Rhode Island Department of Environmental Management

Office of Water Resources – Stormwater Technology Review Committee

235 Promenade St. Providence, RI 02908 Ph: 401-222-4700

Alternative Stormwater Technology Certification

Vendor Contact:
Mr. Chris French
National Regulatory Manager
Hydro International
94 Hutchins Drive – Portland, ME 04102
cfrench@hydro-int.com
https://www.hydro-int.com/en
Ph: 804-466-2099

Technology Name:
First Defense® Optimum Vortex Separator

Approval Type:
Pretreatment/Retrofits

Certification Dates:
Issued: July 24, 2023
Expires: July 24, 2028

CERTIFICATION:

The Rhode Island Stormwater Technology Review Committee which consists of members from the Department of Environmental Management (DEM), Department of Transportation (DOT) and the Coastal Resources Management Council (CRMC) have reviewed the **First Defense® Optimum Vortex Separator** (**First Defense® Optimum**) application for certification of its Technology Approval and accepted use for Stormwater Treatment in the State of Rhode Island.

In accordance with Stormwater Rule 250-RICR-150-10-8.9B, **Hydro International** has petitioned the permitting agencies to certify the **First Defense® Optimum** as an acceptable structural stormwater control described in Stormwater Rule 250-RICR-150-10-8.31. They have submitted monitoring results and supporting information developed in accordance with the provisions of the Technology Assessment Protocol (TAP) for Innovative and Emerging Technologies as described in in Stormwater Rule 250-RICR-150-10 Sections 8.39 and 8.40.

The **First Defense® Optimum** is granted reciprocity in Rhode Island as a proprietary stormwater treatment technology, given that it has been issued an MTD (manufactured treatment device) Lab Certification from the New Jersey Department of Environmental Protection (NJDEP) effective July 19, 2021 as a result of the *NJCAT Technology Verification – **First Defense® Optimum** Vortex Separator – Hydro International* study, performed in-house by **Hydro International** at their full-scale hydraulic testing facility in Portland, Maine with third party oversight provided by FB Environmental Associates. The study was conducted in accordance with the NJDEP "Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" from 2013. This NJDEP MTD Lab Certification recognizes the **First Defense® Optimum** as a stormwater treatment technology which provides 50% removal of total suspended solids (TSS) when operating at or below the maximum treatment flow rate for each device specified in the attached *Table 1: RIDEM Approved **First Defense® Optimum** Sizing Table for 50% TSS Removal.* The State of New Jersey is a member of the Technology Acceptance Reciprocity Partnership (TARP). As per Stormwater Rule 250-RICR-150-10-8.39, both TAPE and TARP approved devices are allowed reciprocity consideration in Rhode Island.

The **First Defense® Optimum** is a pre-treatment or retrofit device that captures TSS from stormwater runoff as described in Stormwater Rule 250-RICR-150-10-8.31. It is a vertically oriented cylindrical structure manufactured from pre-cast reinforced concrete and cross-linked polyethylene plastic, designed to remove trash and sediment from stormwater. This product was developed by **Hydro International**. The **First Defense® Optimum** is approved for online and off-line use.

The manufacturer has demonstrated that this product meets the minimum water quality standards for pretreatment as described in Stormwater Rule 250-RICR-150-10-8.31. The **First Defense® Optimum** is approved for **50%** removal of total suspended solids (TSS) when designed to operate at or below the flow rates specified in the attached *Table 1: RIDEM Approved **First Defense®** **Optimum** Sizing Table for 50% TSS Removal*. The **First Defense® Optimum** is NOT recognized for removal of Pathogens, Total Phosphorus or Nitrogen. This device may be used as an approved pretreatment or retrofit device provided that the design, installation, and maintenance are conducted in accordance with the following terms and conditions:

I. GENERAL CERTIFICATION REQUIREMENTS

1. The system must be designed and installed to adhere to the manufacturer's specifications titled "First Defense® Optimum Specification".

2. The **First Defense® Optimum** is **certified as a pretreatment** device in accordance with Stormwater Rule 250-RICR-150-10-8.31, provided the device treats the flow of the first inch of runoff from the capture area, unless waived by the state permitting agency. The system's design must utilize flow rates, impervious catchment sizes, hydrocarbon storage capacities and maximum sediment capacities listed in the attached *Table 1: RIDEM Approved **First Defense® Optimum** Sizing Table for 50% TSS Removal* and *Table 2: Standard Sediment Storage Capacity of **First Defense® Optimum** Devices.*

3. All applications which propose a unit that is designed to capture greater than one acre of impervious cover must be reviewed and approved by the manufacturer.

4. This device is **certified as a retrofit device** in accordance with Stormwater Rule 250-RICR-150-10-8.6A. Retrofits are allowed flexibility with regards to the eleven minimum standards described in Sections 8.6 through 8.17 of Stormwater Rule 250-RICR-150-10, but in general they are considered effective if they capture at least 50% of the catchment and meet the target water quality treatment of at least the first 0.5 inches of the water quality volume.

5. The approved devices shall be located such that they are accessible for maintenance and/or emergency removal of oil or chemical spills.

6. The device cannot be used in series with another Hydrodynamic separator to achieve enhanced removal rates for TSS.

II. MAINTENANCE REQUIREMENTS

1. Standard permitting conditions for inclusion of this technology will, at a minimum include the following:

    a. Each individual owner must ensure that any and all of their proprietary stormwater treatment devices are maintained in accordance with the manufacturer's specifications, which are provided in the **First Defense® Optimum Vortex Separator** Operation and Maintenance Manual: https://hydro-int.com/sites/default/files/first_defense_operation_and_maintenance_5-17-21.pdf

    b. Each individual owner must ensure that any and all of their proprietary stormwater pre-treatment devices are maintained in accordance with the requirements stated in Stormwater Rule 250-RICR-150-10-8.31-C, which requires the sump to be inspected a minimum of 2 times per year. Additionally, the device must be cleaned out using a vacuum truck when either the device's pollutant removal capacity is reduced by 50% or more, or when 50% or more of the device's pollutant storage capacity is filled or displaced.

    c. All material removed from the unit must be properly disposed of and is the responsibility of the owner.

    d. The applicant must include a copy of the **First Defense® Optimum** Operation and Maintenance Manual in their project specific long term operation and maintenance plan.

2. The applicant must provide evidence of a maintenance contract which extends for a minimum of two years. The contracted maintenance provider must receive training by **Hydro International** on how to properly maintain **First Defense® Optimum** devices. This requirement excludes maintenance providers recognized by the RIDEM to be qualified in maintenance of **First Defense® Optimum** devices.

III. REPORTING REQUIREMENTS

1. Upon request from the owner of any **First Defense® Optimum** system installed in the State of Rhode Island, the vendor shall provide the owner with a recommended maintenance schedule after the first year of the device's operation. If a recommended maintenance schedule is requested by the owner after the first year of the device's operation, then the owner is responsible for notifying the vendor of any additional pollutant loading sites where contributing drainage areas may be subject to further development (i.e., strip malls).

2. The Vendor shall provide a listing to the RIDEM Office of Water Resources of all systems installed within the State of Rhode Island on an annual basis.

3. The Vendor shall provide an annual listing to the RIDEM Office of Water Resources of all Rhode Island maintenance providers that they trained in **First Defense® Optimum** maintenance.

4. The Vendor shall immediately notify the RIDEM Office of Water Resources if/when any changes are made to the model name/number of any **First Defense® Optimum** device for all models approved in this certification.

5. The Vendor shall immediately notify the RIDEM Office of Water Resources if and when any revisions are made to the design, installation operation and maintenance manuals for all models applicable to this certification. Revisions deemed by the RIDEM to be substantial, may require re-application to the Alternative Stormwater Technology Program.

6. The Vendor shall notify the RIDEM at least thirty (30) days following any proposed transfer of ownership of the Component technology. Notification shall include the name and address of the new owner and a written agreement between the existing and new owner specifying a date for transfer of ownership, responsibility, and liability for the Component. All provisions of this Certification shall be applicable to any new owners.

IV. RIGHTS OF THE RIDEM AND CRMC

1. The RIDEM may suspend, modify, or revoke this approval for cause, including but not limited to non-compliance with any of the conditions or provisions of this approval, mis-representation, or failure to fully disclose all relevant data, or receipt of new information indicating that the use of the **First Defense® Optimum** system is contrary to the public interest, public health, or the environment.

2. This approval does not represent an endorsement of the **First Defense® Optimum** system by the RIDEM, RIDOT or CRMC. This letter of approval may be reproduced only in its entirety.

3. The **First Defense® Optimum** General Specification and **First Defense® Optimum** Inspection and Maintenance Guide referenced herein are approved upon the date of approval of this Certification.

4. The RIDEM reserves the right to suspend or revoke this Certification if updated design, installation, and O&M manuals are not provided to the RIDEM within thirty (30) days of RIDEM request or one hundred and eighty (180) days prior to the expiration date of this Certification. All revisions must be reviewed and approved by the RIDEM prior to re-certification.

Eric Beck

Digitally signed by Eric Beck
Date: 2023.07.25 11:42:58 -04'00'

Eric A. Beck, P.E. Date
Administrator of Groundwater and Wetlands Protection
RIDEM

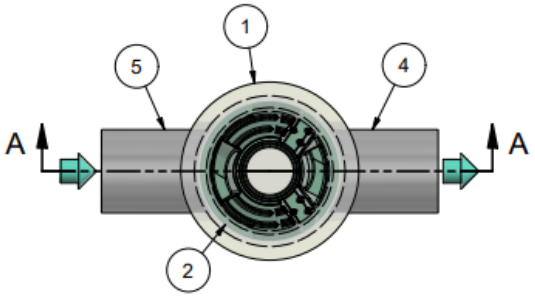
ATTACHMENTS:

Table 1: RIDEM Approved First Defense® Optimum Sizing Table for 50% TSS Removal

Model #	Maximum Treatment Flow Rate (cfs)	Approximate Impervious Treatment Area (acres)
FDO-3	1.02	0.928
FDO-4	1.81	1.649
FDO-5	2.83	2.581
FDO-6	4.07	3.715
FDO-7	5.53	5.052
FDO-8	7.23	6.605
FDO-10	11.33	10.347

Table 2: Standard Sediment Storage Capacity of First Defense® Optimum Devices

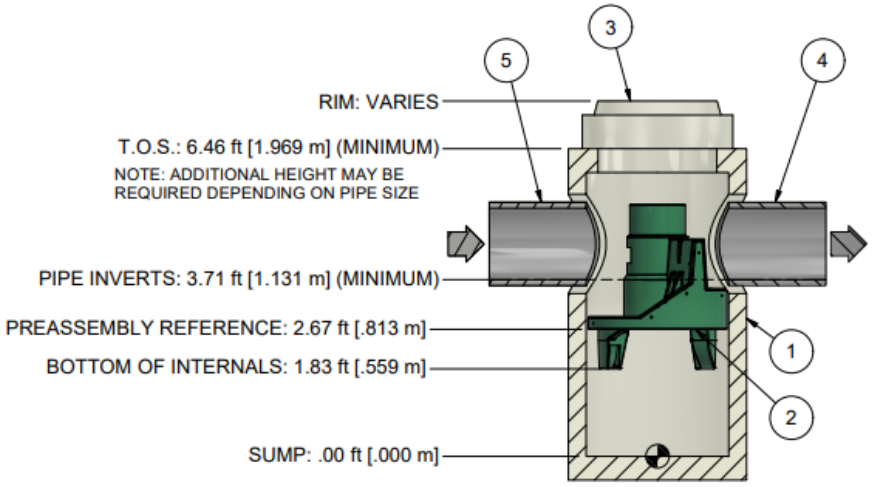
Model #	Structure Inside Diameter (ft)	50% of Max Sediment Storage Volume (ft^3)
FDO-3	3	5.3
FDO-4	4	9.4
FDO-5	5	14.7
FDO-6	6	21.2
FDO-7	7	28.9
FDO-8	8	37.7
FDO-10	10	58.9



PLAN VIEW

HYDRO FRAME AND COVER (INCLUDED)

GRADE RINGS BY OTHERS AS REQUIRED



SECTION A-A

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.

PRODUCT SPECIFICATION:

1. Peak Hydraulic Flow: 15.0 cfs (424 l/s)
2. Min Sediment Storage Capacity: 0.4 cu. yd. (0.3 cu. m.)
3. Maximum Inlet/Outlet Pipe Diameters: 18 in. (450 mm)
4. The treatment system shall use an induced vortex to separate pollutants from stormwater runoff.
5. For more product information including regulatory acceptances, please visit https://hydro-int.com/en/products/first-defense

GENERAL NOTES:

1. General Arrangement drawings only. Contact Hydro International for site specific drawings.
2. The diameter of the inlet and outlet pipes may be no more than 18".
3. Multiple inlet pipes possible (refer to project plan).
4. Inlet/outlet pipe angle can vary to align with drainage network (refer to project plans).
5. Peak flow rate and minimum height limited by available cover and pipe diameter.
6. Larger sediment storage capacity may be provided with a deeper sump depth.

PARTS LIST

ITEM	QTY	SIZE (in)	SIZE (mm)	DESCRIPTION
1	1	36	900	I.D. PRECAST MANHOLE
2	1			INTERNAL COMPONENTS (PRE-INSTALLED)
3	1	30	750	FRAME AND COVER (ROUND)
4	1	18 (MAX)	450 (MAX)	OUTLET PIPE (BY OTHERS)
5	1	18 (MAX)	450 (MAX)	INLET PIPE (BY OTHERS)

PROJECTION

IF IN DOUBT ASK

DATE:	SCALE:
11/2/2021	1:30

DRAWN BY:	CHECKED BY:	APPROVED BY
ER	MRJ	

Title
3-ft DIAMETER
FIRST DEFENSE

GENERAL ARRANGEMENT

Hydro International

hydro-int.com

HYDRO INTERNATIONAL

WEIGHT:	MATERIAL:

STOCK NUMBER:

DRAWING NO.: FD GA-3

SHEET SIZE:	SHEET:	Rev:
B	1 OF 1	-