McWane Ductile
Dear Readers,

Thank you again for receiving us this quarter. We hope all of you are having a happy, safe, and enjoyable summer. This time of year brings us outdoors to enjoy activities such as backyard family barbecues, fireworks, and days at the beach that we can’t enjoy other times of the year.

Summer also brings the onslaught of hurricane season. Our first storm of the year, Arthur, created much attention, although thankfully visited very briefly. It did, however, show some of the benefits of using McWane Ductile Iron Pipe, most notably ductile iron pipe’s ability to stay where a utility buries it. Hurricanes bring storm surges, resulting in unusually high water levels. Some piping materials, like HDPE, are less dense than water and, therefore, are prone to floating. In buried installations, this may not seem to be a concern; however, high water levels in saturated sandy environments create the potential for HDPE pipe to float out of the location where it was buried. The next time you see a report from a flooded area, look for a ribbon of HDPE pipe sprawled across the roadway. If you see one, you’ll know how it got there.

June, besides bringing the start of hurricane season, also brings water works professionals together from across the world at AWWA’s Annual Conference and Exhibition. For the first time in 40 years it was held in Boston, Massachusetts, and more than 11,000 people attended. Even famed basketball coach Rick Pitino of the Louisville Cardinals stopped by the McWane booth to meet, greet and talk a little basketball with our visitors. Many attendees also took some additional time to visit some of the historical sites around town, but few realized the historic significance of Boston’s water system. Through the diligent effort and foresight of its past and current staff, Boston has used primarily iron pipe since it stopped using wood pipe nearly 200 years ago. This foresight has allowed the Boston Water and Sewer Commission to manage and maintain a major utility system that averages fewer than 40 main breaks a year, in spite of still having pipes in service dating back to 1848 — that’s well over 150 years! This is certainly a service record that most utilities half its size would envy. In fact, some utilities have 40 breaks a month, or even a week, because they use cheap, inferior pipe materials like PVC and HDPE.

So, while many of our readers are in the midst of their busiest time of year, installing many miles of McWane Ductile Iron Pipe, we want to offer our thanks for your support and reassure you that we’re at your service now and for generations to come. A contractor popularized on television by the name of Mike Holmes has a saying: “Do it right the first time.” We have a similar saying: “Do it right — do it Ductile.”

Mark Niewodowski
National Manager
Marketing & Specifications Department
McWane Ductile
Design

The design basis behind ductile iron pipe is the most conservative of products on the market today. Decades of reliable service provide evidence of ductile iron’s success. Design calculations are found in the ANSI/AWWA C151/A21.51 standard design for ductile iron pipe. The most notable difference is the safety factor. The safety factor for ductile iron pipe is 2.0, while the safety factor for steel ranges from 1.33 to 2.0, depending on the percent of yield strength used.

Initial consideration for a project involves determining the best product for the job. Upon weighing all the factors, we can all certainly agree that ductile iron is the best overall choice for water utility projects.

DUCTILE VS. STEEL: MAKING THE BEST CHOICE

By: Jerry Regula, National Product Engineer, McWane Ductile

DUCTILE IRON

HOOP STRESS EQUATION:

\[ T = \frac{F_s (P_w + P_s) (D)}{2S} \]

Where
- \( T \): pipe wall thickness
- \( F_s \): factor of safety (2)
- \( P_w \): working pressure, psi
- \( P_s \): surge pressure, psi
- \( D \): outside diameter in inches
- \( S \): specified minimum yield strength ductile iron 42,000 psi

STEEL

HOOP STRESS EQUATION:

\[ T = \frac{(P_w) (D)}{2S} \]

OR

\[ T = \frac{(P_w + P_s) (D)}{2S} \]

Where
- \( S \): allowable stress, psi
  - 50% yield strength of steel
  - 75% yield strength of steel
Notice the two different equations used to calculate thickness design. Allowing the stress to escalate to 75 percent of yield strength, in effect, lowers the safety factor of steel pipe to 1.33 when including surge. Compare that to the 2.0 safety factor used in the ductile iron pipe design. The difference in percentages of yield affect the thickness design of the pipe. Let’s stay with the more conservative, trustworthy calculations.

Look at this from another angle. We have a 24-inch water line with a working pressure of 150 psi.

**LET’S TALK CASH**

**DUCTILE IRON PIPE IS A PRODUCT THAT PROVIDES A COST-EFFECTIVE TRANSMISSION LINE OVER ALTERNATIVE PRODUCTS. THE CHART IS AN EXAMPLE USING A 24-INCH LINE AT 2,000 FEET OPERATING 24 HOURS PER DAY.**

<table>
<thead>
<tr>
<th></th>
<th>Ductile</th>
<th>Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Rating (PSI)</td>
<td>350</td>
<td>150</td>
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<tr>
<td>Actual ID (Inches)</td>
<td>24.95</td>
<td>22.94</td>
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<tr>
<td>Flow Rate (Gallons/Min)</td>
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<td>7620</td>
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<tr>
<td>Velocity (Feet/Second)</td>
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<td>5.9</td>
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<tr>
<td>Unit Head Loss (Ft/1,000 ft)</td>
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<td>9.09</td>
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<tr>
<td>Total Head Loss (Feet)</td>
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<td>8.09</td>
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<tr>
<td>Annual Pumping Cost ($/Yr)</td>
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<td>14,540.23</td>
</tr>
<tr>
<td>Annual Savings</td>
<td></td>
<td>$7361</td>
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</table>

**LET’S TALK CASH**

Everyone would like to see a return on investment, and this annual savings could be put to good use. Ductile iron pipe is also SMaRT certified. With as much as 95 percent recycled materials, using ductile iron is a benefit to our environment. Ductile iron also has no expiration, which basically means that when replaced it can be recycled over and over again.

**CORROSION AND PROTECTION**

Ductile iron pipe is unique when it comes to corrosion control. An oxide layer is formed on the inside and the outside of all ductile iron pipes during the manufacturing process. This oxide layer provides adequate corrosion protection in many circumstances. Utilization of the 10 Point Soil System will determine if there is a need for additional corrosion protection. The next step in corrosion protection for ductile iron pipe is polyethylene encasement, also known as V-Bio.

Bonding three layers of co-extruded linear low-density polyethylene into one forms V-Bio. The inside surface contains an anti-microbial biocide to control microbiologically influenced corrosion, and a volatile corrosion inhibitor to control galvanic corrosion. V-Bio is quite easy to install in the field prior to pipe installation. Much like ductile iron pipe, V-Bio can be installed in virtually any weather condition. No other product on the market compares. Polyethylene encasement has proven to control corrosion in aggressive soils for more than 50 years. In addition, it is very cost effective. The cost for V-Bio is minimal as compared
to the overall cost of the project, especially when compared to the vastly more expensive alternative bonded coatings used by the steel pipe industry. Not to mention the even more expensive costs associated with cathodic protection, which is widely used in conjunction with steel. In general, the bonded coatings that are used to protect steel pipe are very expensive. Other issues that plague bonded coatings are handling and patching. The thin wall of steel pipe may have insufficient beam strength to support its own weight, which makes handling somewhat challenging. It is difficult to handle a section of steel pipe throughout installation without experiencing some type of damage to the bonded coatings. Any void in a bonded coating greatly increases the potential for corrosion. Therefore, these voids must be repaired. Contractors do not have the luxury of waiting until the sun shines to get the job done. Time is money, and these folks need a product that is durable and easy to use, such as ductile iron pipe. Some steel pipes have cement mortar coatings, which are porous and subject to cracking. Again, any void in the coatings increases the potential for corrosion of steel pipe.

**ADDITIONAL CATHODIC PROTECTION ISSUES**

Cathodic protection is rarely required and/or used with ductile iron pipe. Steel pipe, on the other hand, is more reliant on cathodic protection. Ductile iron pipe joints are discontinuous, which helps to isolate corrosion cells to one piece of pipe. Contrarily, steel joints are continuous, which increases the potential for electrolysis and, therefore, the need for cathodic protection. Cathodic protection systems also require maintenance. In comparison, while the use of ductile iron pipe provides an opportunity to save money in the future, the use of steel pipe increases pumping and maintenance costs.

**INSTALLATION FACTORS**

Whether it’s rain, sleet, snow, heat, or freezing temperatures, ductile iron pipe can handle them all. Let’s look at a scenario: It is 3:00 p.m. on a Friday afternoon, and Eric’s daughter is pitching in the league championship game at 5:00 p.m. Eric’s boss would like to get one more joint of 24-inch steel pipe installed. Great! That is going to take Eric approximately 90 minutes to weld. Eric gets halfway through the weld, and it starts to rain.
Rain + weld + daughter’s softball game = one unhappy situation

Fortunately, we have a solution. Switch the steel to ductile iron pipe. Eric is thankful that the engineer specified ductile iron pipe. It is still raining, but Eric installs four joints of 24-inch ductile iron pipe before 4:00 p.m. and makes it to the softball game. Eric knows that the job wasn’t rushed and will function under pressure.

Happy boss + happy daughter = happy Eric

Additionally, ductile iron pipe joints come in 18- and 20-foot lengths, which are much easier to handle in the field than 40- to 50-foot steel joints. Do the math: four joints of 24-inch ductile per hour equals 72 feet versus one joint of steel at 40 feet.

The 18-foot ductile iron joints also provide a better opportunity for deflection, reducing the number of fittings. Here is another example of the use of ductile iron reducing the overall cost of a project. Ductile iron is also great for horizontal directional drilling. The 18-foot joints provide a small radius to go over, under, or around obstacles. Puller heads are also provided from the manufacturer to ease the pulling of the pipe.

The combination of outstanding restraint with the ability to move with thermal expansion and contraction also make ductile iron, particularly TR Flex®, an outstanding choice for bridge crossings.

**SUMMARY**

Consider design, history, installation, and cost. Weigh all the facts, and I am confident we will all agree. When it matters, use ductile iron. When does it matter? Always.
Pacific States and its sister company, Tyler Union, answered the call for donations for the final phase of the USS Iowa’s permanent home at the Los Angeles Harbor. We would like to offer a special thank you to Ferreira Construction for this tricky installation. The USS Iowa, also known as the Battle Ship of Presidents, hosted an array of high-profile passengers, including President Franklin Delano Roosevelt, President George W. Bush, President Ronald Reagan, and First Lady Nancy Reagan, along with numerous other dignitaries during nearly 50 years of service.
McWANE DUCTILE PROJECT PROFILES

NORTHEAST — ATLANTIC STATES

Sales Representative: Jeff Houser
Project Location: Whitney Avenue, Hamden, CT
Project Owner/Utility: South Central Regional Water Authority
Project Engineer: Lenard Engineering — Glastonbury, CT
Project Contractor: C.J. Fucci — New Haven, CT

Types of DIP used on the project:

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<th>Diameter</th>
<th>Joint</th>
<th>Class</th>
<th>Footage</th>
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<tr>
<td>36”</td>
<td>Tyton®</td>
<td>52</td>
<td>2400</td>
</tr>
<tr>
<td>36”</td>
<td>TR Flex®</td>
<td>52</td>
<td>1800</td>
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OBSTACLES OVERCOME DURING WATER MAIN UPGRADE

South Central Connecticut Regional Water Authority determined that the water main along the Whitney Avenue area required upgrading. Lenard Engineering provided the pipeline modeling, design and construction supervision. As contractor on the job, the folks at C.J. Fucci handled the main installation.

In the process, the crew came upon a few tricky obstacles. The installation was along a very busy state highway that has construction limits on hours worked. The law stipulates that roadway lane closures may begin at 9:00 a.m. and that cleanup must be completed by 3:00 p.m., at which time the crew must be off the road.

Gene Zwicharowski and his crew at C.J. Fucci took the limitations in stride and were up to the challenge. In fact, they took proactive steps in order to ensure their group was prepared well ahead of start time. Doing so allowed maximum productivity during such tight time frames. At present, the project is nearing completion, with no product issues to date.
COMMUNITIES COLLABORATE TO REROUTE WATER SUPPLY

This Michigan-based project is comprised of five different parts: two water main projects, a water tower, a connection to a treatment plant, and a pump station. McWane’s involvement is focused largely on the effort to deliver water to Fruitport and Fruitport Township. A collaborative effort between the two communities, the finished project will change the water supplier from Muskegon Heights to the city of Muskegon.

Subsequent to the completion of this project, the original water line will be left in service. It will then serve as a backup to the newly installed water line. The pipe was provided with cable bond conductivity straps.

Joel and Jesse McCormick own the project contractor, McCormick Sand. McCormick has been in the underground construction business since 2002 and presently has 16 employees. David VanderMolen, P.E., is the estimator and project manager on the job. We are also thankful to the folks at EJ, the project distributor, for their long-term relationship with McWane, and we certainly hope to continue to expand that relationship in the future.
SOUTH — MCWANE PIPE

HIXSON UTILITY DISTRICT INTERCONNECTION WITH WALDEN’S RIDGE UTILITY DISTRICT

In May this year, McWane Pipe began work on a new collaboration between the Hixson Utility District and Walden’s Ridge Utility District in Tennessee. The need for an interconnection arose when Walden’s Ridge decided not to continue purchasing water from Tennessee American and, instead, chose to begin partnering with the Hixson Utility District.

Two weeks after McWane was selected for the project, we began shipping 10 loads of pipe weekly to Mayse Construction Company, the contractor managing labor and construction. To date, we have shipped half of the entire pipe on the project, and Mayse is currently laying it.

The first section installed, including the bore under Highway 153, was tested in early July and is now in service. Walden’s Ridge employees are pleased with the project’s progress. General Manager Ron West says, “I’m excited about this project and ready to be buying my water from Hixson Utility District.”

<table>
<thead>
<tr>
<th>Types of DIP used on the project:</th>
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<tbody>
<tr>
<td>Diameter</td>
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SOUTH — MCWANE PIPE
CLOSING THE LOOP NEAR APEX AIRPORT IN SILVERDALE, WASHINGTON

Ductile iron pipe will close a big water “loop” that has required several phases and projects over the last few years in Silverdale, Washington. A new 16-inch water main that runs parallel to the Apex Airport will service many residences in Silverdale and numerous folks throughout much of the surrounding area. In addition, the project will service the homes along the airport that are currently being serviced by two-inch and four-inch PVC pipe. The resulting ductile iron pipe will have about 20 direct service taps to the homes that you see in the pictures.

Project contractor Pacific Coast General opened its doors about three years ago, and until recently, the company had been utilizing ductile iron pipe from a different manufacturer. However, they, along with distributor HD Supply, chose to use McWane Ductile Iron Pipe on this project. This is the first project that we have received from them through HD Supply, and we appreciate Thomas Gibson’s efforts in securing it. We are both excited and thankful to be doing business with both Pacific Coast General and HD Supply on this project.

<table>
<thead>
<tr>
<th>Diameter</th>
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<th>Class</th>
<th>Footage</th>
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<tr>
<td>4”</td>
<td>Tyton®</td>
<td>51</td>
<td>562</td>
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ALEXANDRIA RENEW ENTERPRISES

The Alexandria Renew Enterprises (AlexRenew) project is an integral part of the Virginia community’s state-of-the-art nitrogen upgrade program. This project involves the construction of a Nutrient Management Facility that will reduce nitrogen levels in the roughly 13 billion gallons of wastewater that AlexRenew treats each year. Clark/US, LLC, a partnership formed by Ulliman Schutte Construction (Miamisburg, Ohio) and Clark Construction (Bethesda, Maryland) is leading the efforts on this project. One element will be the construction of an 18-million-gallon concrete tank that is approximately 30 feet below grade. The construction team will connect the new tankage to an existing wastewater plant and install an odor control system. To make the project even more beneficial for the local community, it will also include the construction of a regulation soccer field, the burying of existing electrical lines and the realigning of Hoofs Run Drive from a Chesapeake Bay resource protection area.

This high-profile project requires best efforts from both the installer and material provider to ensure a great performance. The project team decided to use a precast concrete for the tanks, which required off-site preparation of the majority of its fabricated wall pipes. Dutchland Corporation in Gap, Pennsylvania, pre-installed a portion of the items to keep the project on schedule.

One exciting result of this Alexandria Renew Enterprises project has been the kick-start of a meaningful relationship between McWane Ductile’s Treatment Plant Group and Ulliman Schutte Construction. McWane Ductile’s Treatment Plant Group looks forward to a mutually prosperous relationship with Ulliman Schutte Construction in the future. With hard work and determination, this project can become one of the many success stories for these incredibly ambitious companies. We are truly thankful to all those involved!
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- Calculate volume, tonnage, thrust restraint, energy savings and more
- Search and view sales support listings
- Submit photos and information for field support
- Watch informational videos
- Review frequently asked product and installation questions
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Go to the App Store or Google Play to download the FREE app today, or access it online at pe.mcwane.com.
Dear Ditch Doctor,

The inspector and his engineer boss out here on the pipeline I’m installing are insisting that I quick-test this waterline first with air, and then with water. I’m used to doing water testing, and the AWWA or DIPRA guidelines make it easy to follow. But this air thing has me a little worried. What should I tell them?

Sincerely,
Perplexed in Paducah

Dear Perplexed,

Tell them one word: “NO.” Or, if you feel the need to provide more clarity, tell them, “HECK NO. Not while I’m standing anywhere near here!”

It’s simple and as reliable as gravity: air is compressible and water is not. In fact, thermodynamic principles and centuries-old science tell us that both the surface tension and viscosity of water are much greater than those of air, which explains why air can escape through the tiniest of holes, where water does not. But enough of the engineering techno-babble. It’s not about the pressure involved with air or water; it’s only about what happens when each is released, especially if unplanned or not controlled. Water is incompressible, so it stores no energy, it’s just there. But air is very compressible, stores energy as it compresses, and is always looking, seeking, wanting to move things around and relieve this pressure. Think of compressed air as a large and angry mechanical spring just begging to expand. Simply put, when water drains itself from a pipeline, it goes, “goosh” and makes a puddle. When air escapes any pressurized containment it goes, “BOOM” and throws things to the heavens! Not much moves around or goes very far when a cap or other control fails against water pressure. Anybody close is just wet for a while. No big deal. People pay money for that at amusement parks! But air coming out all of a sudden will throw things through you or so far past where you’d care to go look for them, it ain’t funny.

Here’s a simple experiment: fill two balloons equally, one with air and one with water. Take a pin to each. You tell me the difference in what happens!

Stay safe out there. If you need any assistance at all, I’ve got some great friends in the business that could certainly help you out. They’re the national product engineers for the McWane Ductile companies and can be found through a simple Google search. Free of charge, they are always there to help and assist you with inspectors or engineers as well.

Sincerely,
The Ditch Doctor

Dear Ditch Doctor,

I have a buried cement-lined ductile iron pipeline in an area of the country where temperatures vary greatly. These temperature variations occur not only seasonally but often daily. The problem is that this pipeline is usually only active (supplying water) during the spring and summer months. It’s typically dry (perhaps a small level of water within sections of it) during the off months of fall and winter. Some have expressed concern that this will damage the cement lining and/or the pipe by freeze/thaw cycles and the filled/drainage nature of the system and, specifically, that the repeated wetting and drying of the lining will hurt it. Should we really be concerned? Should we use a different piping material? Please help.

Sincerely,
Concerned in Colorado

Dear Concerned,

I hate to tell you this, but you have no real concerns. Cycles of any kind do not damage or degrade ductile iron pipes. Not cycles of time, not cycles of pressure, not cycles of loading from within or upon the pipe. Heck, I’ve even seen a bicycle and a motorcycle run right into ductile iron pipes and, let me put it this way, it wasn’t pretty for either of the riders! The most common lining in standard ductile iron pipes is comprised of Portland Type II cement mortar. This is the same material used across the country and around the world as curbs, sidewalks, patios, and countless other structures of our everyday life. If this concern was valid, sidewalks that get rained upon through most spring and summer seasons would then fall apart in the other months of the year, and we know that doesn’t happen.

Just like ductile iron, Portland cement is a highly versatile and wonderfully adaptive product. And let’s not forget that even in the worst of circumstances, things like the expansion pads between sections of sidewalk offer the same protective breathing that is afforded to ductile iron pipelines, through the rubber gasket joints within it. There’s built-in help and assurance that’s not even needed! Also, if the low-level residual water streams in some of your pipe sections were to freeze, no worries. That will not affect the lining because the water is never embedded or mechanically involved with the lining itself. The water freezes, the water melts, it moves on without harming a thing. So, rest easy. My only suggestion would be to consult with the operators of your system in regards to any residual water stagnating in the down times. Not that it would hurt the pipes, but I’d bet the local pharmacy would sell a boatload of Tums or Pepto-Bismol if disinfection wasn’t proper each springtime!

Sincerely,
The Ditch Doctor
With unparalleled strength and flexibility, the TR Flex® system is the perfect choice for utilities, engineers and contractors.

The TR Flex® system features:

- Boltless restraint
- Easy installation
- Single source manufacturing for pipe and fittings
- Industry-wide standardization and compatibility

For more information, check out www.mcwane.com.

TR FLEX® is a registered trademark of US Pipe & Foundry Co.

For Generations

MCWANE CAST IRON PIPE CO.
1201 Vanderbilt Road
Birmingham, AL 35234

[FIRST NAME] [LAST NAME]
[ADDRESS1]
[ADDRESS2]
[CITY], [STATE] [ZIP]