

Appendix 4: Operations & Maintenance Manual



Hydroworks® HydroDome

Operations & Maintenance Manual

Version 1.0

Please call Hydroworks at 888-290-7900 or email us at support@hydroworks.com if you have any questions regarding the Inspection Checklist. Please email a copy of the completed checklist to Hydroworks at support@hydroworks.com for our records.

Introduction

The HydroDome (Figure 1) is a state-of-the-art hydrodynamic separator. HydroDome can be used for water quality and quantity flow control if desired.

Hydrodynamic separators remove solids, debris and lighter than water (oil, trash, floating debris) pollutants from stormwater. Hydrodynamic separators and other water quality measures are mandated by regulatory agencies (Town/City, State, Federal Government) to protect storm water quality from pollution generated by urban development (traffic, people) as part of new development permitting requirements.

As storm water treatment structures fill up with pollutants they become less and less effective in removing new pollution. Therefore, it is important that storm water treatment structures be maintained on a regular basis to ensure that they are operating at optimum performance. The HydroDome is no different in this regard and this manual has been assembled to provide the owner/operator with the necessary information to inspect and coordinate maintenance of their HydroDome.

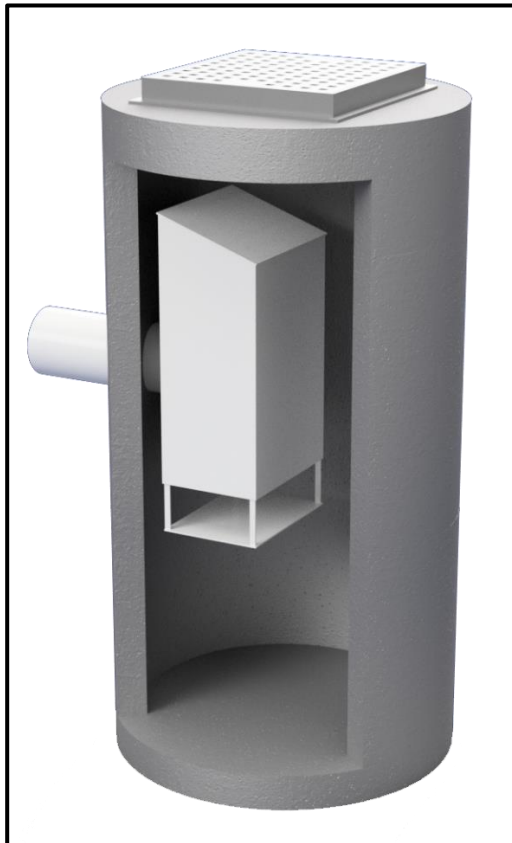


Figure 1. Hydroworks HydroDome

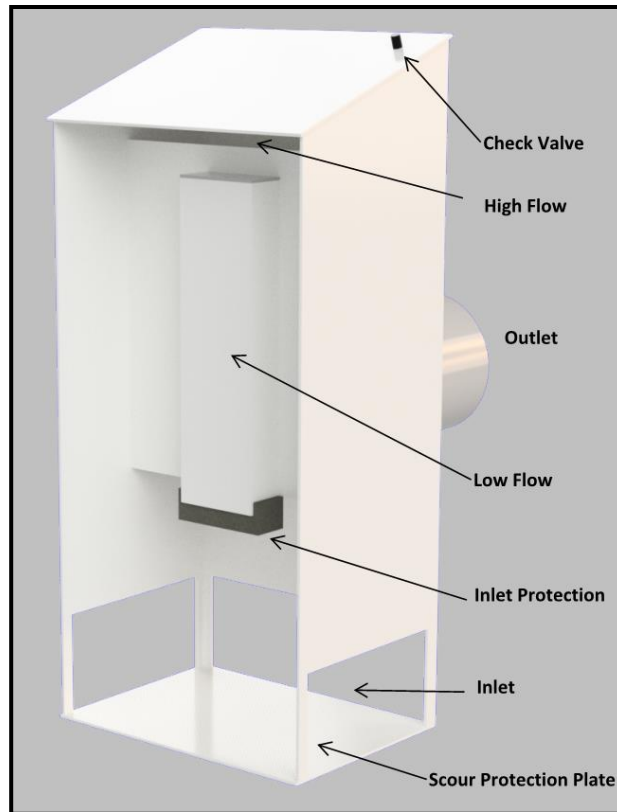


Figure 2 HydroDome Internal Components

Inspection

Procedure

Floatables

A visual inspection can be conducted for floatables by removing the cover/grate and looking down into the separator.

TSS/Sediment

Inspection for TSS build-up can be conducted using a Sludge Judge®, Core Pro®, AccuSludge® or equivalent sampling device that allows the measurement of the depth of TSS/sediment in the unit. These devices typically have a ball valve at the bottom of the tube that allows water and TSS to flow into the tube when lowering the tube into the unit. Once the unit touches the bottom of the device, it is quickly pulled upward such that the water and TSS in the tube forces the ball valve closed allowing the user to see a full core of water/TSS in the unit. Several readings (2 or 3) should be made at different locations of the structure to ensure that an accurate TSS depth measurement is recorded.

Operation

The water level during periods without rain should be near the outlet invert of the structure. If the water level remains near the top of the HydroDome this may suggest that there is an obstruction downstream of the HydroDome or that the inlet protection at the HydroDome may need to be cleaned.

Frequency

Construction Period

The HydroDome separator should be inspected every four weeks and after every large storm (over 0.5" (12.5 mm) of rain) during the construction period.

Post-Construction Period

The Hydroworks HydroDome separator should be inspected during the first year of operation for normal stabilized sites (grassed or paved areas). If the unit is subject to oil spills or runoff from unstabilized areas (storage piles, exposed soils), the HydroDome separator should be inspected more frequently (4 times per year). The initial annual inspection will indicate the required frequency of inspection and maintenance if the unit was maintained after the construction period.

Reporting

Reports should be prepared as part of each inspection and include the following information:

1. Date of inspection
2. GPS coordinates of Hydroworks unit
3. Time since last rainfall
4. Date of last inspection
5. Installation deficiencies (missing parts, incorrect installation of parts)
6. Structural deficiencies (concrete cracks, broken parts)
7. Operational deficiencies (leaks, elevated water level)
8. Presence of oil sheen or depth of oil layer
9. Estimate of depth/volume of floatables (trash, leaves) captured
10. Sediment depth measured
11. Recommendations for any repairs and/or maintenance for the unit
12. Estimation of time before maintenance is required if not required at time of inspection

A sample inspection checklist is provided at the end of this manual.



Maintenance

Procedure

The Hydroworks HydroDome unit is typically maintained using a vacuum truck. There are numerous companies that can maintain the HydroDome separator. Maintenance with a vacuum truck involves removing all of the water and sediment together. The water is then separated from the sediment on the truck or at the disposal facility.

The area around the HydroDome provides clear access to the bottom of the structure (Figure 3). This is the area where a vacuum hose would be lowered to clean the unit.

In instances where a vacuum truck is not available other maintenance methods (i.e. clamshell bucket) can be used, but they will be less effective. If a clamshell bucket is used the water must be decanted prior to cleaning since the sediment is under water and typically fine in nature.

The local municipality should be consulted for the allowable disposal options for both water and sediments prior to any maintenance operation. Once the water is decanted the sediment can be removed with the clamshell bucket.

Maintenance of a Hydroworks HydroDome unit will typically take 1 to 2 hours depending on size of unit and using a vacuum truck. Cleaning may take longer for other cleaning methods (i.e. clamshell bucket).

Inlet protection (Figure 2) is located at the inlet to the low flow opening in the HydroDome to ensure the opening does not become clogged. Although it is not anticipated that the inlet protection will have to be replaced on a regular (i.e. annual) basis since the inlet protection is protected by the submerged entrance to the HydroDome, the inlet protection should be checked each time the HydroDome is inspected or maintained. The inlet protection is removable and should be rinsed with water to ensure any debris caught on the protection is discarded. Unless damaged, the inlet protection can be reinstalled. A replacement piece can be bought through Hydroworks and/or retail stores. Hydroworks can provide information on the inlet protection and where it can be bought. A sign that the inlet protection needs cleaning/replacement would be a water level near the crown of the outlet pipe in the structure during periods with no flow.



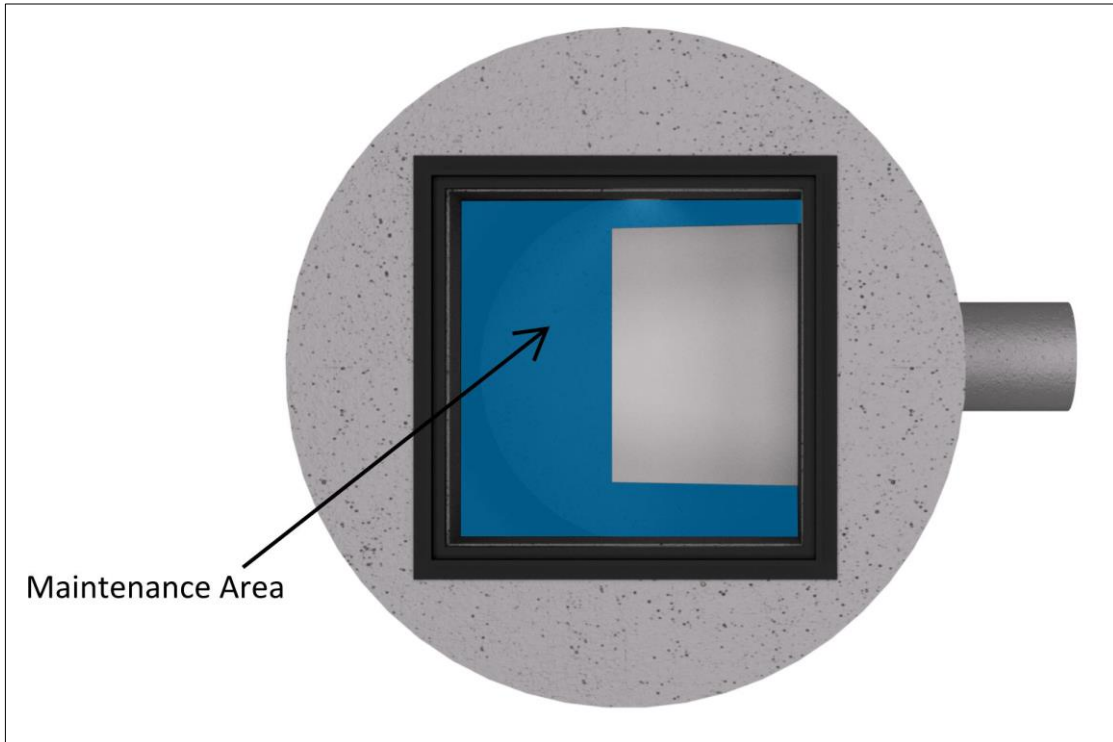


Figure 3. HydroDome Maintenance Access

Frequency

Construction Period

A HydroDome separator can fill with construction sediment quickly during the construction period. The HydroDome must be maintained during the construction period when the depth of TSS/sediment reaches 24" (600 mm). It must also be maintained during the construction period if there is an appreciable depth of oil in the unit (more than a sheen) or if floatables other than oil cover over 50% of the area of the separator

The HydroDome separator should be maintained at the end of the construction period, prior to operation for the post-construction period.

Post-Construction Period

The maintenance for sediment accumulation is required if the depth of sediment is 1 ft or greater in separators with standard water (sump) depths (Table 1).

There will be designs with increased sediment storage based on specifications or site-specific criteria. Please contact Hydroworks at 888-290-7900 to inquire whether your HydroDome was designed with extra sump depth to extend the frequency of maintenance.



The HydroDome separator must also be maintained if there is an appreciable depth of oil in the unit (more than a sheen) or if floatables other than oil cover over 75% of the water surface of the separator.

Table 1 Standard Dimensions for Hydroworks HydroDome Models

Model	Diameter ft (mm)	Maintenance Sediment Depth in (mm)
HD 3	3 (900)	12 (300)
HD 4	4 (1200)	12 (300)
HD 5	5 (1500)	12 (300)
HD 6	6 (1800)	12 (300)
HD 7	7 (2100)	12 (300)
HD 8	8 (2400)	12 (300)
HD 10	10 (3000)	12 (300)
HD 12	12 (3600)	12 (300)



HYDRODOME INSPECTION SHEET

Date
Date of Last Inspection _____

Site
City _____
State _____
Owner _____

GPS Coordinates _____

Date of last rainfall _____

Site Characteristics	Yes	No
Soil erosion evident	<input type="checkbox"/>	<input type="checkbox"/>
Exposed material storage on site	<input type="checkbox"/>	<input type="checkbox"/>
Large exposure to leaf litter (lots of trees)	<input type="checkbox"/>	<input type="checkbox"/>
High traffic (vehicle) area	<input type="checkbox"/>	<input type="checkbox"/>

HydroDome	Yes	No
Obstructions in the inlet	<input type="checkbox"/> *	<input type="checkbox"/>
Damage to HydroDome (cracked, broken, loose pieces)	<input type="checkbox"/> **	<input type="checkbox"/>
Improperly installed outlet pipe	<input type="checkbox"/> ***	<input type="checkbox"/>
Internal component damage (cracked, broken, loose pieces)	<input type="checkbox"/> **	<input type="checkbox"/>
Floating debris in the separator (oil, leaves, trash)	<input type="checkbox"/>	<input type="checkbox"/>
Large debris visible in the separator	<input type="checkbox"/> *	<input type="checkbox"/>
Concrete cracks/deficiencies	<input type="checkbox"/> ***	<input type="checkbox"/>
Exposed rebar	<input type="checkbox"/> **	<input type="checkbox"/>
Raised water level (water level close to top of HydroDome)	<input type="checkbox"/> ***	<input type="checkbox"/>
Water seepage (water level not at outlet pipe invert)	<input type="checkbox"/> ***	<input type="checkbox"/>
Water level depth below outlet pipe invert _____"		

Routine Measurements			
Floating debris depth	< 0.5" (13mm)	<input type="checkbox"/>	>0.5" 13mm) <input type="checkbox"/> *
Floating debris coverage	< 75% of surface area	<input type="checkbox"/>	> 75% surface area <input type="checkbox"/> *
Sludge depth	< 12" (300mm)	<input type="checkbox"/>	> 12" (300mm) <input type="checkbox"/> *

* Maintenance required
 ** Repairs required
 *** Further investigation is required

Note: Inspections should not be made within 24 hours of a storm to allow the water to drain from the structure to assess a raised water level or water level seepage





Hydroworks® HydroDome

One Year Limited Warranty

Hydroworks, LLC warrants, to the purchaser and subsequent owner(s) during the warranty period subject to the terms and conditions hereof, the Hydroworks HydroDome to be free from defects in material and workmanship under normal use and service, when properly installed, used, inspected and maintained in accordance with Hydroworks written instructions, for the period of the warranty. The standard warranty period is 1 year.

The warranty period begins once the separator has been manufactured and is available for delivery. Any components determined to be defective, either by failure or by inspection, in material and workmanship will be repaired, replaced or remanufactured at Hydroworks' option provided, however, that by doing so Hydroworks, LLC will not be obligated to replace an entire insert or concrete section, or the complete unit. This warranty does not cover shipping charges, damages, labor, any costs incurred to obtain access to the unit, any costs to repair/replace any surface treatment/cover after repair/replacement, or other charges that may occur due to product failure, repair or replacement.

This warranty does not apply to any material that has been disassembled or modified without prior approval of Hydroworks, LLC, that has been subjected to misuse, misapplication, neglect, alteration, accident or act of God, or that has not been installed, inspected, operated or maintained in accordance with Hydroworks, LLC instructions and is in lieu of all other warranties expressed or implied. Hydroworks, LLC does not authorize any representative or other person to expand or otherwise modify this limited warranty.

The owner shall provide Hydroworks, LLC with written notice of any alleged defect in material or workmanship including a detailed description of the alleged defect upon discovery of the defect. Hydroworks, LLC should be contacted at 136 Central Ave., Clark, NJ 07066 or any other address as supplied by Hydroworks, LLC. (888-290-7900).

This limited warranty is exclusive. There are no other warranties, express or implied, or merchantability or fitness for a particular purpose and none shall be created whether under the uniform commercial code, custom or usage in the industry or the course of dealings between the parties. Hydroworks, LLC will replace any goods that are defective under this warranty as the sole and exclusive remedy for breach of this warranty.

Subject to the foregoing, all conditions, warranties, terms, undertakings or liabilities (including liability as to negligence), expressed or implied, and howsoever arising, as to the condition, suitability, fitness, safety, or title to the Hydroworks HydroDome are hereby negated and excluded and Hydroworks, LLC gives and makes no such representation, warranty or undertaking except as expressly set forth herein. Under no circumstances shall Hydroworks, LLC be liable to the Purchaser or to any third party for product liability claims; claims arising from the design, shipment, or installation of the HydroDome, or the cost of other goods or services related to the purchase and installation of the HydroDome. For this Limited Warranty to apply, the HydroDome must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and Hydroworks' written installation instructions.

Hydroworks, LLC expressly disclaims liability for special, consequential or incidental damages (even if it has been advised of the possibility of the same) or breach of expressed or implied warranty. Hydroworks, LLC shall not be liable for penalties or liquidated damages, including loss of production and profits; labor and materials; overhead costs; or other loss or expense incurred by the purchaser or any third party. Specifically excluded from limited warranty coverage are damages to the HydroDome arising from ordinary wear and tear; alteration, accident, misuse, abuse or neglect; improper maintenance, failure of the product due to improper installation of the concrete sections or improper sizing; or any other event not caused by Hydroworks, LLC. This limited warranty represents Hydroworks' sole liability to the purchaser for claims related to the HydroDome, whether the claim is based upon contract, tort, or other legal basis.