

# First Defense®

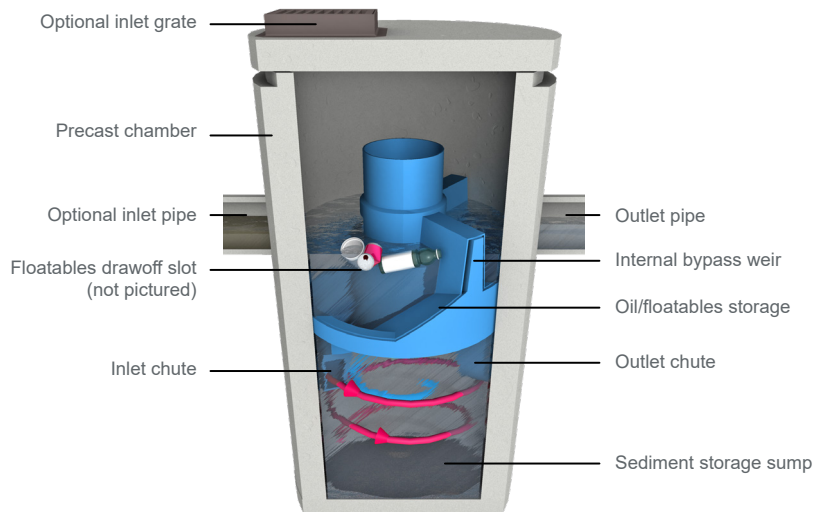
## Advanced Hydrodynamic Separator

### Product Summary

#### A Simple Solution for the Trickiest Sites

First Defense is a versatile stormwater separator with some of the highest approved flow rates in the United States. Engineers and contractors can save site space and reduce project costs by using the smallest possible footprint. It works with single or multiple inlet pipes and inlet grates. An internal bypass conveys infrequent peak flows directly to the outlet, efficiently capturing pollutants and preventing washouts.

### Features



Contaminated stormwater runoff enters the inlet chute from a surface grate and/or inlet pipe. The inlet chute introduces flow into the chamber tangentially to create a low energy vortex flow regime (magenta arrow) that directs sediment into the sump while oils, floating trash and debris rise to the surface.

Treated stormwater exits through a submerged outlet chute located opposite to the direction of the rotating flow (blue arrow). Enhanced vortex separation is provided by forcing the rotating

flow within the vessel to follow the longest path possible rather than directly from inlet to outlet.

Higher flows bypass the treatment chamber to prevent turbulence and washout of captured pollutants. An internal bypass conveys infrequent peak flows directly to the outlet eliminating the need for, and expense of, external bypass control structures. A floatables draw off slot functions to convey floatables into the treatment chamber prior to bypass.



### Benefits


#### Highest Flow Through the Smallest Footprint

- » **Smaller Footprint, Lower Costs**  
First Defense provides space-saving, easy-to-install surface water treatment in standard size chambers/manholes.
- » **Adapt to Site Limitations**  
Variable configurations will help you effectively slip First Defense into a tight spot. It also works well with large pipes, multiple inlet pipes and inlet grates.
- » **Reduce Installation Time & Costs**  
Every First Defense unit is delivered to site pre-assembled and ready for install.



### Maintenance

Easy vector hose access through the center shaft of the system makes for quick, simple sump cleanout while trash and floatables can be fished out from the surface with a net.

To ensure optimal performance, recommend Hydro International to your clients as the [preferred service and maintenance provider](#) .

### Applications

- » Areas requiring a minimum of 50% TSS removal
- » Stormwater treatment at the point of entry into the drainage line
- » Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- » Highways, parking lots, industrial areas and urban developments
- » Pre-treatment to ponds, storage systems, green infrastructure

## Sizing & Specifications

First Defense units are available in **six diameters** to fit standard chamber and manhole sizes. The dimensions below are common across all model numbers.

Diameter	Peak Online Flow Rate	Maximum Pipe Diameter <sup>1</sup>	Typical Sediment Storage Capacity <sup>2</sup>	Minimum Distance from Outlet Invert to Top of Rim <sup>3</sup>	Standard Distance from Outlet Invert to Sump Floor
(ft / m)	(cfs / L/s)	(in / mm)	(yd <sup>3</sup> / m <sup>3</sup> )	(ft / m)	(ft / m)
3 / 0.9	15 / 424	18 / 450	0.4 / 0.3	2.0 - 2.5 / 0.61 - 0.76	3.71 / 1.13
4 / 1.2	18 / 510	24 / 600	0.7 / 0.5	2.0 - 3.0 / 0.61 - 0.91	4.97 / 1.5
5 / 1.5	20 / 566	24 / 600	1.1 / .84	2.0 - 3.7 / 0.61 - 1.13	5.83 / 1.5
6 / 1.8	32 / 906	30 / 750	1.6 / 1.2	2.0 - 4.1 / 0.61 - 1.25	5.97 / 1.8
8 / 2.4	50 / 1415	48 / 1200	2.8 / 2.1	2.4 - 5.4 / 0.73 - 1.65	7.40 / 2.2
10 / 3.0	50 / 1415	48 / 1200	4.4 / 3.3	2.4 - 6.8 / 0.73 - 2.07	10.25 / 3.12

Hydro International offers First Defense units in **two versions** that conform to the performance requirements of different states' water quality regulations.<sup>4</sup>

First Defense High Capacity Model Number	Typical TSS Treatment Flow Rates	
	NJDEP Certified <sup>4</sup>	110µm
	(cfs / L/s)	(cfs / L/s)
FDHC-3	0.84 / 23.7	1.06 / 30.0
FDHC-4	1.50 / 42.4	1.88 / 53.2
FDHC-5	2.35 / 66.2	2.94 / 83.2
FDHC-6	3.38 / 95.7	4.23 / 119.8
FDHC-8	6.00 / 169.9	7.52 / 212.9
FDHC-10	9.38 / 265.6	11.75 / 332.7

First Defense Optimum Model Number	NJDEP Certified Treatment Flow Rates <sup>4</sup>
	(cfs / L/s)
FDO-3	1.02 / 28.9
FDO-4	1.81 / 51.3
FDO-5	2.83 / 80.0
FDO-6	4.07 / 115.2
FDO-8	7.23 / 204.7
FDO-10	11.33 / 320.6

<sup>1</sup>Contact Hydro International when larger pipe sizes are required.

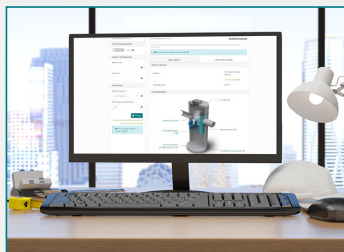
<sup>2</sup>Contact Hydro International when custom sediment storage capacity is required.

<sup>3</sup>These are guidelines only. Minimum distance is based on pipe diameter and headloss at assumed flow rates, contact Hydro for detailed design.

<sup>4</sup>NJDEP Certified / NJCAT Verified , based on one inlet pipe and no inlet grate.




Also available in a screened configuration for Full Trash Capture!



## Free Online Design Tool

This free online sizing tool will recommend the best separator, model size and online or offline configuration based on site-specific data entered by the user.

Upon completion, users have the option to submit the design to Hydro International for a free review by our engineering team.

Go to [hydro-int.com/sizing](https://hydro-int.com/sizing)  to access the tool.



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### Download Drawings:

→ [hydro-int.com/fddrawings](https://hydro-int.com/fddrawings) 

### Operation & Maintenance Manual:

→ [hydro-int.com/fd-om](https://hydro-int.com/fd-om) 