



MODERN PIPE WITH AN ANCIENT HERITAGE

CLAY PIPE INDUSTRY MARKS MILESTONE AMIDST RESURGENCE

By Jim Rush

WHILE TRENCHLESS TECHNOLOGY

is generally considered to be a relatively new phenomenon – the first CIPP and HDD installations are less than 50 years old – some parts of the industry trace their roots back farther. Tunneling for civil purposes, for example, dates back to ancient civilizations in Persia, Greece, and Rome.

Similarly, clay pipe has a history that goes back millennia, with the earliest known example coming from Babylonia in 4,000 BC, according to sewerhistory.org. And, like tunneling, clay pipes play a key role in our underground infrastructure systems today. Also similar is the fact that the clay pipe manufacturing process has

continued to evolve into a modern, engineered product designed to meet the exacting demands of sewer system operators.

The clay sewer pipe industry in the United States dates back to 1815 with installations in Washington, D.C. In 1849, the first domestic clay pipe manufacturing facility was established in Middlebury, Ohio. In the years that followed, cities across the country began laying pipe systems to convey sewage away from populated areas.

Around the turn of the 20th century, it was recognized that sewer pipe standards were needed; size, strength, quality and installation methods varied widely from location to location. As a result, an ASTM Committee was

formed for clay sewer pipes. Eventually, this led to the publication of Standard C13 on the Manufacture of Clay Pipe in 1917 (which is now incorporated into ASTM C700).

That same year, the Clay Products Association was formed with the merger of the International Clay Products Bureau and the Society of Vitrified Clay Pipe Manufacturers. That organization – now known as the National Clay Pipe Institute – is celebrating its 100th anniversary amidst a resurgence of vitrified clay as a preferred gravity sanitary sewer pipe.

BACKGROUND AND ROLE OF NCPI

In the aftermath of the publication of the first standard, it was recognized

that improvements were needed regarding clay pipe manufacturing and installation. This was especially apparent as the construction of wastewater treatment plants proliferated in the second half of the 1900s. Previously, sewer systems relied on a combination of infiltration and rain water to periodically flush the system. In the treatment plant era, however, infiltration was not only no longer useful, but a detriment.

Enter NCPI. In the mid-1950s, NCPI began the development and testing of leak-free, flexible compression joints. In the past, clay pipe was manufactured without joints and joined in the field using hot pour asphalt or cement mortar.

Testing began at the NCPI lab in Chicago, where staff experimented with different jointing systems. Part of the testing regimen included burying the pipes in proximity to root-intrusive plants to test for effective against roots in addition to infiltration. By the late 1950s, some clay pipe manufacturers were producing factory-applied, leak-free flexible compression joints. By the early 1970s, these jointing systems were standard for most clay pipe producers.

“It was a result of NCPI’s testing that brought the jointing systems for clay pipes to where they are today,” said Dick Brandt, CEO of The Logan Clay Products Co. and chairman of the board for NCPI. “Over the years, NCPI

has been a place for all of the clay pipe manufacturers to come together and share technical information. A lot of the advancements that have occurred in the industry are a result of the NCPI and its staff. As manufacturers, we all do things a little differently, but it is all based on the principles developed by NCPI and shared with its member companies.”

Following the development of the leak-free, factory-applied joint, the next major endeavor for NCPI was the development of a method to ensure the effectiveness of the installed piping system. Working in concert with the Bay Area Committee on Air Testing in California, NCPI’s efforts led to the creation of a new testing standard

120 YEARS OF SERVICE & GOOD AS NEW

In the spring of 2016 the City of Minneapolis was upsizing an existing sanitary sewer pipeline to add capacity. The old line was a 12-in. diameter pipe manufactured by the Red Wing Sewer Pipe Co. in Red Wing, Minnesota, installed and in-service since 1896.

The contractor, Minger Construction, retrieved several of the existing 12-in. by 3-ft long pipe sections from a jacking shaft located at the corner of 12th and Nicollet Avenues.

A few sections of pipe were tested by The Logan Clay Products Co. in Logan, Ohio.

The 120-year-old pipe, manufactured and installed 20 years prior to the first ASTM governing standard, tested 42 percent above the minimum bearing strength first introduced in 1917.

The 1896 clay pipe was in condition to serve another 120-years.

The Bottom Line: Vitrified Clay Pipe (as a fired ceramic) doesn't degrade with time – Vitrified Clay Pipe, properly installed, will serve a community for centuries.

Clay Pipe Standards & Practice Timeline 1896 - 2016

1896	12-in. Sanitary pipeline installed. - No design specifications - No bearing strength standards - No installation standards
1917	ASTM C13 introduced for Standard Strength (SS) Clay Pipe: 12-in. Minimum Bearing Strength 1,200 lbs/LF
After 120 years of service	12-in. pipe tested -Actual Bearing Strength 1,700 lbs/lf
2016	Current bearing strength standards (per ASTM C700) -12-in. Vitrified Clay Pipe -Extra Strength (ES) 2,600 lbs/LF

using low-pressure air to verify structural integrity and/or isolate and correct potential problems.

Further research involved testing bedding materials and methods to assure the longevity of the installed piping systems, as well as the manufacturing process with regards to quality control in the raw materials and manufacturing process.

“Over the years, there have been a series of small changes in the clay pipe industry, but when you take them in their totality, they are pretty dramatic changes,” said Brandt, whose grandfather started with Logan Clay in the

1930s and purchased it in the 1950s. Brandt himself joined the company in 1968. “When I got involved in the business in the 1960s, we were still making some pipe on steam presses and extruders were just becoming commonplace at the time.

“Additionally, we are using better and better vacuum systems to remove entrapped air from the clay mixture, which results in a denser, stronger product. Finally, there are computer-controlled, gas-fired kilns that are much more precise than the coal-fired kilns that were used up until about the 1960s. We are able to know much

more about the process, maximize the product's strength and minimize the amount of time it takes to fire it.”

CURRENT ACTIVITIES OF NCPI

While clay pipe has a long history with a proven track record, NCPI and its members oftentimes find themselves fighting dated stereotypes regarding the performance of clay pipe – namely that the joints leak. Hence, education is among the key initiatives of the institute.

“It really wasn't until after the passage of the Clean Water Act in 1972 that the use of factory-applied, leak-free flexible joints with clay pipe became commonplace,” said NCPI president Jeff Boschert. “Prior to that, much of the pipe being installed didn't have a leak-free joint and, as a result, there is still a mentality in some areas that clay pipe leaks. Many owners and engineers are not aware of the changes that have occurred in clay pipe production over the last 50 to 60 years.”

Boschert spends much of his time working on educational outreach, speaking to contractors, consultants, owners and inspectors on topics including installation practices, comparison of sewer pipe materials, trenchless installation methods and maintenance. The outreach occurs in cities throughout the country, as well as national conventions like the NAS-PTT No-Dig Show and the UESI/ASCE Pipelines Conference.

NCPCI was, however, founded on the basis of research, and that research continues. NCPI is currently testing haunching techniques for circumferential barrel support of clay pipe.

“NCPI is a fantastic technical resource,” said Rudy Brandt, Dick Brandt's son and current president of Logan Clay. “We see situations all the time where people have questions about the pipe or the bedding, and we rely on NCPI to provide the best answer.”

IMPACT OF TRENCHLESS TECHNOLOGY

The manufacture and use of clay pipe is on the rise in the United States, and trenchless technology has certainly played a role in its growth, according to Boschert. Clay pipe is

commonly used in conjunction with the pilot tube method of guided boring, which has increased in popularity over the last decade or so.

“Trenchless technology has really helped the clay pipe industry,” said Boschert, who initially joined NCPI as a trenchless specialist in 2004. “The pilot tube method is something new and different that attracts people's attention. And when they actually use it, they are not only impressed by the technology, but also by the clay jacking pipe. It gives people who otherwise might not consider using clay pipe a chance to see the benefits.”

Clay jacking pipe for trenchless installations are equipped with a specially manufactured flush jointing system comprising a stainless steel collar and rubber gaskets on machined pipe ends. There are also no bells on the jacking pipe, allowing for smoother installation during the jacking process.

The uptick in the trenchless market led Logan Clay to acquire the No-Dig pipe brand. “We have seen an in-

crease in the trenchless market and we see that trend continuing,” said Dick Brandt. “The trenchless market is also important in that it allows us to demonstrate how our product compares favorably with any of our competitors.”

LOOKING AHEAD

The history of clay pipe in the United States has had an interesting trajectory, going from being the predominant market leader to almost an afterthought. In fact, Boschert, a civil engineer who started his career in the transportation sector, said he was surprised to learn that clay pipe was still being made prior to his joining NCPI. Now, the use of clay pipe is once again on the rise.

“Right now the market is booming,” Boschert said. “Jurisdictions that haven't used clay pipe for years are now starting to include clay pipe in their specifications – both for open-trench and trenchless projects.”

He said that owners are drawn to the pipe's longevity, corrosion resis-

tance, ability to withstand both hydro and mechanical cleaning methods, and the fact that clay pipe does not change over time. He added that five of the largest six cities in the United States (New York, Los Angeles, Chicago, Philadelphia and Phoenix) specify and use clay pipe for gravity sanitary sewer projects.

As an indication of the growing popularity of clay pipe, Logan Clay recently built a new kiln at its Logan, Ohio, facility to expand its production capabilities. And Dick Brandt sees no slowdown in the future.

“I think the trend toward clay pipe will continue, especially as cities are developing asset management plans that evaluate the life expectancy and life-cycle costs,” he said. “With the advancements of clay pipe over the years, you have leak-free piping system with ceramic material properties unaffected by time that will last for 200 years and more.”

Jim Rush is editor of *Trenchless Technology*.



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