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Conservation through Proper Pipe Installation

The Longevity of Concrete Pressure Pipe and the Proper Installation Methods to Achieve It

By Rick Deremiah — Oct 07, 2013

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Water conservation discussions often center on strategies for using less water, particularly at point of use. But another element to consider is the often-unseen wastefulness that can come from pipes that fail prematurely, leading to leaks or ruptures requiring early replacement.

Records indicate there are concrete pressure pipes of 80 years old or more in the ground today and still performing well; this longevity makes them an ideal, reliable option for a range of municipal water and wastewater projects. But, like any building material, longevity and performance — and therefore unnecessary loss of water — rely not just on a quality product, but also on proper installation. Lack of planning, improper handling or skipped steps can lead to problems down the road. It's important for contractors to follow manufacturer recommendations, utilize proper handling and storage techniques, and



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monitor and inspect pipes at every stage. In addition, active involvement and supervision by project managers is a must.

Pre-Installation

As with any project, successful concrete pressure pipe installation begins well before the pipes even arrive on site. This can be done with proper design planning, team communication, accurate surveying and product understanding. Here are the key steps necessary to ensure the proper installation and long-term reliability of concrete pipelines:

Use knowledgeable contractors: Require contractors bidding on the job to have familiarity with installing concrete pressure pipe, with bonus points for having installed the sizes specified for the project. If such a requirement is impractical, use a pre-qualification process if possible.

Understand and follow manufacturer recommendations: At all stages, from handling procedures to jointing techniques, refer to manufacturer recommendations. Manufacturers have the best understanding of the pipes' capabilities and limitations, and they are familiar with common installation errors that can lead to problems. Seek out your manufacturer's representative for help and keep them involved at all stages of the process; they want the project to succeed for the long term as much as you do.

Provide detailed specs: Successful installation starts with a complete, detailed set of technical specs for your installing contractor. Your pipe vendor can and should assist with this process. Ensure the specs include a section that spells out, in detail, expectations for each stage of installation — how the pipe should be handled, offloaded, stored, slung, and placed in the trench; bedding details including type and compaction; how the joints go together; how errors should be reported and corrected, etc.

Offer training: Coordinate with your manufacturer to ensure installers are trained, hands-on, with the pipes they'll be installing. This is particularly essential for crews who have never worked with concrete pressure pipe or those that haven't worked with larger sizes. Hanson Pressure Pipe, for example, has a field services team that provides ongoing assistance and training throughout the installation process.

Survey accurately: Ensure the site is properly surveyed, including proper depth and proper alignment. Incorrect measurements, particularly when installations are heading to a fixed point, can lead to costly delays.

Inspect, inspect, inspect: Have a full-time inspector on site whose job is to ensure technical specs and manufacturer recommendations are being followed.

Handling and Storage

A Portland cement-rich mortar coating on the outside of concrete pressure pipe protects its steel cylinder, as well as the prestressing wire in prestressed concrete pressure pipe (L-301 and E-301) or the bar reinforcement of B-303 bar-wrapped pipe, from corrosion. It's durable and long lasting — but if damaged it can leave the steel unprotected and therefore lead to potential problems down the road. Consider these strategies to ensure the integrity of the mortar coating:

Pre-inspect: While the pipe is still on the delivery truck, give it a visual once-over for any damage during transit: Look for missing mortar, check the steel joint rings to make sure there is no damage or deformation,

Pipe Marking Wall Chart

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Free wall chart - pipe color coding standards set by ANSI and ASME

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and look for obvious circumferential or longitudinal cracks. If small cracks are found, consult with the manufacturer to determine if they need to be repaired.

Avoid chains: Wire rope cables or nylon straps are ideal materials for slinging concrete pressure pipe; chains can damage the mortar coating and must never be used.

Store pipe off the ground: Keep pipes on wooden bolsters or on sand or soil berms, ensuring they're not resting on sharp rocks or debris and to avoid them freezing to the ground. Keeping them elevated also makes it easier to pass lifting cables around the pipes.

Installation

Installing concrete pressure pipe is a straightforward process, and the material's stiffness means that it doesn't usually require special bedding or backfilling under normal conditions, unlike flexible steel or ductile iron pipe that often require bracing, extensive bedding and backfill compaction, or welding. Still, contractors should follow specified procedures for site prep and pipe placement to avoid damaging the mortar coating or jeopardizing the integrity of the joints.

Know your soil: Know the site and its geology, and consider engaging a geotechnical firm to conduct borings to analyze the existing soil. Can the excavated fill be reused as bedding and backfill? Will it need to be compacted? If the soil on site is free of rocks and debris, it may be able to be reused in the trench, but you'll need to understand the soil properties to make such a decision. The soil also should be analyzed to determine if it is corrosively aggressive toward the pipe. If so, the pipe manufacturer can supply a supplemental protective coating.

Follow bedding and backfill spec requirements: Abide by manufacturer instructions for how bedding and backfill are placed. Failing to follow instructions for the amount and type of material can affect the stability and load-carrying ability of the pipes.

Inspect the trench: Before laying the pipe, conduct a final inspection of the bedding to ensure there are no protruding rocks, organic material, or other debris.

Use care with equipment: If heavy equipment or tools strike and damage the mortar, it can affect the pipe's corrosion protection. Use care when operating heavy equipment around the pipes. If the pipe gets hit, check for damage; if the mortar appears damaged, contact your manufacturer rep about a possible repair.

Follow grouting procedures: Portland cement grout is one of the most critical aspects of pipe installation; it is poured into fabric bands secured around the joint to provide corrosion protection to the exposed portions of steel joint rings. Therefore, grout mixing and application should be done by trained personnel. Installers must follow manufacturer recommendations for the ratio of Portland cement to sand; if they use less-than-directed amounts of Portland cement to save money, it will impact the alkalinity and reduce the amount of corrosion protection around the joints.

Communicate problems: Let installers know that they can and should report potential damage to pipes. It's a lot easier — and cheaper — to inspect and repair a pipe during installation than to excavate and replace a segment a few years down the road.

With proper installation and maintenance, concrete pressure pipe is one of the longest lasting and reliable

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materials in the industry — and has thousands and thousands of existing lines to show for it. Taking the time to collaborate with your manufacturer, understand the material, install it properly and inspect work at each stage of the process will help ensure the pipes last as long as they are designed to, eliminate unnecessary material use in early replacement and avoid water waste from failures or leaks.

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