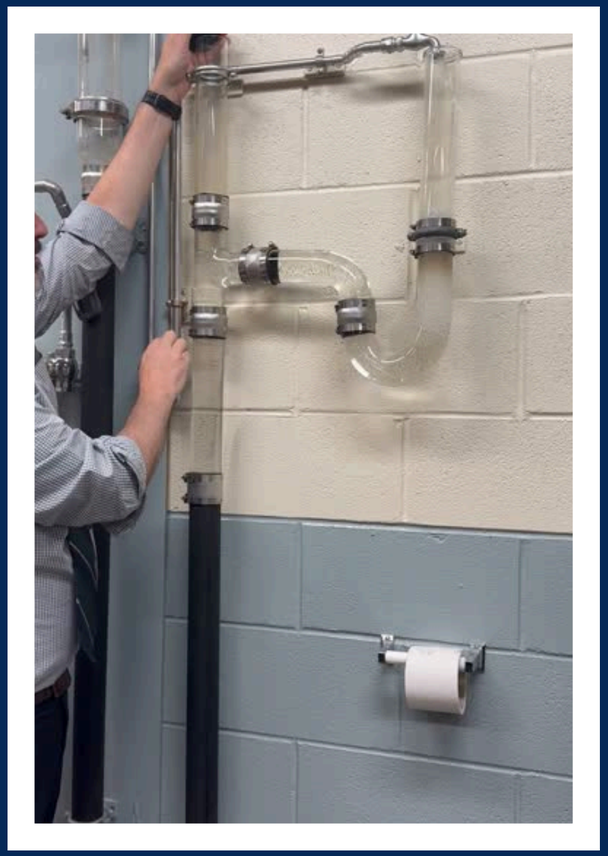
Wednesday 13th August

I took part in a plumbing code class that was very welcoming and engaging, providing an excellent opportunity to discuss and compare the differences between UK and US plumbing codes and regulations. I learned that several different plumbing codes are used across the United States, which was particularly interesting when comparing them to the UK's British Standards and Water Regulations. We also explored the use of specific fittings—some of which are prohibited under US codes but acceptable in the UK. It was reassuring to see the strong emphasis placed in the US on preventing backflow and ensuring the separation of potable and contaminated water systems.



(Above - A map showing which plumbing code each U.S. state use)

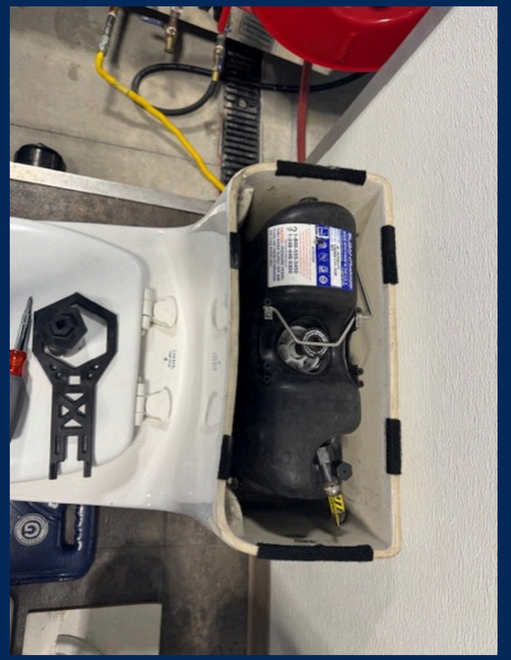




(Above - This video demonstrates how trap seal loss is taught using a visual learning system)

Thursday 14th August

I attended a Plumbing Services class where tutors were learning how to embed service skills and knowledge into their teaching practice. A significant focus was placed on the importance of customer service, with tutors participating in role-play exercises to demonstrate how to teach these essential interpersonal skills to apprentices. During the session, I also had the opportunity to discuss and compare installation requirements and the operation of unvented hot water heaters and WCs.

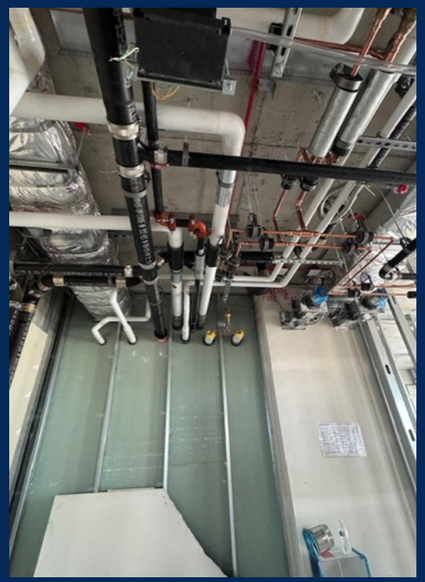


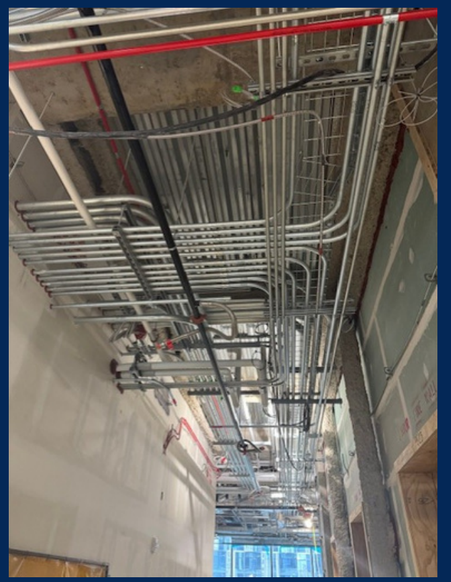
(Left - The inside of a pressurised W/C)

Hudson Building, Detroit

I travelled to Detroit where I had the privilege to tour the Hudson's Detroit building site, which was being plumbed by members of the United Association (UA) plumbers. The 48-storey development will feature a luxury hotel, pool and spa, residential apartments, and office space, including a new headquarters for General Motors. The project also includes a 12-storey office building and a 700-space underground parking garage linking the two towers. As one of the first skyscrapers over 500 feet to be built in Detroit since the 1980s, the Hudson's project plays a key role in the city's ongoing downtown revitalisation.

I greatly valued seeing UA plumbers at work—having previously observed where they train, the assessments they complete, and how they learn. Witnessing apprentices and journeymen applying those skills first-hand on such a major construction site was especially rewarding . This visit gave me a valuable insight into how the training and classroom learning I observed earlier is being translated into real-world construction work. The pictures on the next page show the outstanding views from the 43rd floor, the colossal size of the plantroon equipment and installations, UA plumbers at work, first fix and second fix of bathroom pipework. What also stood out to me was the strong emphasis placed on Health and Safety. It was clear that this was taken very seriously, with well-defined and effective safe systems of work in place throughout the site.





Local Union No. 1 - New York
‘We do it right the first time’

Local 1 runs a five-year apprenticeship program requiring over 10,000 hours of on-the-job training plus 1,070 hours of classroom education for apprentices.

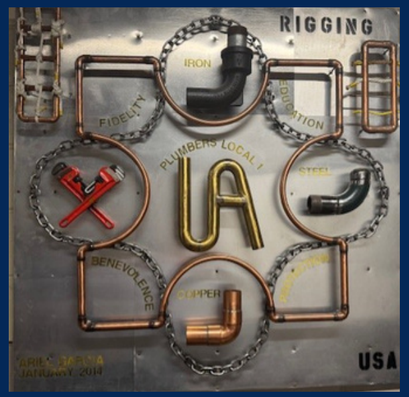
(Above & Below - Hot water class room)

(Above - Waste pipework installation example for a bathroom)

(Above & Below - Examples of students work to show the different types of knots required to learn for rigging)

(Above - W/C rig for teaching and learning fault finding)

(Above -Backflow rigs)



Local Union No.5 - Washington DC

During my stay, I was fortunate to visit several plumbing locals and their training centres. The following pages provide an insight into these facilities and the valuable work being carried out within them.

Plumbers & Gasfitters Local 5, based in the Washington, D.C. metropolitan area, has been serving the region since around 1890 with a focus on installing, maintaining and servicing water, waste and gas systems.

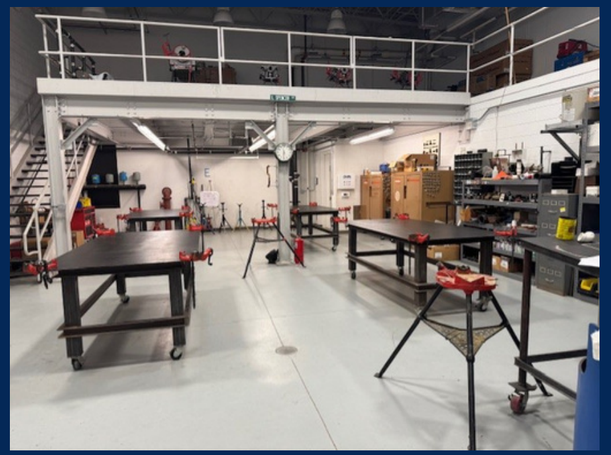
(Above - Chris Biondi, Lucy Mawer, Tom Bigley)

(Above & Below - Workshop to teach rigging and ground pipe installation)

(Above - Hot water training workshop)

(Above - Medical gas training rigs)

(Above - The training centre is 75% self efficient with its own rain water recycling system and solar PV panels)



(Above - Pipe skills training workshop)

Local Union No.98 - Detroit

"Proudly serving the Detroit, MI area since 1893"

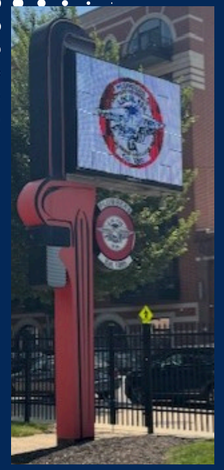
(Above - Substantial welding bays and facilities)

(Above - The Local incorporates its building's plumbing systems into real-world training exercises for apprentices)

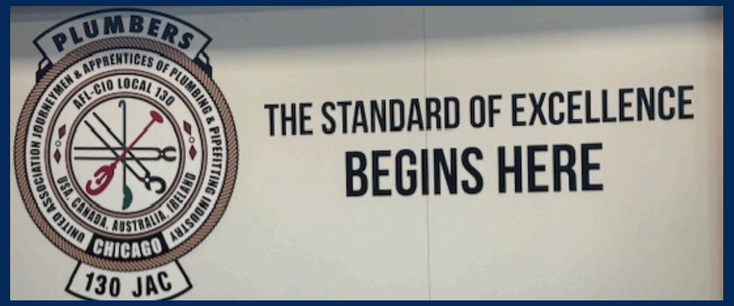
(The local had a extensive area to teach the installation of medical gas to its apprentices, including a life like hospital ward (Above))

(Left,Above - Back flow training rigs)

Local Union No.130 - Chicago



Local 130 has over 6,000 members in the Chicago area, making it one of the larger “straight-line” plumbing locals within the UA.



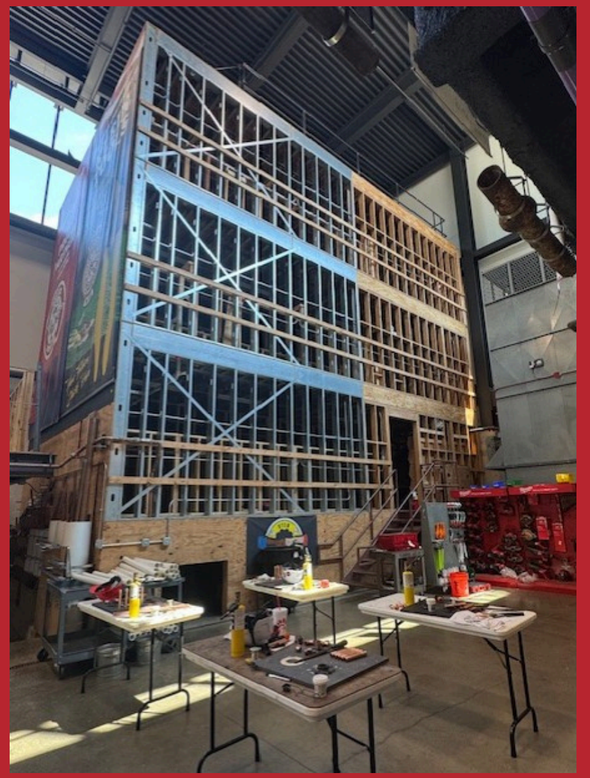
(Below - one of the workshops that houses a 3 story building to train apprentices on working in high rise buildings from ground work to sprinkler systems)

(Above - Plumbing practical workshop)

(Above - one of the extensive maintenance workshops which cover all plumbing components used in sanitation)

(Above - Copper class taking place)

(Above - The centre has an impressive RWH systems that su[plys all of the W/Cs in the building)

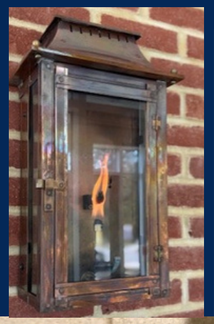


Plumbing History

Each Local showcases a wealth of plumbing artifacts that illustrate the history of plumbing appliances through the ages.

Selection of wooden water mains, some still remain in original installations in the US today

Wooden Bath



Selection of water heaters and boilers

A strong sense of brotherhood and sisterhood was evident throughout the event, reflecting the unity and pride within the trade. One of the most symbolic traditions was the exchanging of pin badges, with each UA local producing its own unique design each year. These pins are highly valued and sought after, and tutors eagerly trade them as a gesture of friendship, respect, and shared professional identity. The exchange not only represents camaraderie but also serves as a lasting reminder of the connections made during the event.

Program Overview

The program emphasised modern pedagogical approaches, technical innovations, and the continuous evolution of standards within plumbing and mechanical systems, noting that plumbing installations in the United States and the United Kingdom share significant similarities, particularly in their mutual commitment to safeguarding end-user welfare and ensuring system efficiency.

Key Insights Gained

1. Modern Training Delivery

During the week, I had the opportunity to observe how plumbing apprentices are trained in the United States. The apprenticeship program offers comprehensive instruction covering every aspect of the plumbing trade — from groundwork and service installation to planning, fitting sanitary appliances, installing heating and cooling systems, environmental, and medical systems. Apprentices also receive training in service and maintenance, developing essential manual skills such as pipe cutting and installation methods, soldering and pipe welding, while maintaining high standards of health and safety throughout.

Each apprentice follows a structured training program, with the added incentive of an annual pay increase upon the successful completion of each year. In contrast, within the United Kingdom, plumbing apprentices primarily receive theoretical instruction that enables them to recognise and understand underground waste pipework installations. The practical execution of such work is undertaken by specialised trades who undergo dedicated training and obtain specific qualifications for these tasks. Conversely, in the United States, this aspect of training is incorporated into the plumbing apprenticeship itself, with apprentices gaining the practical skills required to complete underground pipework installations as part of their profession.

1.1 Comparison of Plumbing Apprenticeships in the United States and the United Kingdom

Plumbing apprenticeship systems in the United States and the United Kingdom share the common goal of developing a highly skilled and safety-conscious workforce; however, their structures, funding mechanisms, and training approaches differ in notable ways.

In the United States, plumbing apprenticeships are frequently delivered through trade unions, most prominently the United Association (UA), and are administered by Joint Apprenticeship and Training Committees (JATCs). These programs are jointly funded by unions and signatory employers through collective bargaining agreements, ensuring that apprentices receive **tuition-free training** while earning a progressive wage throughout their education. Apprentices are considered employees from the outset, combining paid on-the-job experience with structured classroom instruction over a four to five-year period. Admission typically requires a high school diploma or GED, along with demonstrated proficiency in mathematics and mechanical reasoning. Most programs stipulate a minimum entry age of 18, reflecting safety regulations within the construction industry. Upon completion, apprentices achieve journeyman certification, which is recognised nationwide.

In contrast, plumbing apprenticeships in the United Kingdom are primarily coordinated by employers, further education colleges, and approved training providers, operating under frameworks established by the Institute for Apprenticeships and Technical Education (IfATE) and accredited by awarding bodies. These programs are largely publicly funded through the Education and Skills Funding Agency (ESFA). Large employers finance training via the Apprenticeship Levy, while smaller employers typically contribute a modest percentage of the overall cost, with the government covering the remainder. Applicants are generally required to hold a minimum of five GCSEs, including English and Mathematics, and apprentices may begin training at age 16.

UK plumbing apprenticeships typically span four years, integrating workplace training with academic study on a day-release basis. However, the scope of training differs from that of the U.S. model: UK apprentices primarily acquire the theoretical knowledge necessary to recognise and understand systems such as underground waste pipework, while specialist trades—trained and qualified specifically for those tasks—undertake the practical installation work.

Despite these structural differences, both systems share a commitment to technical excellence, public safety, and end-user welfare. Each framework reflects the broader educational and regulatory environments of its respective country, yet both ensure that plumbing professionals are well-prepared to uphold modern standards of quality, efficiency, and safety within the built environment.

2. Sustainability Practices

It was encouraging to see that, where possible, most of the training centers incorporated rainwater harvesting systems (RWHs), solar power, and solar-heated water systems within their buildings. These systems not only supported sustainable operation but also served as valuable teaching aids to reinforce learning. The program also emphasised techniques for water conservation and the adoption of energy-efficient plumbing technologies.

3. Instructor Development

The program showcased a range of approaches to curriculum design, assessment, and mentoring aimed at supporting apprentice success. I observed the use of diverse teaching strategies, including collaborative methods such as the jigsaw technique, alongside the integration of educational theories and case studies to enhance understanding and engagement.

In the United States, plumbing instructors undertake an in-depth training program to ensure that the next generation of tradespeople are educated to the highest standards. Instructor training is a mandatory and ongoing part of their professional role, culminating in significant achievements such as graduation after completing a set number of training hours over several years.

In the United States, fifth-year plumbing apprentices within the United Association (UA) who demonstrate exceptional technical proficiency, leadership, and communication skills may be selected to participate in the UA Instructor Training Program. This prestigious initiative prepares experienced apprentices to transition into educational roles, equipping them with the pedagogical knowledge and teaching methodologies required to deliver high-quality training within union-affiliated apprenticeship programs. Selection for this pathway reflects both professional excellence and a commitment to advancing the trade through education and mentorship.

Conclusion

The WPC-UA Instructor Training Program was a transformative experience. I built lifelong friendships and professional contacts that will continue to support my development as a plumbing tutor. These connections will allow for future collaboration — including virtual classroom exchanges between American and British students — to share teaching approaches, trade experiences, and broaden understanding of plumbing design and installation on an international scale.

This opportunity also helped me grow personally and professionally as a teacher. It strengthened my confidence and reinforced my acceptance as a female educator in what remains a largely male-dominated field. It was heartwarming to see that in the United States, female plumbers and tutors are treated with genuine respect and regarded as equal — if not more highly valued — within the trade.

I sincerely thank the WPC and UA for this invaluable opportunity.

(Tom Bigley, Lucy Mawer, Mark McManus, Raymond Boyd)

(Tom Bigley, Lucy Mawer)

(Lucy Mawer addressing UA officials and upcoming plumbing tutors and Mark McManus)

(Paddy Kavanagh, Tom Bigley, Lucy Mawer, Shayne La Combre)

(Lucy Mawer, Raymond Boyd)

WORLD PLUMBING COUNCIL