

## Introduction

Prinsco's underground retention/detention systems provide a solution to effectively manage and store stormwater runoff utilizing a series of pipes and fittings. As the stormwater moves through the retention/detention systems, sediment and debris will tend to settle out of the water and collect within the system. This will require the system to be regularly inspected and cleaned in order for the system to perform as originally designed. Designing a system that is conducive to regular maintenance will allow the system to function efficiently and extend the service life.

## System Accessories

A good maintenance program is just as important as proper design and installation. There are several components that can be incorporated into a system and can be used exclusively or in tandem to allow for ease of maintenance.

- **Risers:** Risers are placed within a retention/detention system to provide manned access to key parts of the systems. Risers are typically 24" diameter or larger and are located on the laterals adjacent to the manifolds.
- **Cleanouts:** Cleanouts are typically placed on the manifolds. Common sizes for cleanouts are 6-inch or 8-inch diameter pipe. Cleanouts provide an access point for vacuum or water-jetting hoses used to clean the retention/detention system.

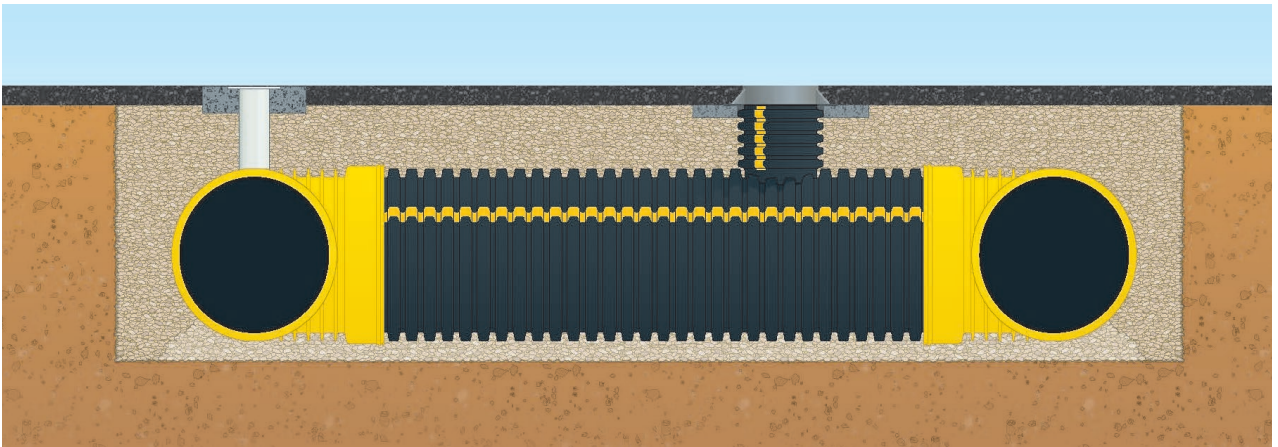


Figure 1: Riser and Cleanout Locations

- **Pre-treatment Device:** The use of a pre-treatment unit is recommended for all retention or detention systems. A pre-treatment unit is designed to capture a majority of the sediment and debris before it is able to enter the retention/detention system. This will reduce the maintenance and cleaning requirements of the systems and reduce pollutants from reaching nearby waterways. Prinsco's Stormwater Quality Units (SWQU) is designed to remove debris collected in runoff including trash sediment, oils, and other suspended solids as shown in Figure 2. Prinsco's SWQU is a cost-effective alternative to other units and removes 80 percent of total suspended solids, oil, and grease.

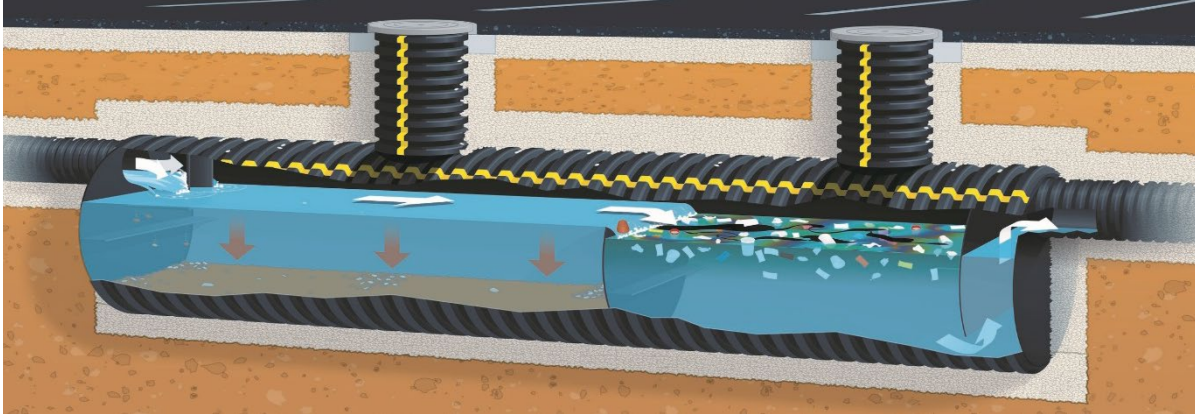


Figure 2: Prinsco's Stormwater Quality Unit

### Retention/Detention System Maintenance

Maintaining a clean and obstruction-free retention/detention system is essential to ensuring the system performs as designed. Buildup of debris can obstruct flow through the laterals or block the entrance of the outlet pipe in a retention or detention system that may cause the system to be inefficient. Additionally, surrounding areas may potentially run the risk of damage due to flooding or other similar issues.

### Initial System Inspection

An initial inspection should be performed before the retention/detention system is put into operation. It is best to create an Inspection and Maintenance Log Sheet at this time. A sample of an Inspection and Maintenance Log Sheet can be found at the end of this technical note. Included with the log sheet should be a layout of the system with invert elevations at the risers and cleanout locations, prior to sediment accumulation. Initial measurements can be taken with a stadia rod or other measurement techniques. These measurements will allow for inspection measurements to be taken from outside of the system, eliminating the need for a manned entrance.

### Inspection Frequency

Inspection frequency will vary based on the system design and requirements. A system inspection schedule should be developed for each individual system, with the industry standard being a minimum of once per year. After the inspection schedule is established for the system, it should be tracked on the Inspection and Maintenance Log Sheet.

Due to construction activities, more frequent inspections should be performed during the first year of operation. Construction sediment and debris loading can be minimized if the Stormwater Pollution Prevention Plan (SWPPP) for the construction site is followed. After the first year of operation, the rate at which the retention or detention system collects soil/pollutants will be heavily dependent on the site activities. During winter months, in geographical areas where sand is applied to road surface, systems may see increased sediment loading. Other increased loading areas are present with vehicle or equipment wash-down areas.

During inspections, elevation of sediment height should be taken from each rise and cleanout. These elevations should be recorded on the Inspection and Maintenance Log Sheet to determine sediment height based on initial invert depth. Also, during the inspection, personnel should be looking for blockages to inlet or outlet stubs. Inspection of pre-treatment unit upstream of the system should always be inspected at this time. Refer to manufacturer's recommendations for inspecting and maintaining the pre-treatment unit.



### Maintenance Frequency

Cleaning frequency will vary for each system. It is at the sole discretion of the inspector to determine if or when the system will require cleaning. The following are recommendations of when the system should be cleaned.

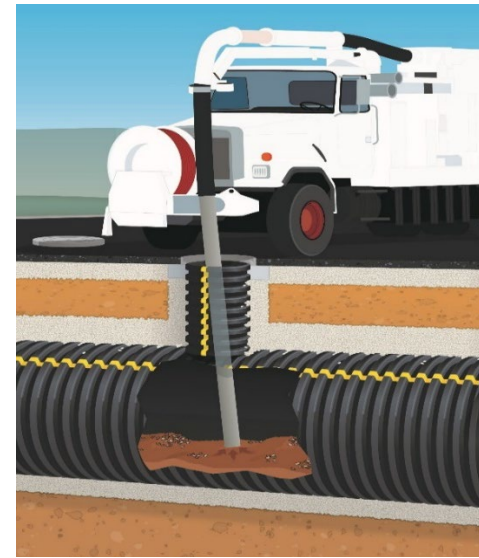
- If the system is experiencing an unusual amount of sediment build up.
- When the system does not drain to the lowest pipe elevation during dry conditions.
- If the system reaches a sediment height between 10 and 20 percent of the pipe diameter.

### System Cleaning

There are typically two ways that a system is cleaned. The first, and most common method, is done by using a high-pressure water jet and a vacuum truck. The high-pressure nozzle with rear facing jets is attached to a hose and drug downstream, washing sediment and debris downstream with it. The vacuum truck would then be located on the downstream end and remove the sediment and debris with its vacuum hose. It should be noted that multiple passes of the water jet may be needed to clean the run, depending on the amount of soil loading. The second method used is a manual method that is very labor intensive. This method should only be used with larger diameter retention or detention systems. Care needs to be taken to ensure damage to the inside liner of the pipe does not occur when manually removing sediment and debris. Strategically placed risers and cleanouts will make this process as easy as possible.

Before the system is cleaned, the following considerations should be made.

- The system will be much easier to clean when there is little or no flow into the system and the system does not have any standing water. When possible, system cleaning should be scheduled around dry weather.
- Before cleaning begins, all outlet stubs should be blocked off. If this is not done, sediment loading could back up or plug downstream pipelines adding to cleaning expenses. This is also done to prevent any of the debris or pollutants from washing into downstream waterways.
- When beginning the cleaning process all upstream pipelines and pre-treatment units should be cleaned prior to starting on the retention or detention system.
- When cleaning the retention or detention system, it is best to start at the highest elevation of the system and work towards the lowest elevation.
- Stationing the vacuum truck above the downstream manifold and jetting the debris from the laterals to the downstream manifold, provides an effective capture point for the vacuum line.



**Figure 3: Vacuum Truck Removing Sediment and Debris**

### Safety

Before entering a retention or detention system, ensure all OSHA and local safety regulations are being followed. Only personnel with appropriate confined space permits and personal protective equipment should be allowed to enter the system.

### Material Disposal

After maintenance and cleaning, dispose of sediment, floatables, oil, and water in accordance with local regulations. Water and sediment from cleanout procedures should not be dumped into a sanitary sewer. In some locations, proper disposal of sediment from the SWQU can be compared to the disposal of sediments from manholes or catch basins.



Table 1: Inspection & Maintenance Log Sheet Example

Inspection & Maintenance Log Sheet - EXAMPLE										
<b>Type of System:</b>		42" Detention with two 24" Risers					<b>Location:</b>		Minneapolis, MN	
<b>Notes/Comments:</b>		Contact owner when sediment level reaches 8" (200 mm) or outlet stub is restricted. Scheduled cleaning should be done through SB's JET/VAC								
<b>Ports / Cleanouts / Manholes</b>		Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	
<b>Initial Inspection</b>										
Date: 3/17/2020	<b>Invert Depth</b>	84" (2100 mm)	84" (2100 mm)	86" (2150 mm)	87" (2175 mm)	88" (2200 mm)	89" (2225 mm)	90" (2250 mm)	91" (2275 mm)	
	<b>Sediment Depth</b>	----	----	----	----	----	----		----	
	<b>Inspector Name:</b>	Inspector 1			<b>Maintenance Performed / Notes:</b>					
<b>Inspection and Maintenance</b>										
Date:	<b>Depth to Sediment</b>	81" (2025 mm)	81" (2025 mm)	81" (2025 mm)	82" (2050 mm)	84" (2100 mm)	84" (2100 mm)	85" (2125 mm)	85" (2125 mm)	
	<b>Sediment Depth</b>	3" (75 mm)	3" (75 mm)	5" (125 mm)	5" (125 mm)	4" (100 mm)	5" (125 mm)	5" (125 mm)	6" (150 mm)	
	<b>Inspector Name:</b>	Inspector 2			<b>Maintenance Performed / Notes:</b>		Excess amounts of sediment throughout system			
Date:	<b>Depth to Sediment</b>									
	<b>Sediment Depth</b>									
	<b>Inspector Name:</b>				<b>Maintenance Performed / Notes:</b>					
Date:	<b>Depth to Sediment</b>									
	<b>Sediment Depth</b>									
	<b>Inspector Name:</b>				<b>Maintenance Performed / Notes:</b>					



Table 2: Inspection & Maintenance Log Sheet

Inspection & Maintenance Log Sheet									
Type of System:					Location:				
Notes/Comments:									
Ports / Cleanouts / Manholes		Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8
<b>Initial Inspection</b>									
Date:	Invert Depth								
	Sediment Depth	----	----	----	----	----	----		----
	Inspector Name:				Maintenance Performed / Notes:				
<b>Inspection and Maintenance</b>									
Date:	Depth to Sediment								
	Sediment Depth								
	Inspector Name:				Maintenance Performed / Notes:				
Date:	Depth to Sediment								
	Sediment Depth								
	Inspector Name:				Maintenance Performed / Notes:				
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