



San Francisco
Water Power Sewer
Services of the San Francisco Public Utilities Commission

SEWER SYSTEM IMPROVEMENT PROGRAM | Grey. Green. Clean.

Cured-In-Place-Pipe (CIPP) Sewer Rehabilitation

Keeping Our Sewer System in a State of Good Repair

The San Francisco Public Utilities Commission (SFPUC) operates and maintains the City's combined sewer system that operates 24/7 to protect public health and the environment. We have almost 1,000 miles of sewer mains under our streets, and approximately 30% or 300 miles of these critical sewer pipes are over 100 years old. Every year, we routinely repair or rehabilitate approximately 15 miles of sewer mains, and we partner with other City departments like SFMTA and SF Public Works as much as possible to "dig once" and upgrade our infrastructure in conjunction with their projects.

Upgrading our Sewer Pipes Under our Streets

Upgrading our infrastructure is disruptive, but the alternative is even more disruptive and expensive. The SFPUC follows standard industry practices to replace or rehabilitate aging sewers and considers the size of the sewer and potential disruption to the adjacent neighbors and businesses. The two construction methods used include:

- **Open-Cut** - As the name implies, open-cut involves opening the road surface to excavate and replace the underground pipe. In some cases, the new sewer is installed in a new location and the old sewer is either removed or filled (for structural support) and left in place. Although open-cut replacement is a good practice for smaller sized pipes this method involves extensive impacts to the road and the adjacent neighborhood.
- **Trenchless** - This method involves accessing the pipe through existing manholes or a similar access point, and the existing pipe is rehabilitated from the inside using a synthetic pipe liner. This method of rehabilitation is called Cured-In-Place-Pipe (CIPP). New pipes can also be installed using trenchless method, where a boring machine is used to bore a tunnel where new pipe is inserted. Particularly for large diameter sewers (greater than 36-inches in diameter), this method is much less disruptive.

BENEFITS OF CIPP

- Less disruption to neighbors and those using the roadway by avoiding extensive excavation and street repaving
- Reduced construction duration compared to open-cut construction method
- Less expensive than replacing the pipe
- Long-lasting with a 50-year design life

More on Cured-In-Place-Pipe (CIPP) Sewer Rehabilitation

Due to its lower cost, reduced impacts to the public and typically shorter construction duration, CIPP has become the industry standard for large sewer pipe rehabilitation. CIPP uses a resin saturated felt tube to line the inside of the existing pipe, and the most commonly used resin contains a chemical called styrene¹. When the CIPP work is completed and the resin has cured, a new pipe is formed inside the existing pipe.

A typical trenchless sewer rehabilitation project would include:

- 1. Rerouting the Wastewater Flow:** Pumps and hoses are used to re-route sewer flows, ensuring sewer service is maintained during construction.
- 2. Cleaning and Inspection:** Prior to lining the existing sewer, the pipe is cleaned using high pressure water hoses and video cameras to inspect the pipe condition.
- 3. Pipe Lining:** A flexible liner is placed into the existing sewer. Heated water is circulated into the liner, pushing the liner tightly against the existing sewer walls. The heat causes the liner material to cure, creating a new pipe within the existing sewer that is free of cracks and holes.
- 4. Lateral Connection:** Openings are cut in the new liner where existing laterals from homes and business connect to the sewer main. These connections are sealed
- 5. Ancillary work:** While the sewer main is being rehabilitated, there may be additional work to rehabilitate or replace side sewer laterals and manholes.

The actual pipe lining process typically takes two to three days to complete for each segment (approximately half of a block). The duration can depend on the size of the pipe.

What to Expect During Construction

- **Travel Lane/Parking Restrictions** - Although less disruptive than the open-cut method, trenchless work still requires access to the sewer main under the street.
- **Odors** - In some cases, the curing process can result in odors that will usually dissipate quickly. The contractor will implement construction procedures to minimize airborne styrene during CIPP work. To help reduce odors, run water in all sinks and drains to make sure p-traps are filled (p-traps are the “u” shape portion of drain pipes). Drains can also be covered with a wet towel.
- **“In-pipe” Noise** - During the pipe lining process, a humming noise called an in-pipe noise can sometimes be heard. Covering drains can help reduce this noise.

For more information on how our combined sewer system works, visit sfwater.org/sewers

¹ Styrene is a clear, colorless liquid that’s a component of materials used to make thousands of everyday products for home, school, work and play. Styrene is used in everything from food containers and packaging materials to cars, boats, computers, and video games. Derived from petroleum and natural gas by-products, styrene helps create thousands of strong, flexible and light-weight products. The styrene used in these products is manufactured synthetically in petrochemical plants. However, styrene also occurs naturally in the environment and is present in many common foods, such as coffee, strawberries, and cinnamon. For more information on styrene, visit the National Institute of [Environmental Health Sciences](#) and [Agency for Toxic Substances & Disease Registry \(ATSDR\)](#) online.



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