

Introduction

Prinsco's HydroStor chamber systems provide a solution to effectively manage and store stormwater runoff utilizing a pipe manifold system to distribute the stormwater to rows of chambers and end caps. As stormwater flows to the chamber system, it carries sediment and debris that tend to collect within the system. Given that chambers are an open bottom system it is essential to capture the sediment and debris before it enters the chamber rows with the use of a pre-treatment device.

Pre-Treatment System Devices

The use of a pre-treatment unit is recommended for all HydroStor chamber systems as debris and sediment buildup in the system will clog the stone void space under the chambers. If the stone becomes clogged with sediment, the storage performance and service life of the system will be compromised. A pre-treatment unit is designed to capture a majority of sediment and debris before it is able to enter the entire chamber system. Therefore, the maintenance and cleaning of the system will be limited to only the pre-treatment and not the entire chamber system. It is crucial to ensure that the pre-treatment device(s) are maintained regularly. For chamber systems, there are two options for a pre-treatment device: a Stormwater Quality Unit (SWQU) or a sediment row.

Sediment Row

One option available for HydroStor chamber systems, which can be used in conjunction with a SWQU or by itself, is a sediment row. The sediment row consists of a series of chambers installed directly on top of two layers of woven geotextile. The geotextile serves as a filter and prevents the sediment from clogging the bedding stone. The specified geotextile is also durable enough to withstand cleaning and maintenance procedures using water jet technology. The sediment row will typically be located in the first row of chambers and connected to the control structure(s). This connection is made with a short stub of 18" (450 mm) pipe for HS75 chambers or 24" (600 mm) pipe for HS180 chambers and will be the point of access for cleaning and maintenance procedures. A 24" (600 mm) connection to HS75 chambers is possible, but a pipe adapter will be required to make the connection to the end cap.

Inspection Ports

Inspection ports are not required for the entire chamber system but may be installed to monitor the sediment levels, particularly in the sediment row. Inspection ports are typically 4"-8" (100-200 mm) PVC risers and are to be installed in the valley between the corrugations on the HS180 chambers or in the circular cut out point at the center of HS75 chambers.

Initial System Inspection

An initial inspection of the pre-treatment device should be performed before the chamber system is put into operation. It is best to create an Inspection and Maintenance log sheet at this time. The 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 and/or pre-treatment devices with the invert elevations at the inspection ports prior to sediment accumulation. Initial measurements can be taken with a stadia rod or other measurement techniques. These measurements will allow for future sediment height measurements to be taken from outside of the system, eliminating the need for a manned entrance.

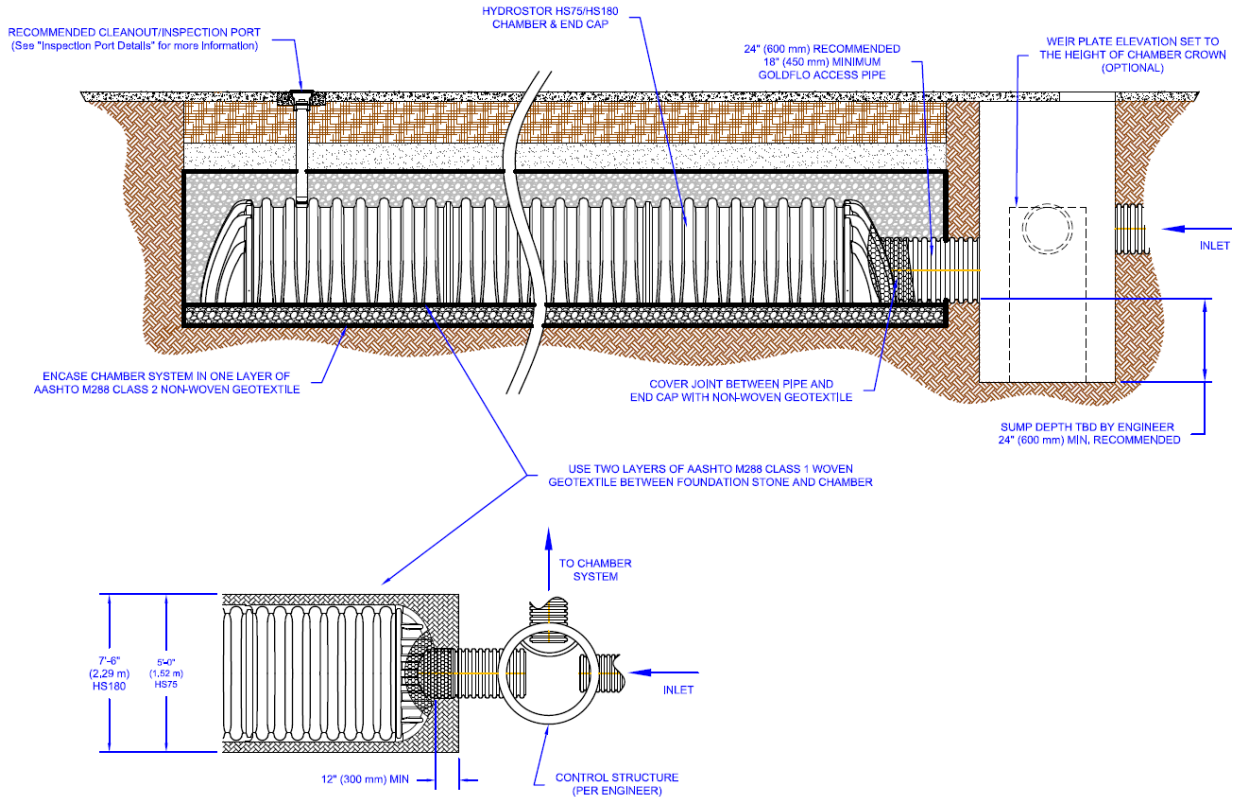


Figure 1: Chamber Sediment Row

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.

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

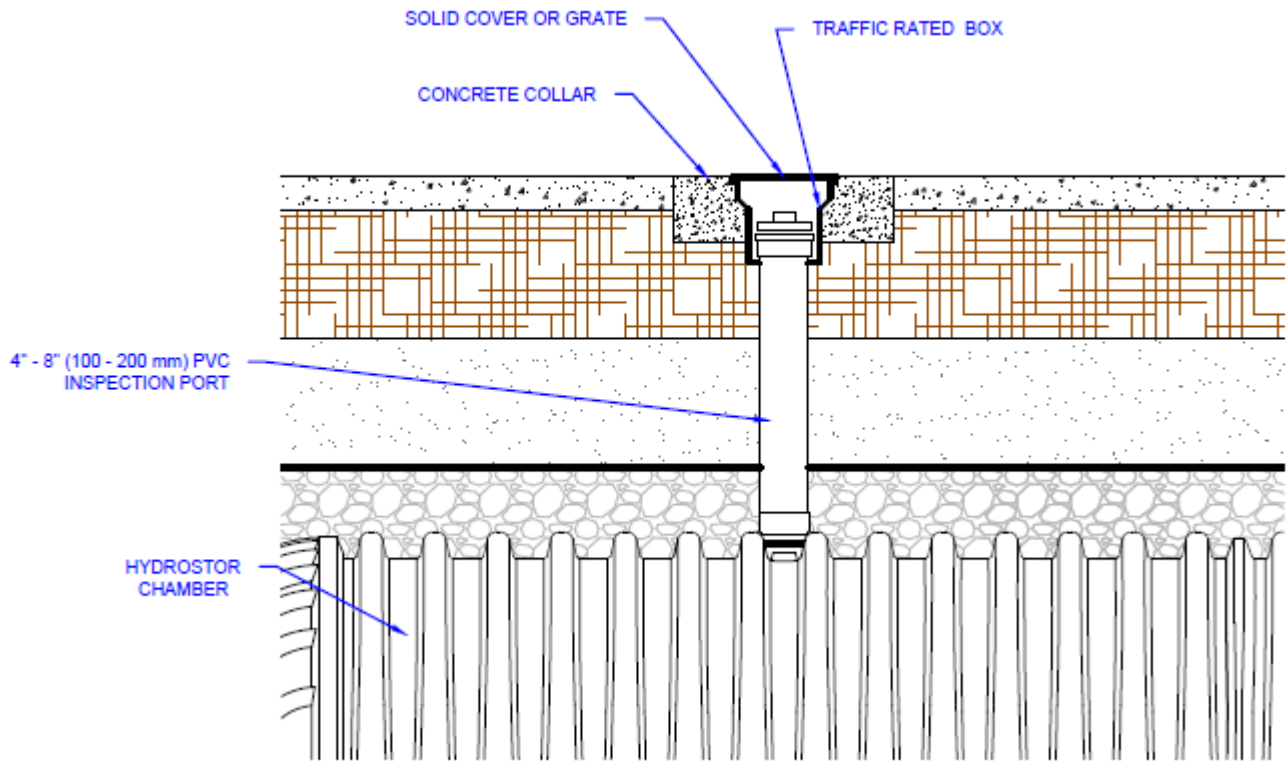


Figure 2: Inspection Ports for Chamber System

Inspection for a sediment row can either be done through an inspection port or by examining the chamber row through the upstream control structure. During inspections, elevations of sediment height should be taken from each riser, cleanout, or inspection port. These elevations should be recorded on the Inspection and Maintenance Log Sheet. During the inspection, personnel should be looking for blockages to inlet or outlet stubs or any other evidence of system malfunction.

Maintenance Frequency

Cleaning frequency will vary for each pre-treatment device based on the system design. It is at the sole discretion of the inspector to determine if or when the device will require cleaning. The following are recommendations of when the device should be cleaned:

- If the system is experiencing an unusual amount of silt and soil build up, the pre-treatment device should be investigated and/or cleaned.
- If the chamber sediment row reaches a sediment height between 1"-3" (25-76 mm), the inspector should recommend cleaning.
- If the system reaches a sediment height greater than 3" (76 mm) in the chamber sediment row, the system should be cleaned at the soonest opportunity.

System Cleaning

The most common method of cleaning is done by using a vacuum truck. For the sediment row, a high-pressure nozzle with rear facing jets is used to direct the sediment and debris to the inlet control structure where it can then be vacuumed out. Care needs to be taken to ensure damage to the geotextile fabric does not occur when removing sediment and debris.



Figure 3: Sediment Row Cleaning

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

- The system will be much easier to clean when there is little to no flow into the system and when the system does not have any standing water. For this reason, system cleaning should be scheduled around dry weather.
- Before cleaning begins, all outlet stubs should be blocked off. This includes the outlet from the diversion structure to the chamber system. 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 first.

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 the maintenance and cleaning, dispose of sediment, as directed, 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 sediments from the sediment row can be compared to the disposal of sediments from manholes or catch basins.



Table 1: Example Inspection & Maintenance Log Sheet

| Inspection & Maintenance Log Sheet | | | | | | | | | |
|--|-------------------|---------------|---------------|------------------------------|---------------------------|---|---------------|---------------|---------------|
| Type of System: HS180 Chambers with SWQU & Sediment Row | | | | | Location: Minneapolis, MN | | | | |
| Notes/Comments: Contact owner when sediment level reaches 8" (203 mm) or outlet stub is restricted. Scheduled cleaning should be done through SB's JET/VAC | | | | | | | | | |
| Ports / Cleanouts / Manholes | Point 1 | Point 2 | Point 3 | Point 4 | Point 5 | Point 6 | Point 7 | Point 8 | |
| Initial Inspection | | | | | | | | | |
| Date: 3/10/13 | Invert Depth | 84" (2134 mm) | 84" (2134 mm) | 86" (2184 mm) | 87" (2210 mm) | 88" (2235 mm) | 89" (2261 mm) | 90" (2286 mm) | 91" (2311 mm) |
| | Sediment Depth | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| | Inspector Name: | Inspector 1 | | Maintenance Performed/Notes: | | | | | |
| Inspection and Maintenance | | | | | | | | | |
| Date: 8/10/13 | Depth to Sediment | 81" (2057 mm) | 81" (2057 mm) | 81" (2057 mm) | 82" (2083 mm) | 84" (2134 mm) | 84" (2134 mm) | 85" (2159 mm) | 85" (2159 mm) |
| | Sediment Depth | 3" (76 mm) | 3" (76 mm) | 5" (127 mm) | 5" (127 mm) | 4" (102 mm) | 5" (127 mm) | 5" (127 mm) | 6" (152 mm) |
| | Inspector Name: | Inspector 2 | | Maintenance Performed/Notes: | | excess amounts of sediment, upon further inspection pre-treatment unit was full | | | |
| 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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|------------------------------------|------------------------|-------------|---------|-------------------------------------|-----------|---------|---------|---------|---------|
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| Ports / Cleanouts / Manholes | Point 1 | Point 2 | Point 3 | Point 4 | Point 5 | Point 6 | Point 7 | Point 8 | Point 8 |
| Initial Inspection | | | | | | | | | |
| Date: | Invert Depth | | | | | | | | |
| | Sediment Depth | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| | Inspector Name: | Inspector 1 | | Maintenance Performed/Notes: | | | | | |
| Inspection and Maintenance | | | | | | | | | |
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| | Inspector Name: | Inspector 1 | | Maintenance Performed/Notes: | | | | | |
| Inspection and Maintenance | | | | | | | | | |
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