

# REPAIRS TO FAILING UNDERGROUND STORMWATER DEVICES

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AQUALIS is the leading nationwide provider of stormwater and lift station management services. These services include preventative maintenance, corrective maintenance or repairs, retrofit and redesign as well as emergency response. AQUALIS helps protect your assets, mitigating Notices of Violation (NOVs), diminishing flooding risks, and supporting your efforts in environmental stewardship.

## OUR MISSION

Inspire change by preserving and protecting our most precious natural resource: water

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Proper ongoing maintenance is critical to underground systems, because once a property owner discovers a problem that comes from underground, the problem has been occurring for some time and requires immediate action. Underground Repairs are then required and can encompass simple measures such as stormwater grate replacements and storm pipe jetting to complete underground system rehabilitations.

## Introduction

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The function of an underground stormwater system is to capture rainfall and deliver it to a stormwater SCM. Roof drains, curbs, catch basins, drop inlets, trench drains, and storm pipes are all part of the stormwater system leading to either an underground proprietary device or an above ground SCM. Therefore, when discussing repairs to underground stormwater systems, the repairs can either reference the stormwater collection system or the underground stormwater SCM.

This whitepaper will briefly discuss various underground stormwater devices (please see the associated whitepaper **“Maintaining Underground and Above Ground Stormwater Systems”** for a more thorough review of underground systems) and provide examples of typical underground system repairs to both collection systems and proprietary devices.

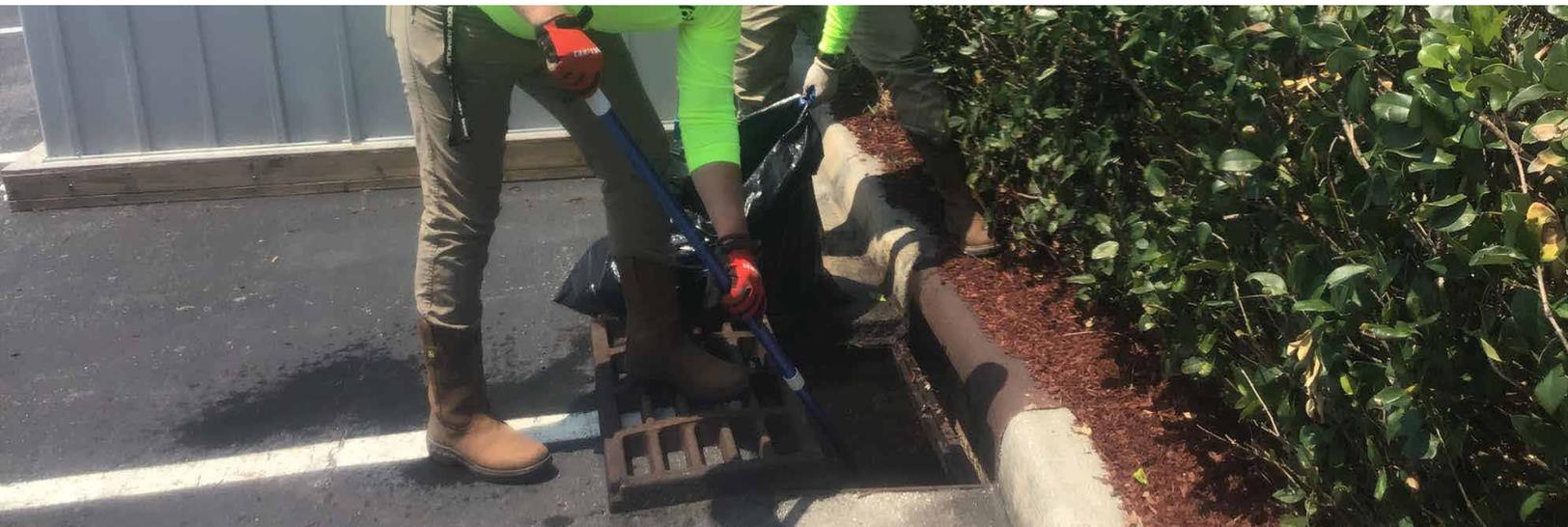
# UNDERGROUND SYSTEMS

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Underground stormwater facilities can be effective stormwater quantity and quality devices. Many sites and developments are limited by size or space and may not be able to implement an aboveground SCM necessary to meet the criteria or standards set forth by the regulatory body. In many of these cases, underground “proprietary devices” are installed as part of the underground stormwater system in order to achieve the desired quantity and quality standards at a site. A proprietary device is a manufactured system designed to treat stormwater. Decision-making on an underground proprietary device versus an above ground SCM usually revolves around land cost, and the value of utilizing scarce land for an above ground SCM (as compared to installing a proprietary device under a parking lot). The popularity of proprietary systems is usually directly related to increased land development and density. Proprietary devices are also used in series with aboveground facilities in order to improve quantity and quality performance.

Common underground proprietary devices include Detention Vaults, Stormceptor Units, Vortechnic Units, Contech StormFilter Units, Swirl Separators, Weir Boxes, etc. The manufactured SCM (or proprietary device) industry is growing quickly, and new systems are being developed and implemented on a continual basis.

As in all facets of stormwater management, regular professional inspection and maintenance is a critical component of ensuring the continual functioning of the stormwater system as designed. Inspection and maintenance programs are especially important in underground systems due to the fact that system failures are typically not noticed until the problems rise to the surface, literally. Failure to respond to repair needs can lead to immediate water quality concerns, regulatory compliance failures, and increased environmental liability for the property owner.



## Why Repairs?

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Sediment, trash, debris and pollutants are the primary cause of underground system repairs, and regular maintenance, including vactor services, is critical. Vactor trucks utilize high-pressure jetting and vacuum water reclamation technologies to effectively clean underground systems. The frequency for this type of service is highly dependent on the inputs to the system, so a proper understanding of the conditions upstream of the system affect the maintenance and repair of the underground system.

The following good-housekeeping techniques can greatly reduce the maintenance and repair costs relative to an underground system and can reduce the frequency of necessary Vacuum Truck Services:

- Educate residents or employees on how their actions impact the stormwater system, and how they can help reduce maintenance costs
- Keep properties, streets and gutters, and parking lots free of trash, debris, and landscape clippings
- Do NOT blow leaves or debris into storm drains
- Ensure the proper disposal of hazardous wastes and chemicals
- Plan lawn care to minimize the use of chemicals and pesticides
- Be conscious of spills and react accordingly
- Sweep paved surfaces and dispose of materials in proper locations; prevent sweeping of materials into storm drains
- Re-vegetate disturbed and bare areas to maintain vegetative stabilization
- Maintain mulch beds to prevent washouts from landscaped gardens
- Clean out the upstream components of the storm drainage system, including inlets, storm sewers and outfalls
- Cautiously and consciously stage materials (including landscaping materials) utilizing best management practices in order to prevent products from entering storm drains

However, repairs will almost always be required to an underground system, and as in above ground repairs, can be divided into the two areas of restorative repairs and rehabilitative repairs.

Restorative repair work consists of a variety of isolated or small-scale maintenance and work needed to address operational problems. Simple grate or drain replacements, and even vactor work, fall into this area.

Rehabilitative repair work consists of large-scale maintenance and major improvements needed to address failures within the stormwater management facilities. This work may require an engineering design with construction plans to be prepared for review and approval. This work may also require more specialized maintenance equipment, surveying, construction permits or assistance through private contractors and consultants. In general, if large equipment is required to work underground, the repair is a rehabilitative repair.

**A few common repairs relative to underground collection and proprietary systems are as follows:**

- Missing storm inlet grate or manhole lid due to theft
- Damaged inlet or manhole structure due to plow or vehicle trauma
- Sinking inlet or manhole structure and/or parking lot damage near structure due to damaged or degrading brick and mortar framing supporting the cast iron/steel frame and grate
- Damaged or failed pipe
  - Corrugated Metal Pipe corrosion
  - HDPE or Concrete Pipe cracking or crushing
- Sinkhole in lot or yard due to gap at junction of manhole box and pipe resulting in sediment loss
- Excessive sediment, trash, or debris volume preventing drainage
- Clogged filter(s) in need of replacement

**Please review the following examples for activities involved in underground repairs.**



Manufactured (Underground )System: Stormceptor

This proprietary device is typically retrofit into a storm sewer system and provides storage and pollutant removal capabilities. Systems are typically designed and installed with inspection and/or maintenance wells or cleanouts. Volumes of sediment, trash, or debris accumulation can be determined by the use of a “sludge judge” or similar tool, or by visual inspection, and when exceeding the manufacturer’s guidelines, be cleaned out by a vactor truck.



Removing manhole covers and inlet grates for access and observation of sumps and proprietary devices; confined space entry



Proprietary device inspection utilizing "Sludge Judge" monitoring tool for sediment assessment on a Stormceptor Unit



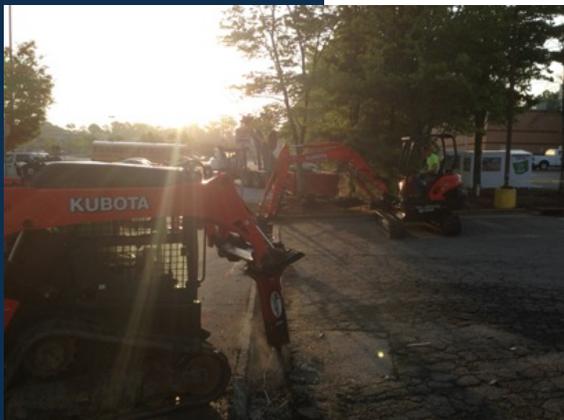
Catch basin sump cleanout; underground detention trash removal



Storm drain grate replacement



Underground system jetting and vacuum



Trench drain installation

## Brick/mortar frame deterioration repair



## Storm pipe replacement



Stormwater systems are designed and implemented with the intent that regular inspections and proper maintenance activities will be performed. This philosophy is even more important for underground systems. Even in well-managed programs, there will be a need for annual underground vector cleanouts and some basic level of repairs.

We hope that this whitepaper has provided the reader with an understanding of common stormwater collection systems, underground proprietary systems, and repairs to both. We invite you to consider AQUALIS Stormwater Management for comprehensive stormwater program management --- we are ready to answer any and all questions about how to get started. Please visit [Aqualisco.com](http://Aqualisco.com) for more information.

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