AOL ISTANBUL

Expert on Trenchless Pipeline Rehabilitation Technologies

YOU DECIDE !

PROBLEM or SOLUTION

www.aolistanbul.com

METHODOLOGY

Trenchless Technology of Existing Pipeline Rehabilitation. (No dig, completely Trenchless) Technology consists of 3 steps;

- Cleaning of the existing Sewer Pipelines
- Video Inspection of the Sewer Pipelines
- Trenchless Rehabilitation (PVC Alloy Pipe)

1) Cleaning of the existing pipelines (sewer pipelines and/or storm water pipelines) using a vacuum/jet capable cleaning truck.

SEWER PIPELINE CLEANING:

Sewer pipelines will be cleaned by removing grit, loose solids, rocks, roots, grease, and any construction debris that are present in the sewer pipeline using a high pressured jet & vacuum capable cleaning truck.
Cleaning will be operated & completed during the cctv inspection to reduce the impact of the natural flow within the pipeline during the process.

All debris/solid particles will be trapped at the end manhole and properly Vacuumed and hauled away when cleaning the sewer pipe segments.

AOL Istanbul crews, sewer pipeline cleaning process

AOL Istanbul crews, sewer pipeline cleaning process in Istanbul

2) Video inspection of the existing pipelines (sewer pipelines and/or storm water pipelines) using a sophisticated camera and robot system.

CCTV Pipeline Inspection

CCTV Pipeline Inspection Services is a part of our Trenchless Technologies works.
We offer general inspection services as well Pre-Construction and Post-Construction Inspection Services which are coupled with PipeLine Cleaning Services so that one can determine the exact status of any given pipe from 6" pipe to 42" pipe. We also provide push cameras for viewing service laterals and smaller pipe diameters. Our cameras can be used for a number of different applications. Furthermore, these camera inspections do not harm existing pipe lines or other confined space but will show you exactly what problems you may have with pipes or the integrity of the confined space.

AOL Istanbul offers a very high tech solution to determine if the existing sewer line or other pipes may need replacing or rehabilitation. Instead of having to completely dig up the entire pipe line just to replace a certain segments manhole to manhole), AOL Istanbul can literally inspect every single aspect of your pipes from Manhole to Manhole and determine whether a spot dig and replace is enough or whether the entire length of pipe must be rehabilitated(Trenchless Rehabilitation).

CCTV Pipeline Inspection is perfect for assessing older pipes that can fracture such as:

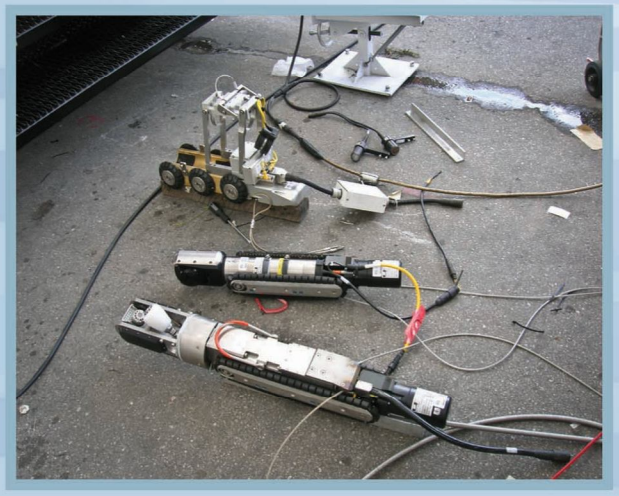
*Cast Iron *Clay *Concrete *Asbestos & Concrete *Reinforced Concrete

CCTV inspection process uses a special camera that is self-propelled to literally crawl through sewer pipeline and has an almost 360 Degree field of view. We can literally see every single inch of pipe as well as any defects which may have occurred such as bad joints, root intrusions, cracked pipe, wholes in pipe or other obstructions. We can also easily determine the existing flow line as well as the amount of debris that may be obstructing the pipe. By using a Vacuum Truck equipped with High Pressure PipeLine Cleaning Equipment, AOL Istanbul can not only clean the lines but remove any of the debris in the pipe and haul/vacuum it away.

Advantages of CCTV Inspection:

- Allows complete viewing of existing sewer pipelines
- Is completely non-invasive and no digging is required
- Preferred technology for viewing existing pipes
- Causes little or no traffic disruption
- Saves huge budgets before the sewer pipelines completely collapse and causes exflirtations.

Once the pipe has been inspected, AOL Istanbul will give you detailed reports outlining the amount of line cleaning was required, the amount of CCTV footage (in meter), as well as the number of problems that were viewed and where. With the Sonar Locator we can specifically determine where any and all service connections may be so that when replacing pipe there is the least amount of digging required either fixing or replacing existing pipes.



AOL Istanbul's Video Inspection cameras

AOL Istanbul's Video Inspection Truck

What is CCTV inspection?

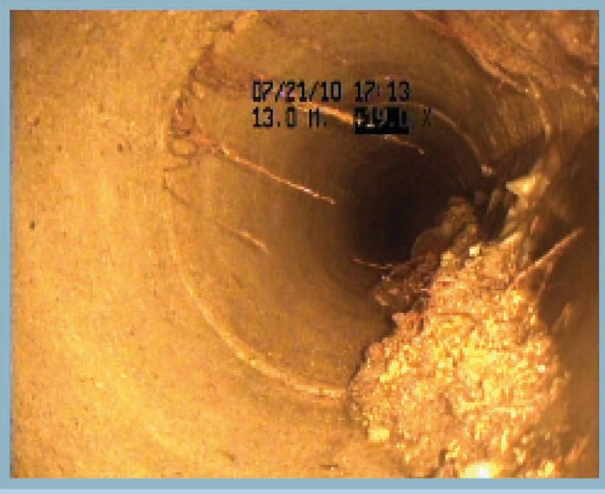
When the cause of a drainage problem at the sewer pipelines, we can insert a CCTV camera into the pipe lines to track it down. Not only does this allow us to see exactly what the problem is, but we can then give you a very accurate estimate of what it will cost to carry out any repairs. CCTV is also useful in identifying issues&problems in a drainage/sewer system before they become more serious.

What CCTV can reveal?

Fractured pipes_- Pressure from above, such as a heavy vehicle driving over the ground, can cause cracks and fractures in your drainage/sewer pipes. Untreated, these will leak contents into the soil, which could result in further damage to the pipe or even subsidence.

Collapsed drains - Can be caused by the drains being badly built in the first place or a variety of other reasons. If left, not only are blockages likely, but subsidence and environmental damage are possible.

Tree roots/Root Intrusion_- Roots seek out moisture so they can find their way through existing faults into the drains. Once the tree roots have entered the drain, other material will get caught in them, making blockages far more likely and frequent.



CCTV inspection step-by-step

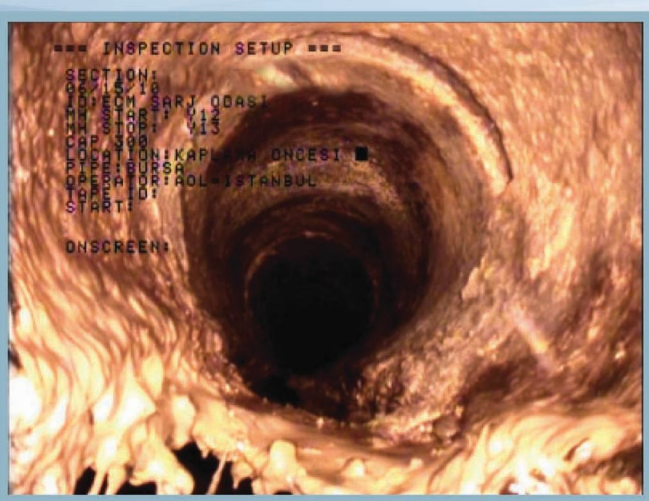
AOL Istanbul can carry out a thorough CCTV inspection with expertise. It's done in three steps,

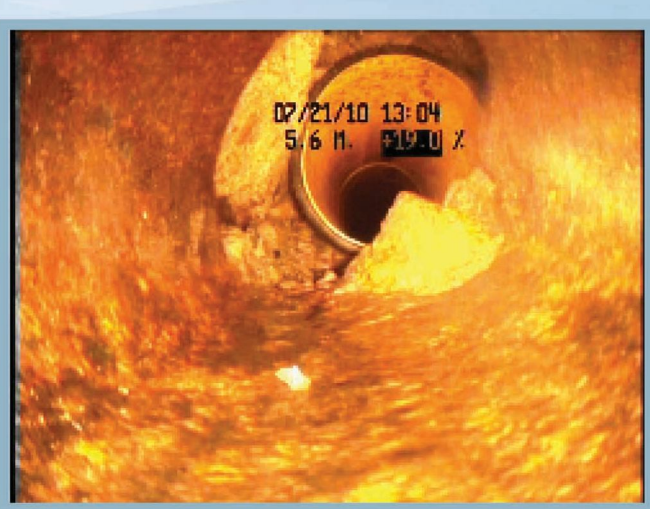
Step 1 - Getting into the drain/sewer line

We'll find an access point/manhole, from where the CCTV camera (mounted on a wheeled crawler unit) will be driven along the pipeline.

Step 2 - Taking a look

Our operator will see&capture images from the camera as it moves along the pipe on a color monitor screen. They will then log anything they see - blockages or structural defects, offset joints, root intrusions - and their location in the pipe.
All images will be recorded on a DVD and to the HDD





Step 3- Compiling our detailed reports

We give you a report of what we've found, listing problems and their location. This will come complete with photos and video, and a plan/blue print showing the location of the drain/sewer lines prepared in Auto-Cad.

3) Rehabilitation of the existing pipeline using the latest technology product PVC Alloy material.

Trenchless Rehabilitation

PVC Alloy is a term used to describe uniquely enhanced PVC material, which has been specifically engineered for use in trenchless applications. PVC Alloy have sufficient material stiffness to provide full structural integrity as well as it also has extremely high impact strength, has a high degree of dimensional stability, also it can relieve high levels of stress. PVC Alloy material will conform to size transitions, tight bends, offset joint and other irregularities. In addition to its strength, flexibility, ductility and tight fit, PVC Alloy pipe is extremely resistant to chemicals.

Ordinary thermoplastics have a 'memory' of their original, manufactured size and shape. If that 'memory is not altered or disrupted, thermoplastic pipes have a tendency to shrink back toward their original size and shape after they have been expanded.

However unique PVC Alloy compound and special installation procedure allows the 'memory' to be reset to a new, expended shape and size. As a result once properly installed PVC Alloy material will not shrink away from the host pipe.

Normally, PVC Alloy pipe is installed form one manhole to next. Typical installations only require four to five hours to pull and process the pipe. It can be also used to line/rehab extremely deteriorated pipe with minimal risk of generating a collapse.

PVC Alloy Pipe's tight fit against the irregular shape of the host/old pipe mechanically locks the liner in the place throughout its service life and thereby controls the leakage of groundwater between the host pipe and the pipeliner.

The original pipeline will be sealed, thereby stopping infiltration, exfiltration and root intrusion with a jointless, smooth pipeliner which will not degrade. The pipe will also have a renewed service life expected to exceed 50 years.

Trenchless Rehabilitation Method from AOL Istanbul
General Product Information

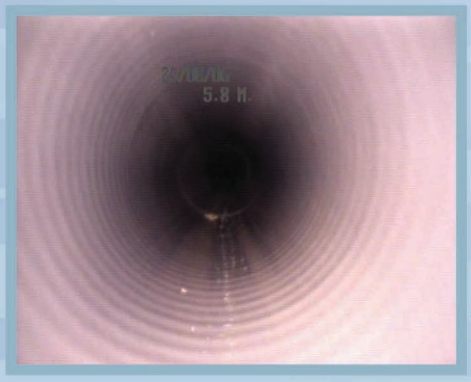
Installation of PVC Alloy Pipeliner on a highway

The Products section of our website provides information regarding the material properties, available dimensions,installation process, installation equipment, as well as the manufacturing process pertaining to PVC Alloy Pipeliners. is the only company to provide both ASTM F 1871 and F 1504 industry standard pipeliners. We encourage you to consider the differences between 's Higher Compliance [complying with ASTM F 1871] and Higher Stiffness [complying with ASTM F 1504] PVC Alloy pipeliners. is also the only company which regularly supplies fold and form PVC pipeliners in diameters from 4" (100mm) up to 32" (800mm).

"What a diffence an alloy makes in fold & form pipe"

PVC Alloy Pipeliner is the perfect pipeline rehabilitation solution for gravity and low-pressure wastewater or storm sewers and culverts.

PVC Alloy is a term used to describe 's uniquely enhanced PVC material that has been specifically engineered for use in trenchless applications. Not only does the PVC Alloy have sufficient material stiffness to provide full, independent structural integrity, but it also has extremely high impact strength, enables a high degree of dimensional stability, and can relieve high levels of stress without structurally compromising the material. The PVC Alloy material can be "thermoformed" at steam temperatures, enabling PVC Alloy Pipeliner to essentially "blow-mold" to the conformation of the host pipe. Upon "blow-molding," PVC Alloy Pipeliner will conform almost exactly to the shape of an existing pipeline, including size transitions, tight bends, offset joints, and other irregularities. PVC Alloy Pipeliner will even conform tightly to the shape of corrugated pipe.



Cut-away of corrugated pipe which has been lined with PVC Alloy Pipeliner.

In addition to its strength, flexibility, ductility, and tight fit, PVC Alloy Pipeliner is extremely resistant to chemicals and abrasion. In fact, years of laboratory tests and experience in actual installations indicate our product will not degrade in a typical sewer environment.

NO POST-INSTALLATION SHRINKAGE

An important characteristic of PVC Alloy Pipeliner is that, due to unique material and installation process, there is no significant shrinkage, neither radially nor longitudinally, after it has been installed. Therefore, it maintains its tight fit (and its ability to control groundwater migration) for the design life of the material.

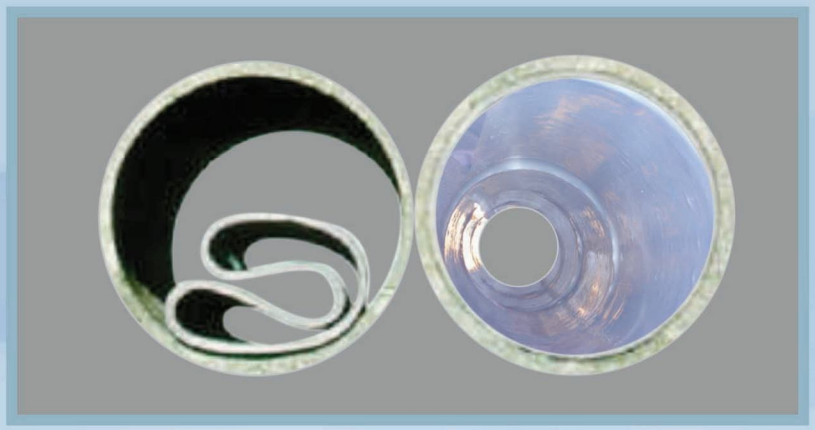
Ordinary thermoplastics have a "memory" of their original, manufactured size and shape. If that memory is not altered or disrupted, thermoplastic pipes have a tendency to shrink back towards their original size and shape after they have been expanded.

However, 's unique PVC Alloy compound and our special installation procedure allow the "memory" of PVC Alloy Pipeliner to be reset to the new, expanded shape and size. As a result, once an PVC Alloy Pipeliner has been properly installed, it will not shrink away from the host pipe.

FACTORY MANUFACTURING ASSURES CONSISTENT QUALITY

PVC Alloy Pipeliner is manufactured in a highly controlled environment.

When you specify PVC Alloy Pipeliner, you will always get the same high-quality product. Since the pipeliner is manufactured in a tightly controlled factory environment, you are assured that every foot of your new pipeliner will meet your specifications and all applicable industry standards. In fact, the only variations from one installation to the next are the ones you specify.



Prior to insertion, PVC Alloy Pipeliner is shaped into a reduced form to assist in installation. Once pulled through the pipeline, it is expanded tightly against the host pipe.

4" to 12" PVC Alloy Pipeliner is coiled in a **flat shape** and folded during insertion; whereas 15" and larger up to 32" PVC Alloy Pipeliner is coiled in an **"H" shape.**

CAREFULLY CONTROLLED INSTALLATION ASSURES PERMANENT FIT

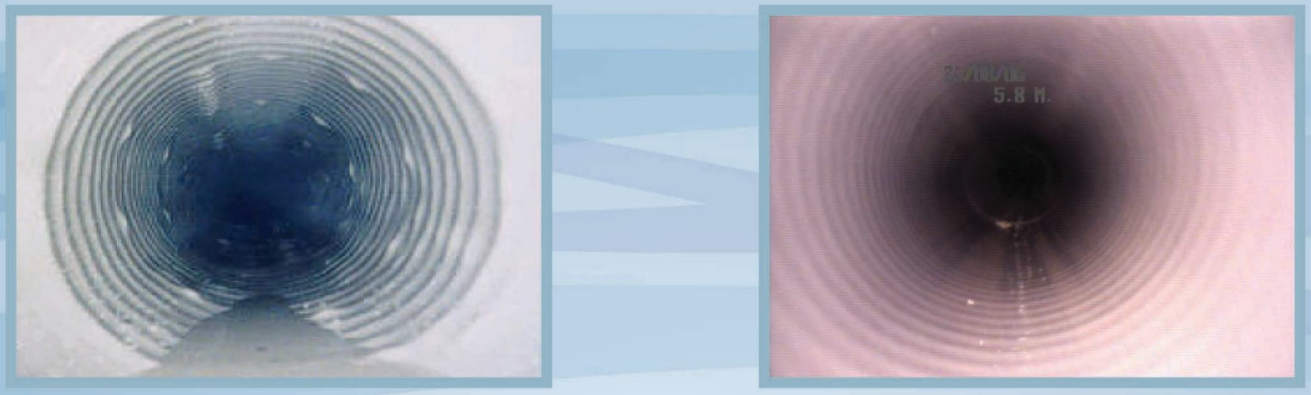
The profile of PVC Alloy Pipeliner is folded in the field with small diameter pipeliners (12" or smaller) and may be deflected to a smaller circumference at the factory during manufacturing process with the "bulkier" large diameter pipeliners (larger than 12"). This reduces the cross-sectional area of the pipe by almost half without disrupting the ability to effectively "blow mold" the pipeliner into its new memory configuration.

The reduced size, the high abrasion resistance, and the very slick surface allow PVC Alloy Pipeliner to be pulled into a pipeline through an existing access point, such as a manhole, without trauma to either the PVC Alloy Pipeliner or the host pipe. Because pipeliner is pulled along the invert without contacting the crown of the pipe,PVC Alloy Pipeliner is routinely used to line extremely crushed pipe with minimal risk of generating a collapse.

A 24" diameter installation in Bursa, Turkey

Normally, PVC Alloy Pipeliner is installed in sections of about 300 feet --- from one manhole to the next --- although installations of 8" and 10" pipeliners exceeding 1,000 continuous feet and installations of 21" and 24" pipeliners exceeding 500 continuous feet have been successfully accomplished. Typical installations only require four to five hours to pull and process the pipeliner, with additional time required to fully reinstate the service connections. Short lengths of culvert pipe, which lack service connections, are often completed in two to three hours.

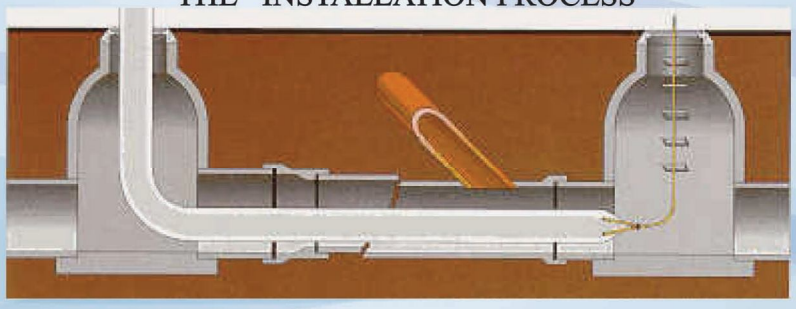
Once inserted, the pipeliner is heated sufficiently to allow the material to "relax" and to reset the PVC Alloy's "memory" to the new size and shape it has assumed. As a result, the installed PVC Alloy Pipeliner will not attempt to return to its original size or shape after it has cooled, nor will it longitudinally shrink.



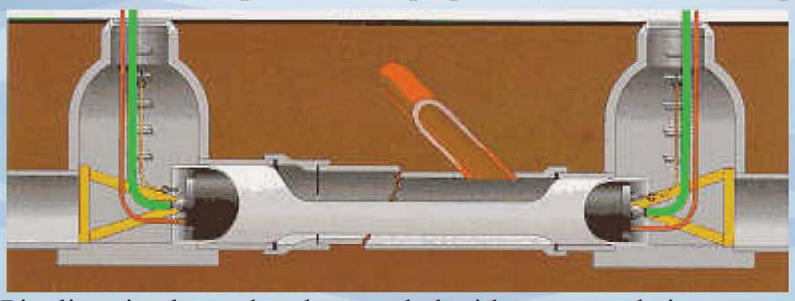
Lined Corrugated Pipe, Izmit Turkey
(the visible rivets show how tightly the pipeliner fits)

PVC Alloy Pipeliner's tight fit against the irregular shape of the host pipe mechanically locks the pipeliner in place throughout its service life and thereby controls the leakage of groundwater between the host pipe and the pipeliner.
After the pipeliner has properly cooled, pressure is relieved and the ends are trimmed at least 3 inches from the manhole walls. Lateral service lines are located and reopened using remote-controlled devices. The unique PVC Alloy material is more ductile (less brittle) and relieves stresses more readily than typical PVC compounds, thereby avoiding cracking or shattering of the pipeliner when the services are reestablished

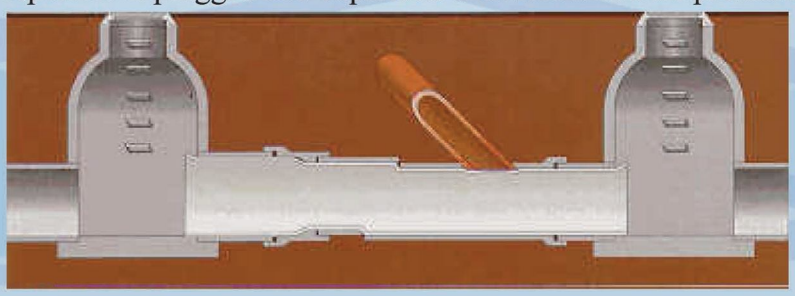
THE INSTALLATION PROCESS



PVC Alloy Pipeliner is heated & pulled into a prepared (cleaned&video inspected) host pipe.



The PVC Alloy Pipeliner is plugged and expanded with steam and air pressure and cooled down.



The PVC Alloy Pipeliner forms a permanent, tight-fitting new pipe in the existing pipe.

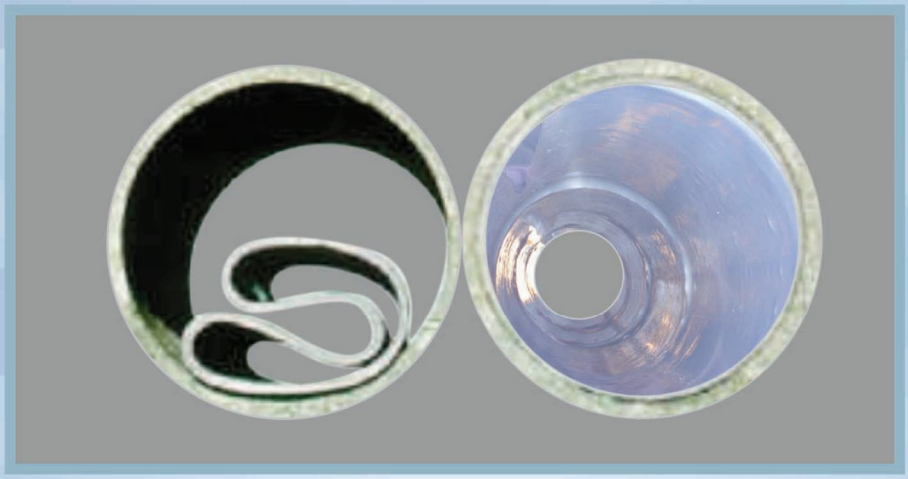
The Results

Because can be installed quickly through existing access points, there is very little or no disruption to the community. Most residents are amazed when they later learn that construction took place and the pipes have been renewed.

The original pipeline will be sealed, thereby controlling infiltration, exfiltration, and root intrusion, with a jointless, smooth pipeliner which will not degrade.

The pipe (or the existing "hole in the ground") will have a renewed service life expected to exceed 50 years.

The Installation Process



Prior to insertion, PVC Alloy Pipeliner is shaped into a reduced form to assist in installation.
Once pulled through the pipeline, it is expanded tightly against the host pipe.

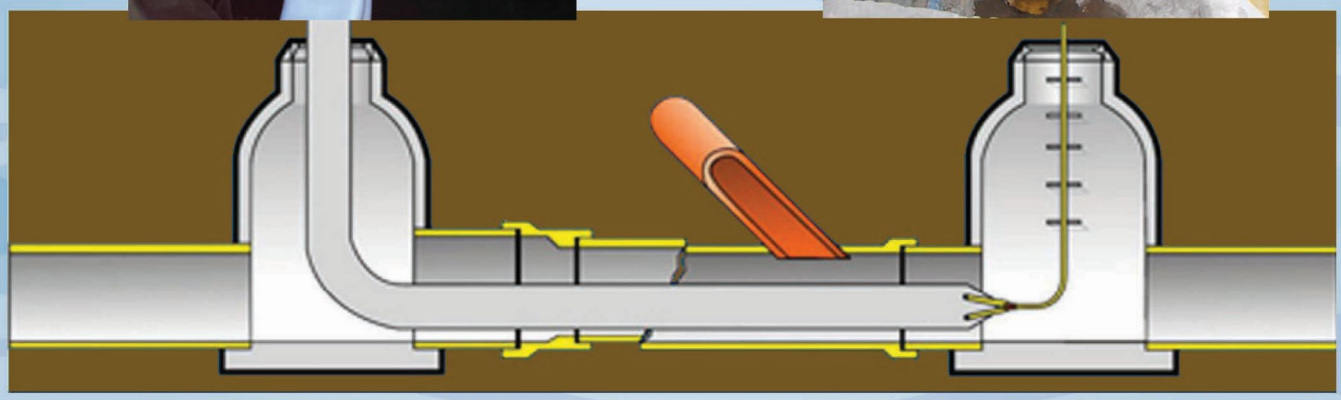
PVC Alloy Pipeliner installs quickly and easily, resulting in minimal community disruption. Typically, installing. PVC Alloy Pipeliner only requires four to five hours plus time for lateral connection reinstatement, but generally results in no sewer service disruption to home owners. Additionally, modest equipment requirements result in limited traffic disruption and minimal disturbance to private property. Furthermore, although PVC Alloy Pipeliner
is generally manufactured to order, its unique ability to conform to the host pipe dimensions will permit the use of pipeliner from inventory so that our local licensed installers can rapidly respond to your emergency needs.
is therewhen you need us, and then we're quickly out of your way.

2. The reel of PVC Alloy Pipeliner is heated with steam prior to insertion.

3. The heated PVC Alloy Pipeliner is pulled into a prepared host pipe.

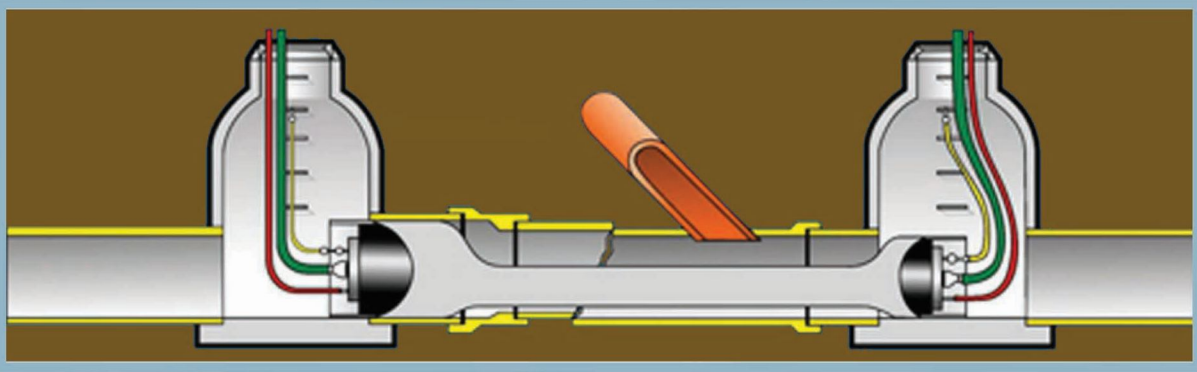
A station, where pipe is inserted

B station ,where pipe is pulled



A winch is used to pull the pipeliner off the reel and through the host pipe. The flat pipeliner is folded as it enters the host pipe, whereas the "H" shape pipeliner is already in a reduced cross-sectional area. The manufacturing and installation methods reduce the cross-sectional area of the pipeliner by almost half. The reduced size, along with PVC Alloy Pipeliner's high abrasion resistance and very slick surface, allow it to be pulled into a pipeline through an existing access point, such as a manhole, without trauma to either the pipeliner or the host pipe. The pipeliner is pulled through the host pipe at a speed of up to 40 to 50 feet per minute depending upon field conditions.Because PVC Alloy Pipeliner is pulled along the invert of the host pipe (as opposed to being inverted with 360 degree contact with the host pipe), contact with crushed sections in the crown of the pipe can be avoided, thereby reducing the risk of collapsing an extremely distressed host pipe during pipeliner insertion. [This is one of many reasons why PVC Alloy Pipeliner is the preferred choice for rehabilitation of extremely deteriorated host pipes.]

4. The PVC Alloy Pipeliner is plugged at both ends than the pipe heated with steam.



Once inserted, the upstream end is plugged tightly against the host pipe and connected to a steam hose. The pipeliner is then heated sufficiently to relax the pipeliner from the insertion pull, thereby preventing post-installation longitudinal shrinkage. After the relaxation period, the downstream end is plugged in preparation for expansion of the pipeliner.

(upstream and downstream)

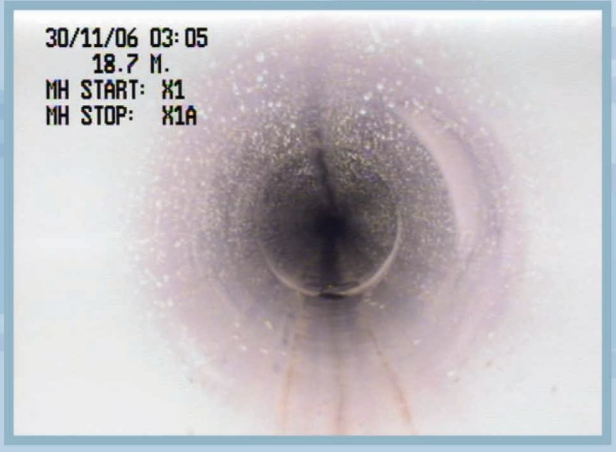
5. The PVC Alloy Pipeliner is expanded with steam and air pressure.

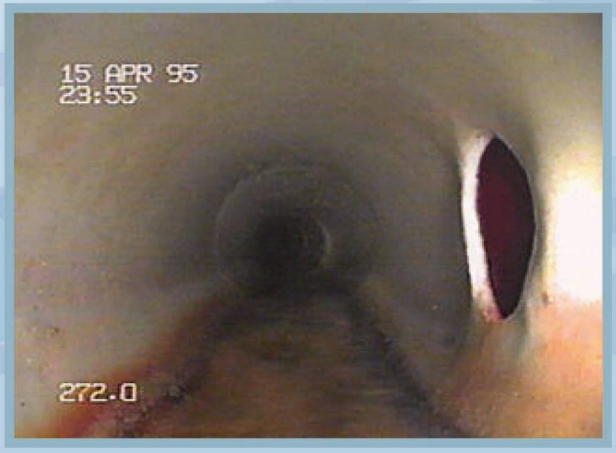
With the pipeliner plugged at both ends, the pressure and temperature can be controlled at the "B station" to properly heat and expand the pipeliner tightly against the host pipe in a thermoforming process similiar to "blow-molding."
The installation temperature, together with the radial stretching of the pipeliner, are sufficient to reset the PVC Alloy's "memory" to the new size and shape it has assumed, and to allow the material to "relax." As a result, the installed PVC Alloy Pipeliner will not attempt to return to its original size or shape after it has cooled.

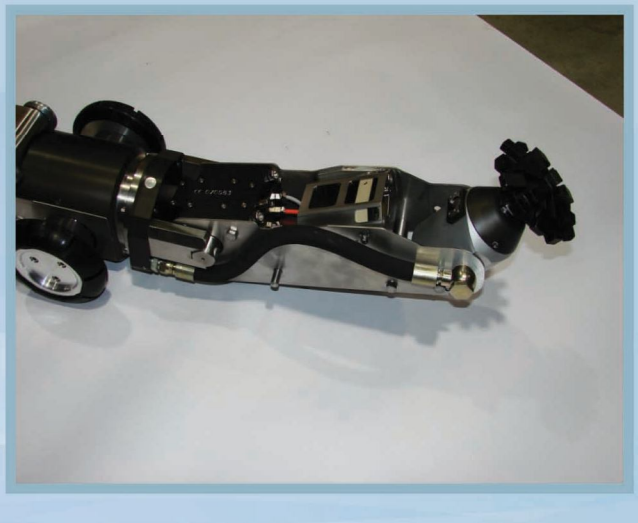
6. The PVC Alloy Pipeliner ends are trimmed.

After the pipeliner has cooled properly, pressure is relieved and the flared ends of the PVC Alloy Pipeliner are trimmed at least 3 inches from the end of the host pipe.

7. Immediately after the pipeliner has been installed, the lateral connections are robotically located and reinstated.





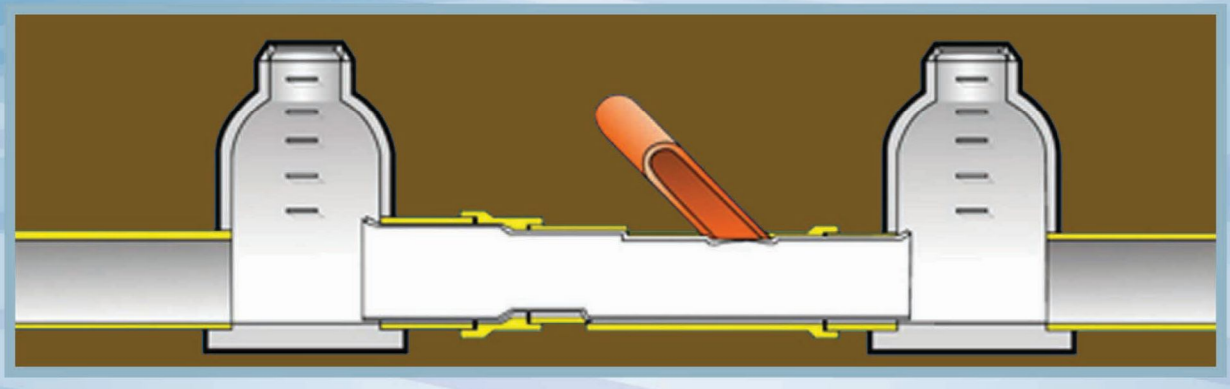


Lateral connections are located and reopened using remote-controlled cutters&robots.
The unique PVC Alloy material is more ductile (less brittle) and relieves stresses more readily than typical PVC compounds, thereby avoiding cracking or shattering of the pipeliner when the services are reestablished.

Lined Corrugated pipe
The visible rivets show how tightly the pipeliner fits

The PVC Alloy Pipeliner forms a permanent, tight-fitting new pipe.

Lined Corrugated Pipe
(the visible rivets show how tightly the pipeliner fits)



PVC Alloy Pipeliner's tight fit against the irregular shape of the host pipe mechanically locks the liner in place throughout its service life and controls the potential for groundwater migration between the host pipe and the

AOL Istanbul crews, sewer pipeline Trenchless Rehabilitation application in Istanbul

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AOL Istanbul pipeline cleaning equipments

Sewer pipeline cleaning & Video inspection

Sewer pipeline cleaning truck

Sewer pipeline cleaning truck (water jet + vacuum)

Sewer pipeline cleaning truck (Jetter)

Sewer pipeline cleaning truck (water jet + vacuum)

AOL Istanbul crews, sewer pipeline cleaning process in Istanbul

AOL Istanbul rehabilition equipment

AOL Istanbul's Video Inspection Truck #1

AOL Istanbul's Video Inspection Truck #2

AOL Istanbul's Rehabilitation Boiler Truck #1

AOL Istanbul's Rehabilitation Boiler Truck #2

AOL Istanbul's Pipe Reel Steam Truck #1

AOL Istanbul's Pipe Reel Steam Truck #2

AOL Istanbul crews, sewer pipeline Trenchless Rehabilitation application in Istanbul

AOL Istanbul video inspection cameras and robots.

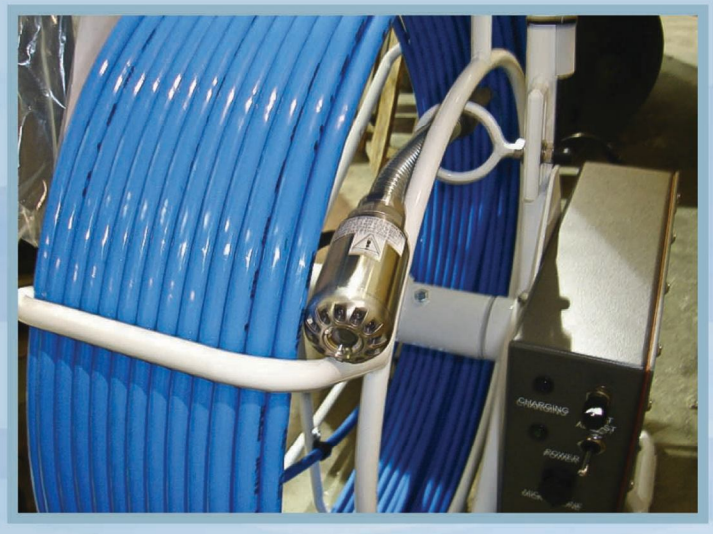
AOL Istanbul's Video Inspection Control Unit / Main Control Board

AOL Istanbul's Video Inspection camera

AOL Istanbul's Video Inspection camera

AOL Istanbul's Video Inspection cameras

AOL Istanbul's Video Inspection cameras



AOL Istanbul's Video Inspection Push Camera (Ø50mm ~ Ø200mm)

AOL Istanbul's Video Inspection Tractor Camera (Ø800mm Ø1200mm)

AOL Istanbul's Cutters&Robots for opening up the service connections

Before Rehab Video Inspection - Pipe Defects and Detoriations

Fractured concrete pipes

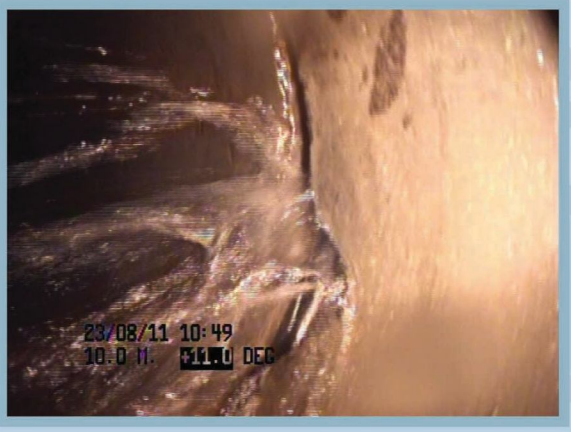
Fractured concrete pipes

Root Intrution

Grease blockages

Gas Effect

Exflitration



Inflitration

Inflitration

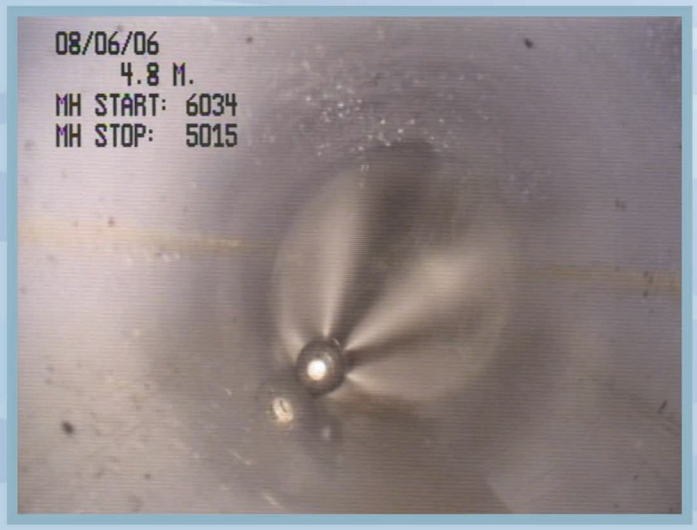
After Rehab Video Inspection

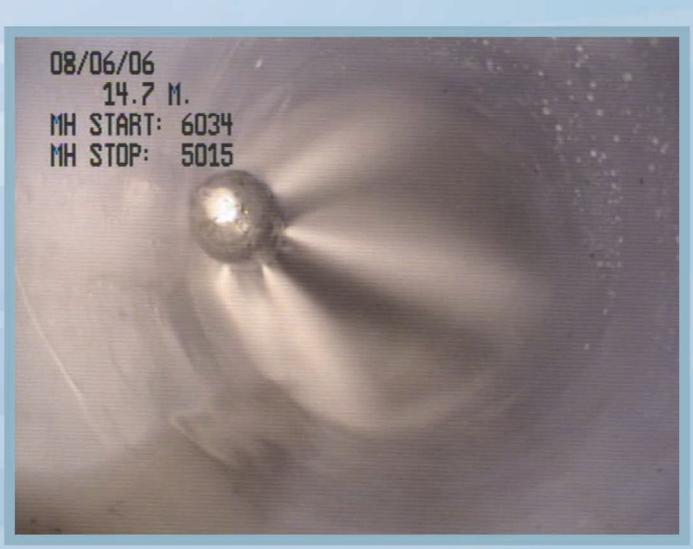
Opening up a lateral / service connection

Opened Service Connection / Lateral

Perfect Fit / New Pipe

Perfect Fit / New Pipe





Easy cleaning process / Maintance

History Preserved in Turkey

Pipe Relining Rehabs Ancient Sewer Pipes
— Feb 01, 2009 Trenchless Technology Magazine

From a Turkish perspective, the concept of aging sewer systems is relative. In Turkey, the basic concepts of modern sanitation, including indoor toilets and sewer pipe systems, date back to at least 764 BCE as evidenced in castles of the Urartu Kingdom. Almost 1,000 years later when Constantine founded Constantinople, the city was engineered with Roman cisterns and sewers thereby laying the foundation for one of the greatest cities of the world.

The sanitation systems of Constantinople enabled it to become the largest and wealthiest city of Europe throughout the Middle Ages. Today, Istanbul has become one of the largest city in the world with a population of more than 13 million. Like any major global metropolis, Istanbul relies upon its sanitation infrastructure to permit such population concentrations.

With a focus on sustainability and cost control, the Istanbul Water and Sewer Department (ISKI) commenced a master plan in 1992 to direct Istanbul's water and wastewater investment efforts through 2040. No matter how well engineered, when sewer systems age, eventually joints fail, pipes crack, roots intrude and systems must be rehabilitated or replaced to ensure continued service. However, when pipes are buried under centuries of dense urban development, access becomes more difficult than most engineers could even imagine. Such challenges are the norm in Istanbul. Whereas trenchless technology is routinely considered a valuable tool in most major cities of the world, trenchless pipe rehabilitation was recognized as absolutely invaluable to Istanbul.

The entirety of Old Town Istanbul is registered as a World Heritage Site. The very idea of tearing up centuries-old cobblestone streets seems blasphemous. Furthermore, the prospective economic impact of disrupting traffic and business operations in this center of tourism cannot be understated. ISKI was faced with tough choices and few solutions. It needed to stop the continuing degradation of its ancient sewer system, which was threatening the survival of numerous historical sites in addition to being a sanitation concern. But simultaneously, it absolutely couldn't tear up the historical sites to fix the problems.

An excellent example of the kind of dilemma regularly faced by ISKI is the Binbirdirek Cistern, which was built in AD 330 as Constantinople was being founded. As centuries passed, the infrastructure above this 224-column cistern grew and changed. Today, restaurants and hotels line a cobblestone street above the cistern; inconveniently, the sewer pipe servicing this street began leaking and exfiltrating into the cistern below. To exhume and replace the old sewer line would close businesses, disrupt traffic in the heart of the historical tourism district and most probably destroy the cistern below. To do nothing would be to allow the continued decay and disuse of the cistern.

In searching the world for solutions to problems such as this, ISKI identified trenchless pipe lining as a viable s olution and realized that such technologies needed to be routinely available in Turkey. Any country desiring entry into the European Union (EU) is required to meet infrastructure quality standards, and ISKI clearly understood that complying with those standards becomes more affordable with access to trenchless technology. Periodic access to such technology via international construction firms was not sufficient for its extensive needs. Rather than just accept the lack of local availability, ISKI began proactively developing a trenchless technology market in Turkey.

Turkish contractor Mehmet Kurtbay, P.E., MBA, saw not only a business opportunity in the pipe rehabilitation projects being released by ISKI, but also a means to serve the needs of his city and nation. Kurtbay began searching the world for technologies uniquely suited to the Turkish market.Whereas trenchless rehabilitation in Turkey was primarily only available through construction firms based in the EU, Kurtbay wanted to establish a Turkish pipe rehabilitation company. As a result, he established AOL Istanbul with his two partners on April 1, 2005.

Most pipelining technologies require extensive experience to avoid costly and disruptive failures. But the critical pipe rehabilitation projects in the historic peninsula of Istanbul absolutely could not afford any disruption caused by a contractor's learning period. Exhumation simply was not and is not an option. Not surprising, few construction firms
are interested in training their future competitors. As a result, Kurtbay wanted to find a technology that local labor could consistently perform with a minimum amount of training. He also wanted a technology where errors could be corrected at lower cost and with less disruption.

After extensively researching trenchless pipe rehabilitation technologies used around the world, Kurtbay believed Ultraliner PVC Alloy Pipeliner from Ultraliner Inc., was the technology solution. The big problem: At the time, it was only being used in North America and its advantages were not widely known or recognized in Europe & Asia.

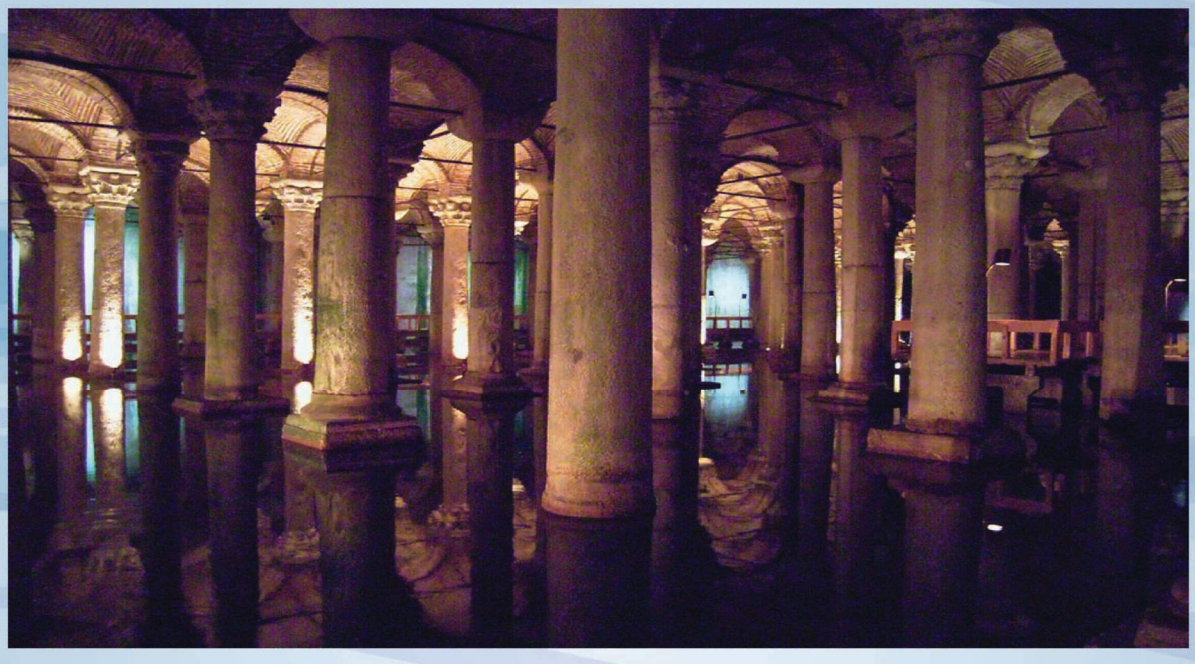
Ultraliner president explains, "At that time, we were not convinced that international expansion was a smart use of our resources. Ultraliner continues to grow rapidly across North America, routinely adding new licensees and crews to provide additional coverage. We believed that our resources should be focused upon continuing our successful domestic expansion."

But Kurtbay and his partners were convinced that Turkey needed a product like Ultraliner PVC Alloy Pipeliner and they persisted. Ultraliner vice president states, "He kept after us and wouldn't relent. As we got to know Mehmet better, we were impressed with his business acumen and his engineering understanding. He is an exceptionally well-educated and savvy contractor. He has a civil engineering degree from the highly regarded Istanbul Technical University and also completed an MBA in the United States. His background makes it easy to work with him. Quite honestly, any concerns we initially had about the ability to support a licensee on the other side of the world were ultimately allayed by our confidence in Mehmet. As it turns out, that confidence has been well placed."

AOL Istanbul garnered enough confidence within ISKI that it awarded its first Ultraliner pipe rehabilitation project within the sensitive historic peninsula. Because Ultraliner PVC Alloy Pipeliner is shelf stable, a single bulk shipment was able to be exported from the United States to Turkey, thereby greatly simplifying project logistics. After AOL Istanbul acquired the requisite equipment, Ultraliner sent a supervisor, its construction operations manager and most senior trainer, to Istanbul for 16 days. During the first week, supervisor helped make final checks and adjustments to the installation equipment and oversaw aboveground field trials for preliminary training. The following week, he assisted the AOL Istanbul crews to install pipeliner for ISKI. The first three lines selected were in a less sensitive neighborhood where the capability of the AOL Istanbul crews could be assessed. These installations went so well, that with supervisor's oversight, the AOL Istanbul crews then lined two of the critical sewer lines above the Binbirdirek Cistern.

The sewer pipes above the cistern were lined at night to prevent disrupting the nearby Magnaura historic site and the numerous hotels, restaurants, shops and tourist traffic. With the pipe ends accessible through the manholes, no excavation was required and no evidence was left of the project upon completion. The next morning, the cafés all placed their tables on the cobblestone streets above the lined sewer pipe and life went on without interruption.

Lining the pipes with Ultraliner PVC Alloy Pipeliner is expected to provide a renewed 100-year, fully structural performance life for the sewer pipes, while controlling root intrusion, infiltration and exfiltration. With the sewer exfiltration stopped by the ISKI pipe rehabilitation project, the historic Binbirdirek Cistern has subsequently been refurbished, currently houses a new restaurant and is open to the public for tours, as well as hosting exhibitions and concerts. A 1,700-year-old historic treasure has been preserved, and an exhibition featuring scale models of Istanbul's Byzantine architecture is currently being hosted in the cistern.



Cisterna Basilica

After AOL Istanbul installed only five lines under his supervision, supervisor returned to the United States and the local crews thereafter were able to prove their capabilities on their own. One of the key advantages of Ultraliner PVC Alloy Pipeliner is that it is a pre-manufactured pipe. All of the design properties that ensure specification compliance and ultimate performance life are factory quality-controlled and essentially unaffected by decisions of the crews during field installation. With fewer variables to influence a quality installation, less experience is required. Installation defects occurring after a crew has 20,000 lf of experience are rare. When mistakes or defects do occur, correction is relatively non-disruptive. If things go wrong, such as an equipment breakdown, the installation process can be stopped at any time and re-started as necessary. If a complete pipeliner installation failure ever occurs, the pipeliner can generally be removed without excavation. Such advantages make Ultraliner especially suited for use by local contractors in emerging pipe rehabilitation markets where experienced personnel are not available for hire.

Over the past years (2005 ~ 2012), AOL Istanbul has lined close to 56 km of sewer pipes in mainly Istanbul and all over Turkey, including the majority of sewer lines rehabilitated within Old Town in Historical Peninsula. The company was recently awarded two additional projects by ISKI and currently operates three lining crews. Of particular note is the rehabilitation of sewer pipes around Hagia Sophia (one of the new seven Wonders of the Ancient World) and the equally impressive Sultan Ahmet Mosque.

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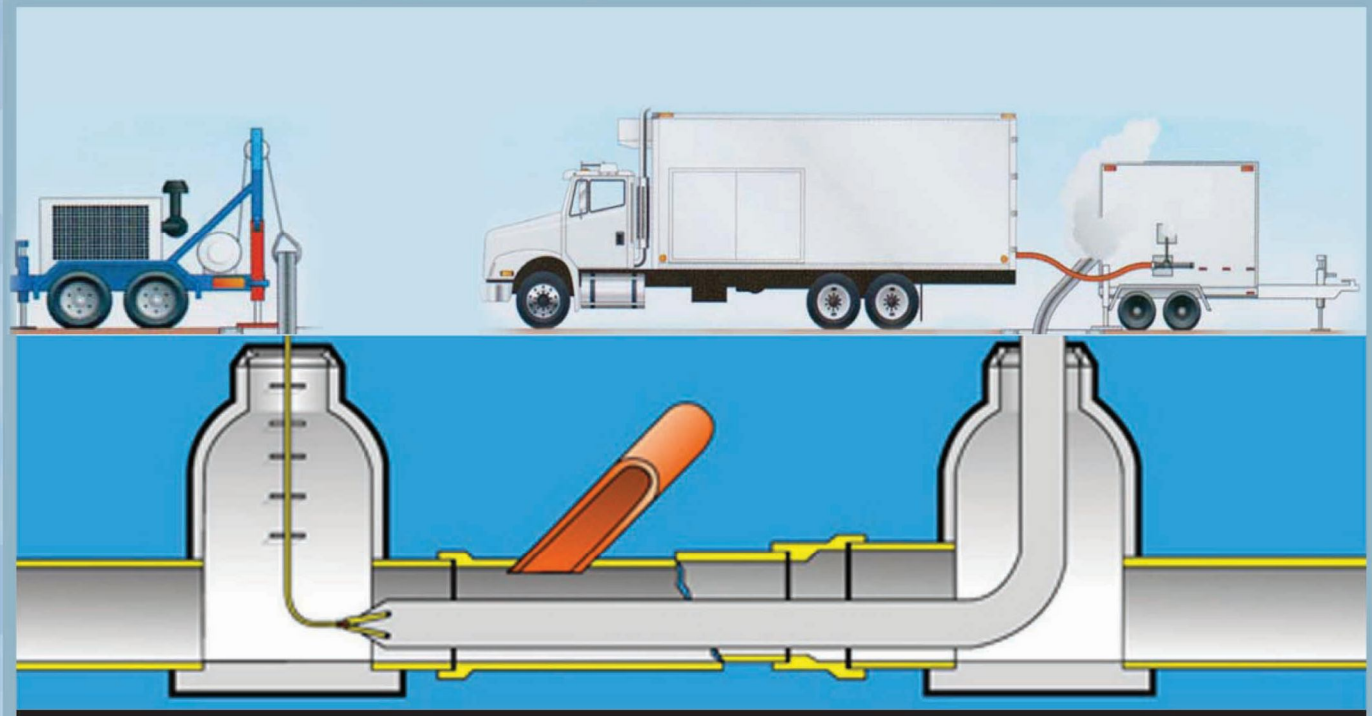
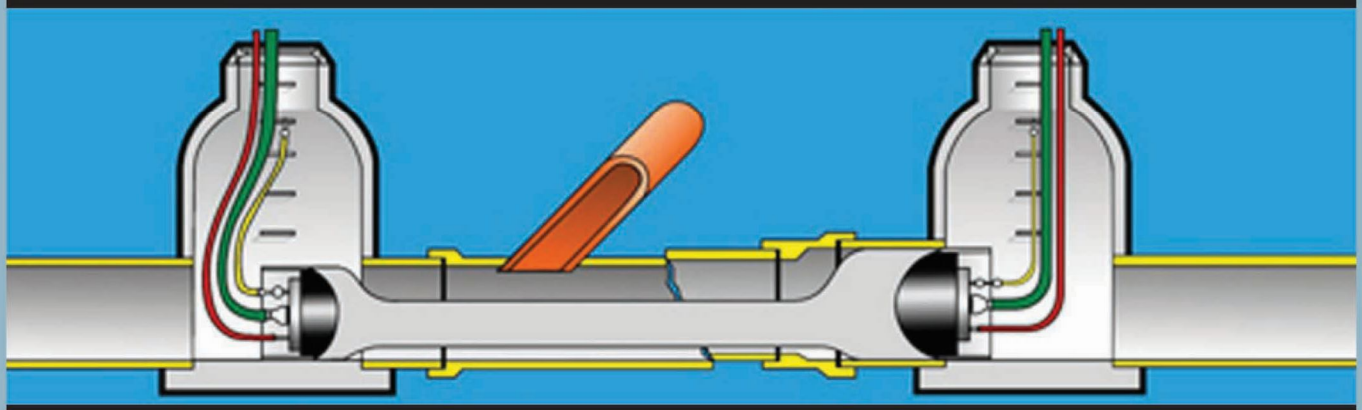
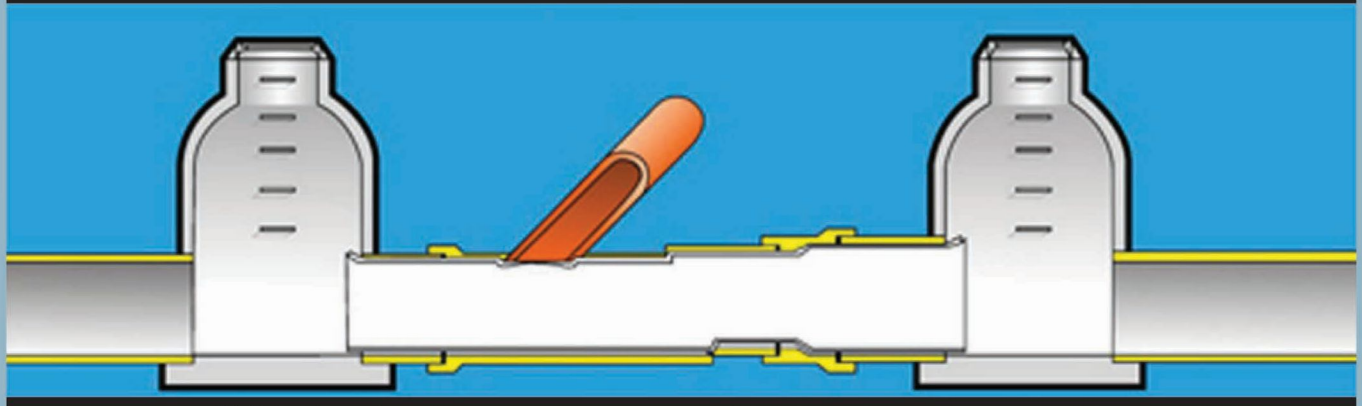
THE INSTALLATION PROCESS



PVC Alloy pipe is pulled into a prepared (cleaned/video inspected) host pipe.



PVC Alloy pipe is plugged and expanded with steam and air pressure.



PVC Alloy pipe forms a permanent, tight-fitting (called 'percect fit') new pipe.

AOL ISTANBUL

Expert on Trenchless Pipeline Rehabilitation Technologies

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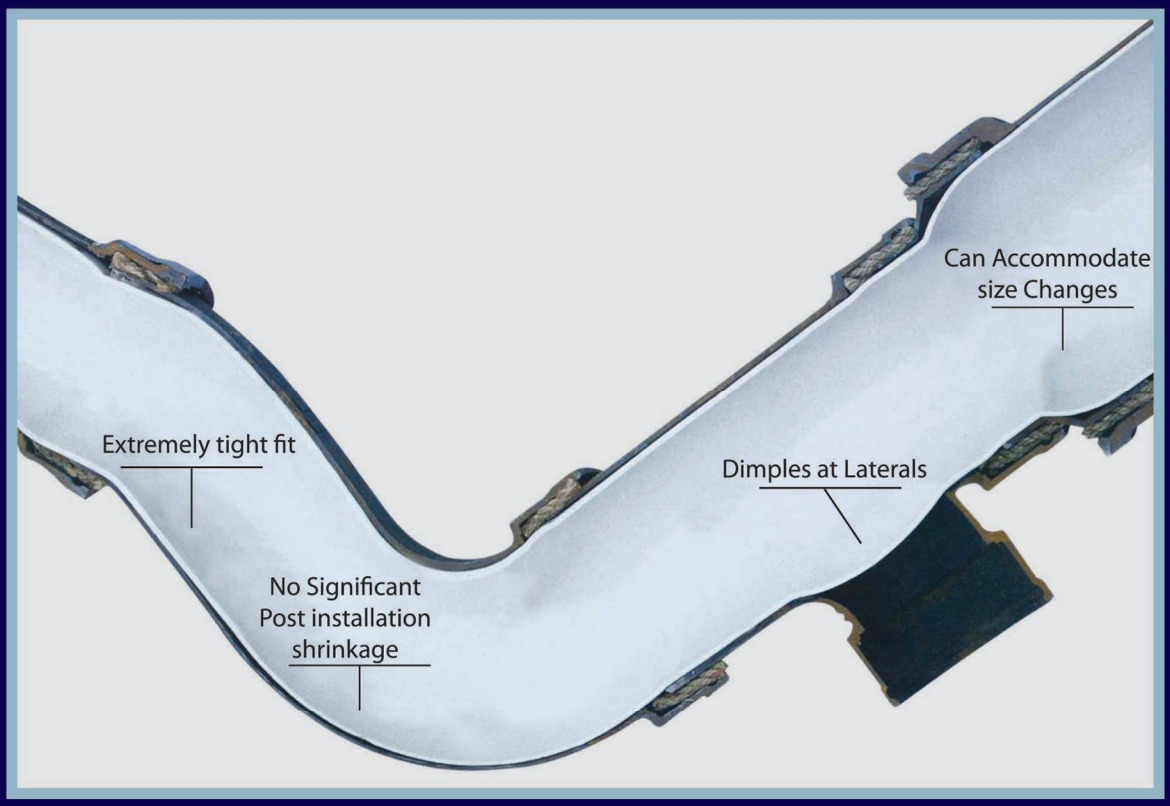
PVC Alloy pipe makes a "Perfect Fit" within the host/existing pipe



AOL Istanbul, Expert on Trenchless Rehabilitation Applications/Metods