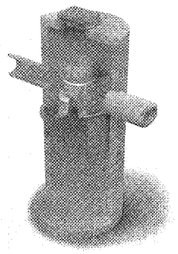

Operation and Maintenance Manual

First Defense® and First Defense®-HC

Vortex Separator for Stormwater Treatment

Hydro International

Stormwater Solutions
Turning Water Around ...®

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1. First Defense® by Hydro International

Introduction

The First Defense® stormwater treatment system is a hydrodynamic separator and settling device. The system is designed to remove total suspended solids (TSS), floatables and hydrocarbons from stormwater runoff. The First Defense® system is typically installed underground, but can be installed above ground. The system is designed to treat flow rates ranging from small water quality flows to the peak flow rate of a 10-year storm event.

Theory

The First Defense® system is an enhanced settling device. Unlike conventional settling devices, the First Defense® system induces a vortex flow pattern to the water entering the device. The vortex flow pattern increases the efficiency of the settling process by creating a longer flow path for the water to travel. The longer flow path allows more time for the sediment particles to settle out of the flow. The vortex flow pattern also keeps the captured sediment particles away from the outlet pipe, preventing scour of the captured sediment particles during high flow rates.

Typical Applications

The First Defense® system is typically installed in urban drainage systems. The system is designed to remove total suspended solids (TSS), floatables and hydrocarbons from stormwater runoff. The First Defense® system is typically installed underground, but can be installed above ground. The system is designed to treat flow rates ranging from small water quality flows to the peak flow rate of a 10-year storm event.

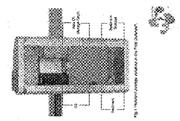


Fig 1: Typical configuration of a First Defense® system

2. Model Sizes & Configurations

The First Defense® system is available in a variety of model sizes and configurations. The configuration of the First Defense® system is dependent on the site design requirements, such as pipe sizes, flow rates, and the amount of space available for the system.

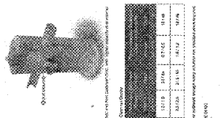


Fig 2: First Defense® Model Sizes & Configurations

Model	Diameter (ft)	Sediment Storage Capacity (cy)	Treatment Flow Rate (cfs)	Peak Flow Rate (cfs)
FD-3	3	0.5	0.5	1.5
FD-4	4	1.0	1.0	3.0
FD-5	5	1.5	1.5	4.5
FD-6	6	2.0	2.0	6.0
FD-8	8	3.5	3.5	10.5
FD-10	10	5.5	5.5	16.5
FD-12	12	8.0	8.0	24.0

3. Maintenance

Inspection

Inspection of First Defense® systems is recommended annually and after every major storm event. Inspection is the only way to determine the actual accumulation of sediment and floatables in the system and to determine if maintenance is required. Inspection should be performed when there is no flow entering the system.

Maintenance Frequency

Maintenance frequency is dependent on the pollutant loading characteristics of the site. Maintenance is usually required less frequently than other stormwater treatment practices. Maintenance frequency should be established based on inspection results.

Maintenance Procedures

First Defense® systems are typically maintained using vacuum equipment. The vacuum truck operator removes the floatables and sediment from the First Defense® system. Maintenance is performed from grade through the manhole access cover.

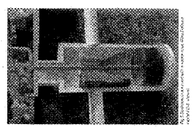
Sediment Removal

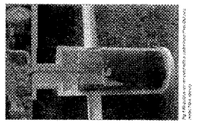
The sediment removal procedure is as follows:

1. Remove the manhole access cover.
2. Measure the depth of sediment and floatables in the system.
3. Remove the floatables and sediment from the First Defense® system using vacuum equipment.
4. Replace the manhole access cover.

Disposal of Sediment and Liquid

The disposal of sediment and liquid removed from the First Defense® system is the responsibility of the owner. Check with your local regulations for proper disposal requirements.



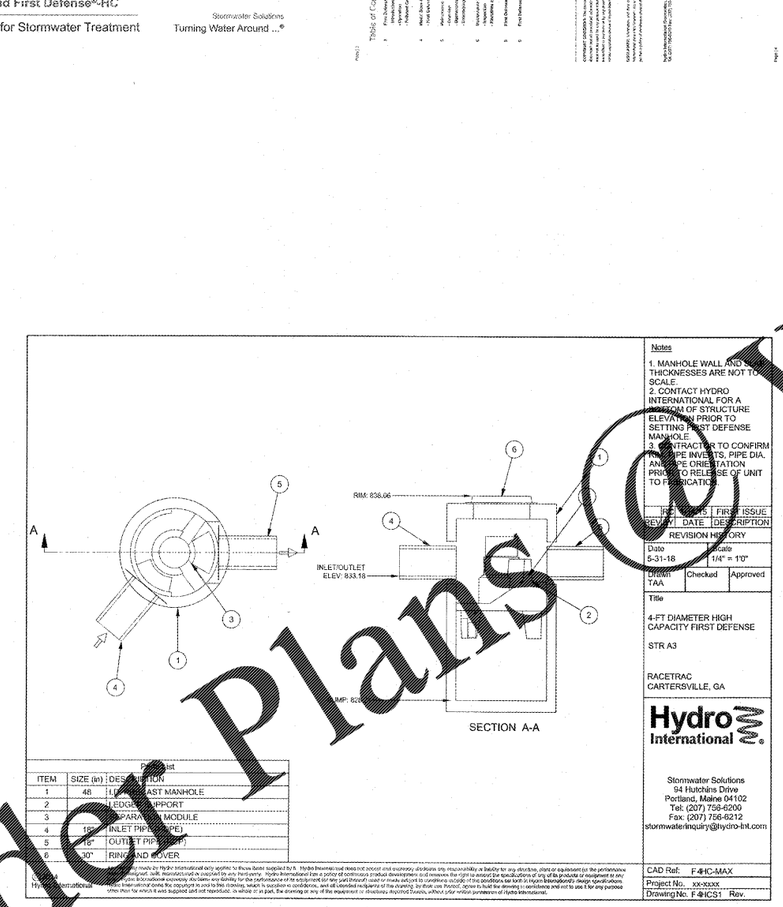


Maintenance Log

Date	Activity Performed	Comments

Inspection & Maintenance Log

Date	Inspector	Sediment Depth (in)	Floatables Present	Sediment Removed	Comments



Parts List

ITEM	SIZE (in)	DESCRIPTION
1	48	I.D. PRECAST MANHOLE
2		LEDGER SUPPORT
3		SEPARATION MODULE
4	18"	INLET PIPE (RCP)
5	18"	OUTLET PIPE (RCP)
6	30"	RING AND COVER

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Notes

1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE.
2. CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING FIRST DEFENSE MANHOLE.
3. CONTRACTOR TO CONFIRM RIM, PIPE INVERTS, PIPE DIA, AND PIPE ORIENTATION PRIOR TO RELEASE OF UNIT TO FABRICATION.

REV	BY	DATE	DESCRIPTION
	RC	1/15/15	FIRST ISSUE

REVISION HISTORY

Date	Scale
5-31-18	1/4" = 1'0"
Drawn: TAA	Checked	Approved

Title

4-FT DIAMETER HIGH CAPACITY FIRST DEFENSE

STR A3

RACETRAC
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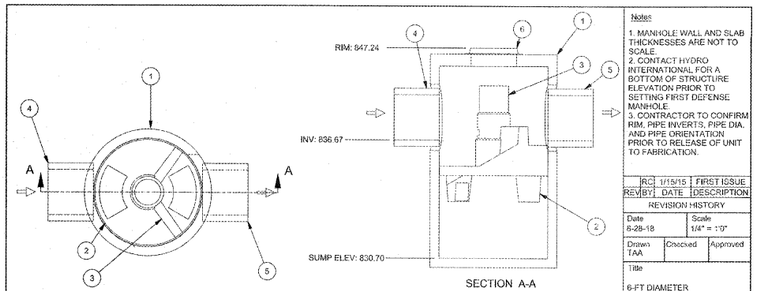
CAD Ref: F4HC-MAX

Project No.: xx-xxxx

Drawing No.: F4HCS1 Rev.



Parts List

ITEM	SIZE (in)	DESCRIPTION
1	72	I.D. PRECAST MANHOLE
2		LEDGER SUPPORT
3		SEPARATION MODULE
4	18"	INLET PIPE (RCP)
5	18"	OUTLET PIPE (RCP)
6	30"	RING/COVER BY HYDRO-INTERNATIONAL

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REV	BY	DATE	DESCRIPTION
	RC	1/15/15	FIRST ISSUE

REVISION HISTORY

Date	Scale
6-28-18	1/4" = 1'0"
Drawn: TAA	Checked	Approved

Title

6-FT DIAMETER
FIRST DEFENSE HC

STR O3

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CAD Ref: F6HC-MAX

Project No.: xx-xxxx

Drawing No.: F6HCS1 Rev.

NO.	REVISIONS	BY	DATE
3	CITY COMMENTS	TAA	9/05/18
2	CITY COMMENTS	TAA	8/08/16
1	CITY COMMENTS	TAA	5/31/18

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LeCraw Engineering

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CARTERSVILLE, BARTOW COUNTY, GEORGIA
LAND LOT 286 - 4TH DISTRICT - 3RD SECTION - PARCEL C066C 058A 005

SCALE	1" = 30'	DATE	03/26/2018
DRAWN	MAT	JOB NO.	005031

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Drawing name: \\192.168.111.11\lecraw engineering\005031 - RaceTrac - Cartersville (E Main Street)_GA\CADD\CONSTR\005031 - 09 - DETAILS.dwg CONSTRUCTION DETAILS - 6 Sep 05, 2018 7:57am by tradd anderson