



City of Tacoma

SIDE SEWER CONDITION ASSESSMENT AND REPAIR RECOMMENDATIONS

Introduction

City of Tacoma property owners are responsible for the construction, maintenance and repair of private side sewers, which connect a building's plumbing to the public sewer main.

The purpose of this manual is to:

- Educate property owners about common problems found in private side sewers
- Recommend when repairs should be performed
- Describe the repair or replacement process

Common Problems

This section describes common problems that may be found in side sewers and how each of them can affect the general condition and working order of a side sewer.

Offset joints

Side sewers are built using multiple segments of pipe that are connected together at joints. Offset joints occur when the pipes don't match up and one of the pipes sits lower or off to the side of the connecting pipe.

Offset joints can cause debris to build up on the joint that can eventually lead to backups. Also, if the joint is offset enough that soil is exposed around the edges of the pipes, the surrounding soil can erode into the pipe and be washed away, eventually causing voids to occur around the outside of the pipe and possibly become sink holes. Offset joints are not watertight and can allow infiltration of clean groundwater into the wastewater sewer system.

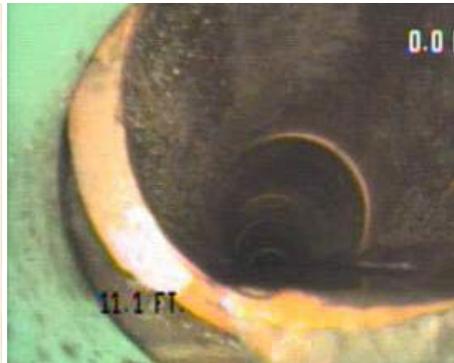


Minor offset joint

Unlikely to cause a buildup of debris and typically doesn't cause any negative effect on the sewer.

Recommendation:

Repair not necessary.

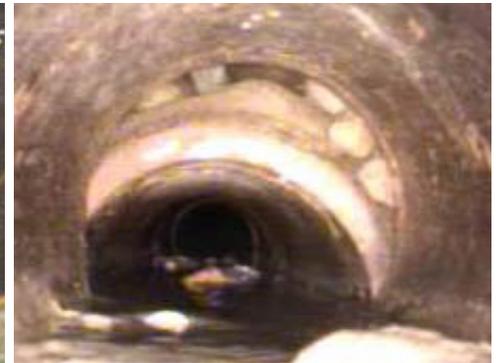


Moderate offset joint

May cause some buildup of debris but typically would not cause a backup and doesn't show any exposed soil around the joint.

Recommendation:

Inspect after a few years, and if no change has occurred, no repair should be necessary.



Severe offset joint

Has a more likely chance for causing a backup over time and exposes the soil around the joint which may result in the surrounding soil eroding into the pipe and eventually causing voids to occur around the outside of the pipe. This may lead to the formation of sink holes at the ground surface.

Recommendation:

Severe offset joints should be repaired.

Sags

Side sewers should be constructed with a minimum fall of ¼ inch per 1 foot of pipe. This allows wastewater to continue flowing via gravity through the pipe without any deposits of debris. When pipes have sags, or low spots in the pipe that don't meet this minimum fall, debris can settle into the low spots. Sags are typically only a problem if they are severe enough to cause debris to settle into the pipe which may eventually result in sewer backups.



Minor sag

May cause a minor buildup of debris but typically not enough to cause a negative effect on the sewer. A sag would be considered minor if it is less than 25 percent of the pipe diameter.

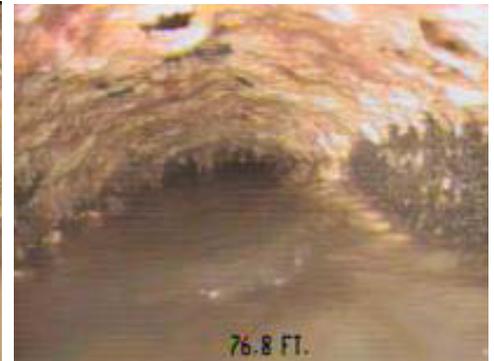
Recommendation:
Repair not necessary.



Moderate sag

A sag 25 percent to 50 percent of the pipe diameter would typically cause debris to settle in the pipe which may eventually cause a backup.

Recommendation:
Moderate sags should be re-inspected every two to five years in order to ensure the pipe is still flowing adequately.



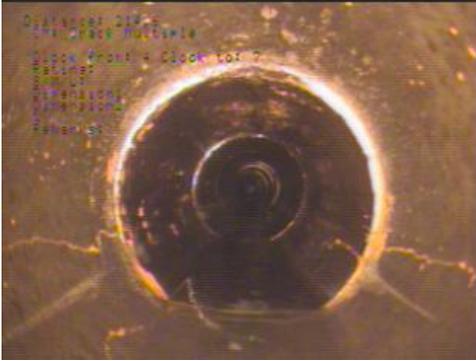
Severe sag

A sag that is 50 percent or more of the pipe diameter has a higher likelihood for buildup of debris which may eventually cause a backup over time. The likelihood for backup may increase if items are flushed which should not be, for example, grease, baby wipes, rags, etc.

Recommendation:
Severe sags should be repaired.

Cracks and Fractures

Cracks and fractures in a side sewer pipe can occur from a variety of sources, including poor original installation, poor soil bedding, root penetration or structural deterioration due to the age of the pipe. In addition to structural impacts, cracks can allow infiltration of clean groundwater into the wastewater sewer system. Once cracks become large enough to expose the soil, they are considered to be holes in the pipe (see definition of Holes).



Minor crack/fracture

Minor cracks or fractures in a pipe typically will have no effect on the working function of the pipe, but may increase in size or severity over time.

Recommendation:

Pipes with minor cracking should be reinspected at least once three to five years after original inspection to determine if the severity is increasing.

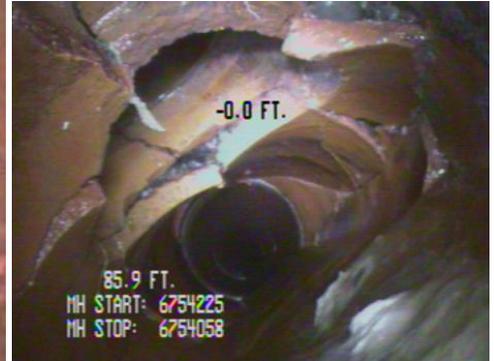


Moderate crack/fracture

Moderate cracks or fractures may or may not be affecting the working condition of the side sewer and are likely increasing in severity over time. Cracks that also have root intrusion and exposed aggregate in concrete pipe are considered moderate (or even severe).

Recommendation:

Pipes with moderate cracks should be reinspected every one to two years, or more frequently if inspections show an increase in severity. Property owners with moderately cracked side sewers, especially ones with signs of increasing severity, should begin planning and budgeting for repairs.



Severe crack/fracture

Severe cracks or fractures are either already having an impact on the working function of the side sewer or are on the verge of collapsing and causing a full structural failure of the pipe.

Recommendation:

Severe cracks should be repaired upon becoming aware of them.

Debris/Grease

Debris can build up in a side sewer if there are structural defects or obstructions in the pipe (such as sags, roots or offset joints) that obstruct the flow of the sewer and if inappropriate items are flushed or poured down the drains. Or, if pipes are constructed at slopes less than the recommended ¼-inch drop per foot of pipe, the liquids won't be moving fast enough to carry away the solids in the pipe. If debris build up is severe enough, it can eventually fill a pipe and cause backups or slow-draining side sewers.

Examples of items that do not degrade like toilet paper and should not be flushed down a drain (even though they may be advertised as flushable) include baby wipes, disinfectant wipes, paper towels, egg shells, coffee grounds, dental floss, toilet bowl scrub pads, feminine hygiene products and grease. Even very hot grease cools quickly once it reaches an underground pipe and sticks to the walls of the side sewer. Over time, grease can cause a side sewer to either drain very slowly or cause a complete blockage of the side sewer. Grease is one of the more common causes of backups and slow-draining side sewers. If debris buildup is resulting from offset joints, sags, root intrusion, holes and/or other structural defects in the pipe, refer to those sections in this guideline for recommended solutions.



Minor debris/grease

Minor debris/grease buildup is described as reducing the pipes capacity (might be better to describe this similar to how described percentage for sags – consistency) by less than 25 percent.

Recommendation:

Minor debris that isn't resulting from structural defects in the pipe should not cause adverse affects to the side sewer and may eventually be flushed away in times of high water usage. If minor grease buildup is evident, remove sources of grease from the pipe to reduce the possibility of a backup. If the pipes slope is inadequate, reinspection may be warranted especially if the pipe begins to show signs of slow draining.



Moderate debris/grease

Moderate debris/grease buildup is described as reducing the pipes capacity by 25 to 50 percent.

Recommendation:

If the debris buildup is due to insufficient slope, the pipe should be cleaned routinely to avoid having a severe buildup which may cause a backup. A property owner may wish to reconstruct the side sewer if cleaning costs are comparable to repair costs. Property owners with moderate debris due to structural defects (such as roots, holes, or sags), especially if the side sewer is showing signs of slowed draining, should begin planning and budgeting for future repairs of the defects.

For pipes that have grease buildup with no structural defects, the pipes may be cleaned to remove the grease. Care should be taken after cleaning to eliminate sources of grease from the side sewer to avoid future backups.



Severe debris/grease

Severe debris/grease is described as reducing the pipes capacity to less than 50 percent or having 50 percent or more of the pipe full of debris.

Recommendation:

If the debris buildup is due to insufficient slope, the pipe should be reconstructed or the pipe will need to be routinely cleaned.

For pipes that have debris buildup due to structural defects (such as roots, holes, or sags) the defect should be repaired.

For pipes that have grease buildup with no structural defects, the pipes may be cleaned to remove the grease. Care should be taken after cleaning to eliminate sources of grease from the side sewer to avoid future backups.

Holes

Some common causes of holes in pipes are deteriorated pipes, roots or poor construction. Holes in the pipe can cause surrounding soils to erode into the pipe that can result in voids forming around the pipe and possibly cause sink holes at the ground surface. In addition, the soils can cause debris buildup in the pipe. Holes also allow provide an avenue for rats to travel in and out of side sewers. Regardless of the size of a hole, they all expose the inside of the pipe to the surrounding soils and should be repaired once they are found.



Small hole with aggregate showing

Recommendation:

All pipes with holes should be repaired when they are discovered.



Medium hole with void

Recommendation:

All pipes with holes should be repaired when they are discovered.



Large hole with void

Recommendation:

All pipes with holes should be repaired when they are discovered.

Roots

Roots are another common problem within side sewers, especially older concrete and clay pipe side sewers that weren't constructed with watertight joints. Once roots seek out a water source in sewer pipes, they continue to thrive and grow. This results in cracked pipes and sewer backups when debris isn't able to pass through the roots. Pipes that are cracked from roots should be repaired in a manner that doesn't allow the roots to grow back into the sewer system. Roots that are coming into joints that aren't cracked may be routinely removed by cleaning the sewer pipes. The frequency of removal will depend on how aggressive the root growth is. The only way to permanently remove roots from a side sewer is to construct a watertight sewer pipe either through replacement or rehabilitation.



Minor root intrusion

Minor root intrusion that obstructs less than 25 percent of the pipe typically will have no affect on the working function of the pipe, but the roots may increase in size or severity over time.

Recommendation:

Pipes with minor root intrusion should be re-inspected at least once three to five years after the original inspection to determine if they have increased in severity.



Moderate root intrusion

Moderate root intrusion may or may not affect the working condition of the side sewer and will likely increase in severity over time. Roots that are blocking 25 to 50 percent of the pipe are considered moderate.

Recommendation:

Pipes with moderate root intrusion should be re-inspected every one to two years, or more frequently, if inspections show cracking or holes due to root intrusion or an increase in root growth.



Severe root intrusion

Severe root intrusion, obstructing 50 percent or more of the pipe, is either already having an impact on the working function of the side sewer or soon will be.

Recommendation:

Pipes with severe root intrusion should be repaired to eliminate the ability for roots to enter the sewer system.

Exposed Aggregate

Concrete pipe, of which many side sewers in Tacoma are constructed, is made of a mixture that includes cement and aggregate (rocks). As the interior cement wall erodes away, the aggregate becomes exposed. This can be caused due to corrosion from hydrogen sulfide gases that are prevalent in wastewater or from erosion due to higher than recommended velocities that may occur in side sewer pipes with steep slopes. It is very difficult to tell from a video inspection how much of the pipe wall thickness may be remaining once the aggregate is exposed. This is one of the most common and most critical defects in a side sewer pipe.

Pipes that are showing severe aggregate for the full circumference of the pipe should be replaced or rehabilitated. Pipes that are showing minor to moderate exposed aggregate should be re-inspected regularly to determine the rate and degree of degradation.



Minor exposed aggregate

Minor exposed aggregate that hasn't spread through the full circumference of the pipe typically will have no affect on the working function of the pipe.

Recommendation:

The pipe should be re-inspected after three to five years to determine if the exposed aggregate is worsening.



Moderate exposed aggregate

Moderate exposed aggregate that covers the full circumference of the pipe likely is not affecting the working condition of the side sewer but the structural stability of the pipe is decreasing. Once full aggregate is showing, it is very difficult to tell how much pipe wall thickness remains. Pipes in this category may be good candidates for rehabilitation prior to them reaching full structural failure.

Recommendation:

Pipes within this category should be re-inspected every one to two years and owners should begin planning and budgeting for repairs.



Severe exposed aggregate with holes

Pipes that have severe exposed aggregate resulting in holes and missing walls of the pipe are considered to have reached full structural failure even though flows may still be able to travel through or seep out of the pipe. Pipes of this severity will eventually fully collapse which may cause severe debris to settle in, sewer backups and possibly sinkholes.

Recommendation:

All pipes with severe exposed aggregate should be replaced as soon as they are discovered.

Inflow and Infiltration

Inflow is a source of surface water that is piped directly to the wastewater side sewer. For example, roof drains, area drains, basement sump pumps and footing drains connected to the wastewater system are considered sources of inflow. These types of connections are illegal in the City of Tacoma and should be directed to the surface water sewer system or allowed to infiltrate into the ground. All sources of inflow should be redirected away from the sanitary sewer system.

Infiltration is when groundwater enters the side sewer through the defects in the pipe. Infiltration can occur in side sewers with cracks, holes, unsealed joints, etc. that are not watertight. All pipes that allow infiltration into the side sewer should be repaired.

Inflow and infiltration do not typically have an adverse effect on the general working function of the side sewer. However, during heavy rain events, the accumulation of infiltration and inflow from all the leaking side sewers and direct surface water connections in the city cause the wastewater collection system to become overwhelmed with high flows and as a result sanitary sewer overflows of untreated wastewater can occur into streets, basements, and our waterways creating an environmental and health hazard in the city.



Clean groundwater pouring in through a defective joint.

Construction Methods to Eliminate Defects in Side Sewers

This section describes various methods available for repairing, replacing, or rehabilitating an existing side sewer. Every side sewer is unique and not all methods are suitable for all circumstances. It is always important to work with a sewer contractor experienced with the particular kind of construction to determine the suitability for each side sewer on an individual basis and to obtain cost estimates for the various methods as they may vary greatly for each project.

Open cut construction

This method of construction is the typical dig and replace that most people are familiar with. This is the most common method of repairing side sewers and consists of digging up the old pipe and replacing it with new pipe. Open cut may be less suitable for areas where there are significant surface improvements that a property owner wants to avoid disturbing and that are costly to replace or when side sewers are fairly deep.

Pipe bursting

This method of construction consists of inserting a new flexible pipe into the old pipe. This method requires digging an installation pit and a receiving pit at each end of the side sewer to allow for the pipe to be inserted and to make final connections at each end. This method is beneficial for sites where there are surface improvements that an owner either chooses not to disturb or that would be expensive to replace. Pipe bursting is not suitable for pipes that are no longer round enough to allow for the bursting machine to penetrate, in pipes with multiple bends, or in pipes that need to have sags corrected as the new pipe will follow the vertical alignment of the old pipe.

Cured In Place Pipe (CIPP) lining

CIPP consists of rehabilitating an existing pipe with a new pipe. A resin-soaked felt tube liner is inserted into the existing pipe, inflated to expand to the shape of the existing pipe, and then cured until the resin hardens to form a pipe within the old pipe. CIPP is also beneficial for sites where there are surface improvements than an owner either chooses not to disturb or that would be expensive to replace. The liner can be inserted through cleanouts in the side sewer and requires no other digging unless needed to install a cleanout. Since CIPP forms to the shape of the existing pipe it is not suitable for pipes that are collapsing or egg-shaped, nor can it be installed in pipes with multiple bends or in pipes that need to have sags corrected as the new pipe will follow the vertical alignment of the old pipe.

Spot repairs

If the majority of a pipe is good condition with little or no defects, a spot repair may be the most suitable and cost effective method for repair. The property owner should consider a full side sewer replacement or rehabilitation if there are multiple defects throughout the pipe. It is generally less costly to hire a contractor once than to have a contractor mobilize to a site multiple times with repeated spot repairs.

Process for Construction

Once it is determined that a repair or replacement is needed, the following steps should be taken:

1. **Hire a contractor** – There are many companies offering a full range of services including unblocking, repairing and replacing side sewers, but some specialize in certain areas. It is important to select a contractor that has experience and knowledge with the method of repair needed. Property owners may check with the Better Business Bureau at (206) 431-2222 to find reputable companies. All repairs performed in the City right-of-way, even if they're on part of the private side sewer system, must be done by a contractor licensed and bonded to work in Tacoma. Companies can be found listed in the local telephone directory under "Sewer Contractors." Since companies offer a wide range of prices, it's a good idea to get at least three written bids before choosing a company.

Rooter services unplug plumbing and private side sewers using water pressure or mechanical "snakes." Make sure the roofer service's snake cable is long enough to reach from a property's side sewer to the City's main sewer line (typically underneath the street or alley). Rooter companies also might repair and/or replace side sewers.

Side sewer contractors repair and/or replace structural problems, such as breaks or holes, in side sewers. Some contractors also might unplug lines.

Plumbers repair leaky or broken fixtures and they install systems in new construction and remodeling. If only some fixtures are not draining, or if pipes are leaking, a plumber might be able to remedy the problem.

(Please note: Permits are always required, on both private property and in the right-of-way, when performing repair work on side sewers or plumbing fixture. Permits are not required for root removal or unlogging services.)

2. **Get permits** – Permits can be obtained at the Permit Counter on the 3rd floor of the Tacoma Municipal Building, 747 Market St., Tacoma, WA 98402.

3. **Get final inspection** – Once all work is completed, a City inspector will inspect the work to ensure it was constructed in accordance with all applicable codes and regulations.

City Financial Programs

Side sewer repairs and replacements can be very expensive. The City offers low-interest sewer loans to qualified homeowners and business owners for side sewer repairs or replacement. For information on how to apply for the Sewer Conservation Loan, call (253) 591-5588.

Low-income households can also inquire with the City's Major Home Repair Program which offers no-interest loans for qualified homeowners within a certain income level. For information about this program, call (253) 591-5236.